science

Research-based evidence

Household Consumption and Expenditure Surveys

A tool for bringing more evidence and accountability to food and nutrition programs and policymaking

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Key messages

- Food consumption and nutrient intake data are essential for identifying and assessing diets, monitoring diet quality, designing nutrition programs and informing food and nutrition policies.
- Household consumption and expenditure surveys (HCES) are increasingly being turned to as a source of food consumption data.
- A typical HCES collects data on household composition, socioeconomic behaviors and food acquisition and consumption data from a sample of households that is representative at the region, state or district level and comprises about 75,000 individuals.
- HCES have proven to be of particular importance in designing and monitoring fortification programs.
- HCES has become a standard tool in the continuing fight against global food insecurity and malnutrition.

BOX 1: Introductions to HCES and key issues in their use in food and nutrition analyses

Topical Area	References
1. An HCES primer	1
2. A guide to using HCES to measure food security	2
3. A guide and criteria for selecting among HCES, Food Balance Sheets, 24-Hour Recall and Food Frequency methods for obtaining data to design and monitor fortification programs	3
4. Descriptions of how to use HCES together with food composition table data to develop estimates of nutrient availability	4, 5
5. A comparative analysis of the costs of HCES and 24-Hour Recall	6
6. General reviews of HCES that also lay out a global strategy for strengthening HCES for undertaking food and nutrition analyses	7, 8
7. An assessment of the relevance and reliability of HCES based on a review of 100 countries' questionnaires	9
8. A case study of how to use HCES to conduct an *ex ante* assessment of biofortification	10
9. A case study of how to use HCES to monitor population diet quality and nutrition status	11

Introduction

Food consumption and nutrient intake data are essential for identifying and assessing diets, monitoring diet quality, designing nutrition programs and informing food and nutrition policies. Household consumption and expenditure surveys (HCES) are increasingly being turned to as a source of food consumption data. HCES are a collection of multi-purpose surveys that collect a variety of data, including information about food consumption and acquisition. HCES include: **1)** household budget surveys; **2)** living standards measurement study; **3)** household income and expenditure surveys and **4)** integrated household surveys. The more than 125 countries that routinely conduct HCES have undertaken an average of seven surveys, with rounds, performed at 3–5 year intervals, consisting of interview data from a sample of about 15,000 households. **Box 1** lists papers providing general introductions to HCES and guides to using them in food and nutrition analysis. Although HCES have been done in most countries for more than three decades, food and nutrition analysts have only recently become familiar with them because they have traditionally not been widely accessible. The surveys are designed, financed and conducted by central bank or ministry of finance macroeconomists to collect the data they require to construct consumer price indices and estimate labor force participation rates, gross domestic product and other economic indicators, and they generally have not shared them with others. Now, however, sparked by the need to track the Millennium Development Goals and their successors the Sustainable Development Goals, HCES have come to be an increasingly common source of data with which to devise evidence-based policies and to address growing demands for increased accountability.[12] With HCES expected to play a prominent role in monitoring the Sustainable Development Goals,[13] they are poised to become an increasingly familiar go-to source for population-based food and nutrition information, much as the Demographic & Health Surveys (DHS) have become for health and nutrition data.

> "HCES have come to be an increasingly common source of data with which to devise evidence-based policies and to address growing demands for increased accountability"

The empirical basis of most nutrition work has long been constrained, because most nutritionists have chosen to rely exclusively on 24-hour recall or observed-weighed food record survey data, both of which are in exceedingly short supply. Nutritionists have regarded these data as indispensable because of their relatively greater precision and reliability. The high costs and administrative demands of these surveys, however, have proven to be insuperable obstacles: the few that have been funded have generally been small-scale and not nationally representative. The result has been to hobble the planning and effectiveness of nutrition programs. As the food and nutrition community is becoming increasingly familiar with HCES, this information gap is being addressed by means of these alternative data sources. At the same time, these data have spawned the use of these surveys in ways not considered when the surveys were originally designed. **Box 2** lists some of the newer food security and nutrition applications of HCES.

While there remain issues and concerns about the quality of HCES, a number of factors have contributed to their growing use in an increasing variety of applications, including:

- growing global and country-specific efforts to improve their quality;[7,8,9,12,13,44,45]

BOX 2: Food insecurity and nutrition-related applications of HCES data

Application	References
1. Conducting subnational food security analysis	14, 15, 16, 17
2. Assessing diet quality and dietary change	3, 16, 18, 19, 20, 21, 22, 23
3. Assessing the diversity of food supplies	11, 24
4. Analyzing the nutrient availability of the domestically produced food supply	11, 24
5. Assessing dietary diversity	11, 23, 24
6. Analyzing the relationship between household food expenditure and malnutrition	25
7. Estimating sodium intakes	26
8. Identifying and monitoring the prevalence of overweight and obesity	27, 28
9. Assessing the consumption of snacks and soft drinks by babies	29
10. Estimating nutrient intakes and the prevalence of inadequate nutrient intakes	4, 5, 30, 31
11. Identifying the most common food sources of specific nutrients	5, 11, 24
12. Designing and modeling the impact of fortification programs	3, 4, 16, 22, 30, 31, 32, 33, 34
13. Designing and modeling the impact of biofortification programs	35, 36, 37, 38, 39
14. Conducting feasibility and cost-benefit analyses of fortification, biofortification and supplementation program portfolios	33, 34
15. Nutrition epidemiological analysis	40, 41
16. Developing a global fortification strategy	42
17. A book and software to facilitate and standardize the analysis of food security and nutrition issues using HCES	43

FIGURE 1: Analyzing the food group composition of the Bangladesh diet

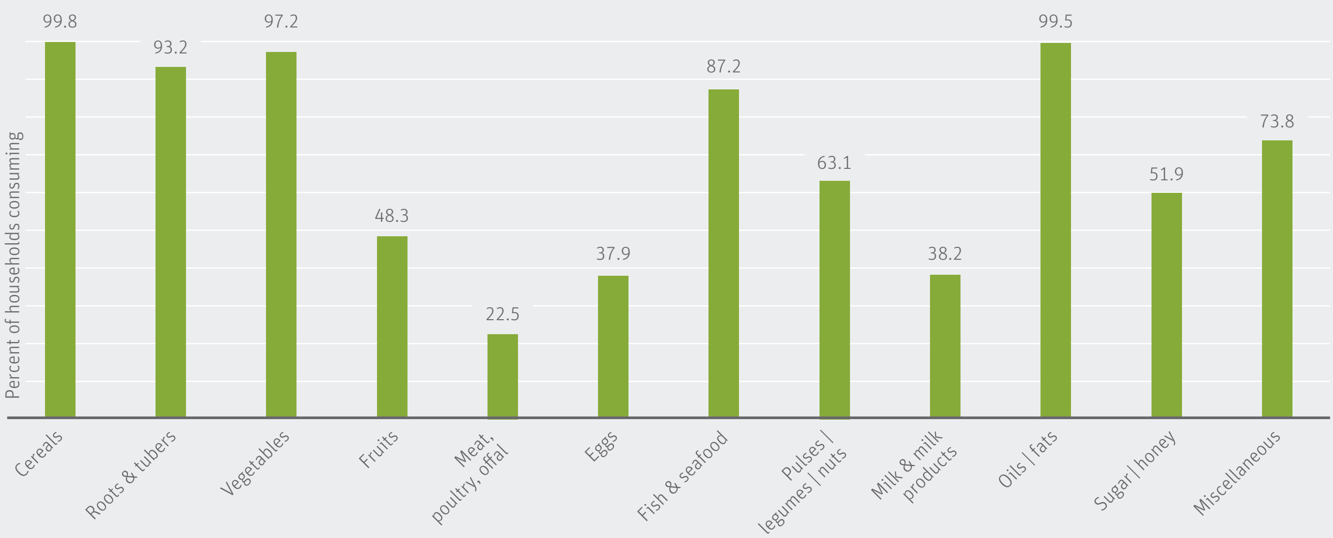


FIGURE 2: Bangladesh households' dietary diversity scores

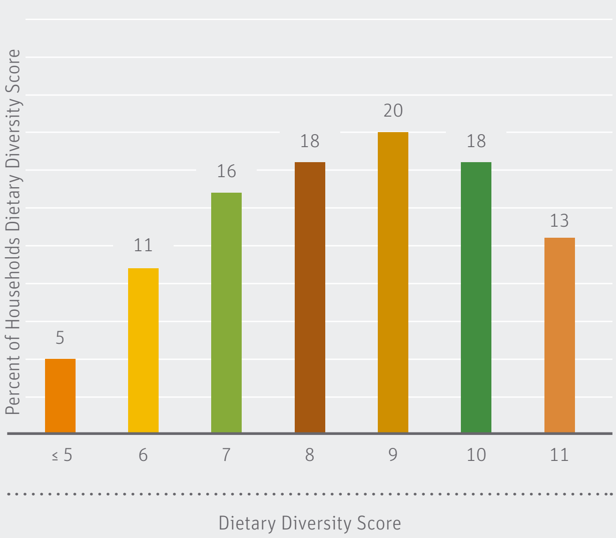
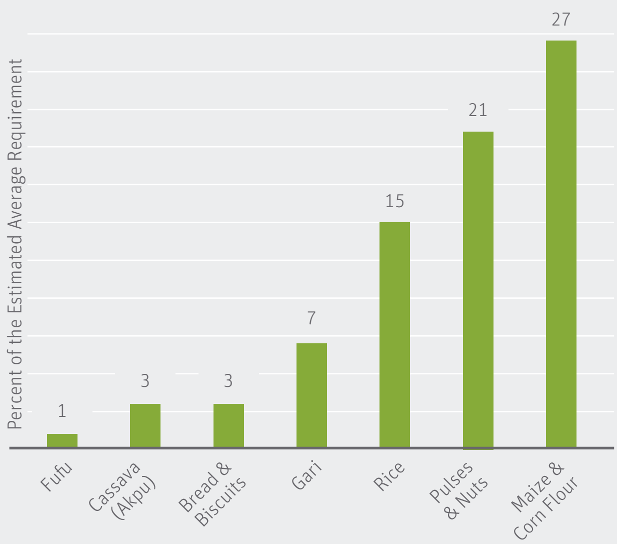


FIGURE 3: The most important food sources in Nigeria



- recognition that they are heterogeneous and that there is a need to be selective – that some of the surveys are sound, while others are of unacceptable quality for use in many nutrition applications;[6,7,8,9]
- acknowledgement that some applications are less demanding in terms of the quality of the data they require;[6] and
- the growing practice of triangulating different sources of data to enable the bracketing of plausible estimates and the reduction of uncertainties.[6,34]

HCES: a window into population-based dietary patterns

A typical HCES collects data on household composition, socio-economic behaviors and food acquisition and consumption data from a sample of households that is representative at the region, state or district level and comprises about 75,000 individuals. On average, a predefined list of roughly 125 food items is used to collect the quantity and value of food acquired and/or consumed during the recall period (commonly the last 7 to 14 days), and identifies how each food item was acquired – i.e., whether it was purchased, sourced from own production or received as a gift or in-kind payment. Some HCES collect a mix of purchase and consumption data; some collect only consumption data. **Figures 1–3** exemplify some of the types of basic, population diet quality analysis that HCES can support.

Dietary assessment methods using HCES

Assessing the adequacy of a household's consumption requires comparing its consumption to its nutritional requirements over a given time period. For most HCES, because no data are collected on food stocks, it is customary to assume that all of the food acquired during the recall period is consumed during the recall period. (This assumption may distort consumption profiles when, for instance, households purchase large quantities of a staple or do not purchase any of a staple during the recall period because the household already has plenty available and it draws down stocks during the recall period.)

First, the household's reported food acquisition and consumption over the recall period are used to develop an estimate of the household's usual daily intake. Each food item in the HCES is matched to a food composition table entry to identify each food's nutrient content per 100 grams (net of non-edible portions). Next, the nutrient content level of each food is multiplied by the reported quantity of the food to provide an estimate of the total nutrient availability or apparent nutrient intake from the food in question. The same procedure is followed for each of the food items in the HCES food list, and the apparent nutrient intake of all of the items is summed and then divided by the length of the recall period to provide the household's estimated total apparent daily nutrient intake. The use of the qualifier "apparent" acknowledges that these totals do not take into account waste and that some of the food is given to persons other than household members or to animals. (Some analysts assume a portion (e.g., 10–15%) of the household's food is wasted. The daily food quantities are sometimes referred to as "available" food rather than "apparent consumption.")

The adequacy of the household's apparent food consumption is measured by estimating the age- and gender-specific estimated average requirement (EAR) of each nutrient of interest for each household member and summing. For any given nutrient, the household's total EAR is compared to its estimated apparent intake of the nutrient. It is assumed that if the household's total apparent nutrient intake is less than the household's EAR, then the household is at risk of inadequate intake; i.e., it suffers from food insecurity.[46]

> "It is assumed that if the household's total apparent nutrient intake is less than the household's EAR, then the household suffers from food insecurity"

BOX 3

Information requirements for designing a fortification intervention

1. Which potentially fortifiable foods are being consumed in the country?
2. What proportion of this consumption is obtained through the purchase of centrally processed foods (amenable to large-scale fortification)?
3. How have these consumption patterns changed over time?
4. What proportion of the population purchasing these foods has inadequate intake of a micronutrient that can be added to this food vehicle?
5. What is the size of the nutrient gap, considering all sources of consumption and other micronutrient interventions?
6. How is the intake gap distributed in the population?
7. What quantities of the potential food vehicle are being consumed?
8. How is the consumption of the food distributed in the population?
9. How bioavailable are the nutrients that will be used in the fortification formulation?
10. At the proposed fortificant levels, does the fortification program put individuals at risk of excess intakes?

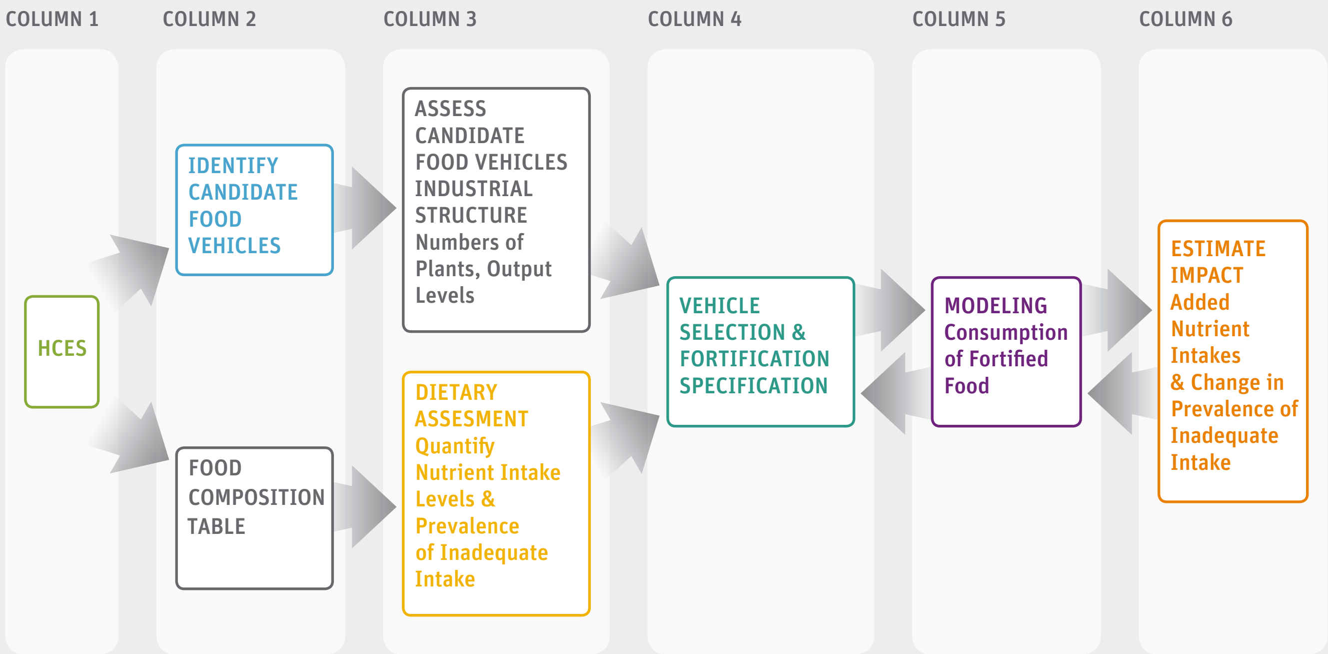
In the case of standard food security analysis, the calculations end here, with a household level measure of the adequacy of energy availability or apparent energy intakes. For fortification, however, it is necessary to conduct the analysis at the individual level so that fortificant levels which are safe, but which, at the same time, maximize the public health impact of fortification, can be approximated.

Designing and monitoring fortification programs with HCES

HCES have proven to be of particular importance in designing and monitoring fortification programs. **Box 3** identifies the food-consumption-related information requirements essential to design and monitor a fortification program. **Figure 4** presents an overview of how HCES can be used to provide much of the required information, as well as to monitor the program and simulate its impact.

HCES collect household level data. To analyze individual household members' nutrient intakes, it is necessary to know, or to assume, how the household's food is distributed among its members. Most commonly it is assumed that households distribute food in direct proportion to each household member's proportionate share of the household's total adult male consumption equivalents (AME).[47] Using the AME to distribute the household's usual daily intake among its members yields individual apparent nutrient intakes. Comparing those levels to each individual's EAR provides a dietary assessment indicator (**Figure 4,** column 3, row 2). It is assumed that if the individual's apparent nutrient intake is less than the his/her age- and

FIGURE 4: HCES-based food fortification program design and monitoring



gender-specific EAR, then the individual is at risk of inadequate intake; if it is greater than his/her EAR, then his/her intake is adequate. The percentage of persons at risk of inadequate intake of a particular nutrient is the prevalence of inadequate intake – a proxy measure for the prevalence of nutrient deficiency. (The methodology described here is the cut point method, a shortcut derived from the probability method which can be used to estimate adequacy when certain conditions are met, as they are for zinc, vitamin A, calcium, and most other micronutrients. In the case of iron, however, it is necessary to use the probability method.[46]) **Table 1** presents an example, analyzing vitamin A intakes (in retinol equivalents, REs) in Zambia.

> "Fortification program impacts may be modeled as the change in nutrient intake status"

One of the first steps in designing or monitoring a fortification program is to quantify the coverage and quantities of each food vehicle apparently consumed (**Figure 4,** column 4, and **Figure 5**). It is often assumed that only the portion of a food item that is purchased is fortifiable (i.e., that which is consumed from home production or received in-kind or free-of-charge/gifted is not). The additional nutrient intake from each fortifiable food is modeled (**Figure 4,** column 5) as the individual's estimated apparent "usual intake" of the food in question, multiplied by the relevant fortification standards (or, alternatively, exploratory fortificant levels might be simulated). In the absence of data, it is generally assumed that all of the fortifiable food item that was purchased was fortified and that the companies producing the fortification vehicle(s) were compliant with existing fortification regulations. These assumptions provide an optimistic, best-case scenario. Alternative sets of assumptions may be adopted to examine other possibilities, and alternative fortification program portfolios may be modeled (as in **Figure 6**) to assess alternative food vehicles and combinations of vehicles. Fortification program impacts may be modeled as the change in nutrient intake status; i.e., as the individual's baseline nutrient intake level minus endline intake level, and/or as the individual's baseline EAR gap minus endline EAR gap (**Figure 4**, column 6, and **Figure 7**).

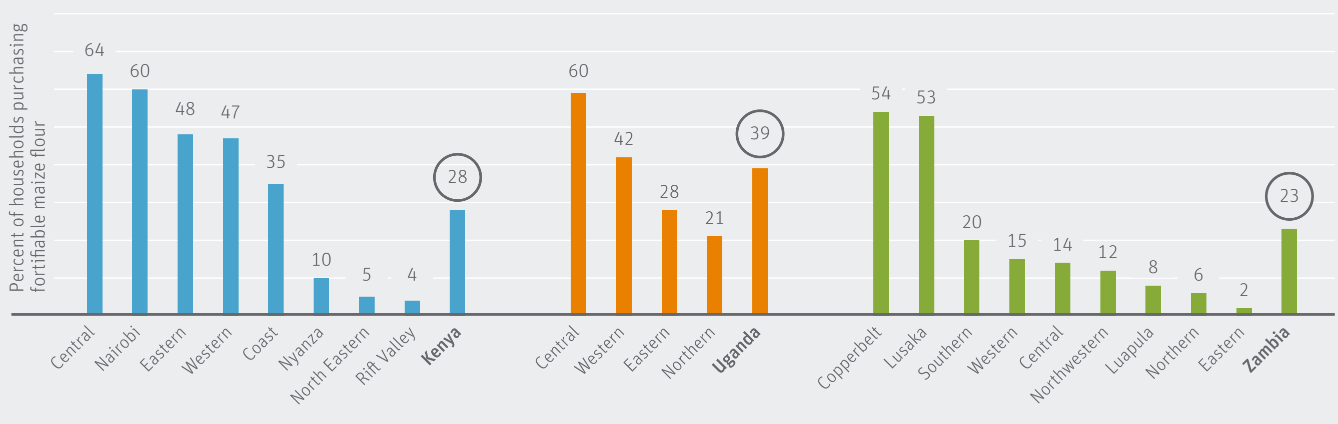
Conclusion

The growing use of HCES to analyze food and nutrition issues together with the growing interest in issues around food prices, food production and food policy, has prompted a spate of efforts to strengthen and standardize HCES' collection of food consumption data.[48,49,50] Among the more telling and forward-looking of these efforts has been the FAO-World Bank publication of ADePT-Food Security Module, an open-access, user-friendly

TABLE 1: Daily intake of vitamin A and prevalence of inadequate vitamin A intake, Zambia 2013

Province | Domain	Percent Population		Mean Vitamin A Intake (RE)	Prevalence of Inadequate Vitamin A Intake	Children 12–59m		Women (15–49y)	
	Urban	Rural			Mean Vitamin A Intake (RE)	Percent of EAR	Mean Vitamin A Intake (RE)	Percent of EAR
Central	22%	78%	110	95.5	58	26%	121	24%
Copperbelt	79%	21%	148	97.3	66	30%	144	29%
Eastern	8%	92%	68	99.0	35	16%	73	15%
Luapula	12%	88%	848	41.2	441	199%	890	179%
Lusaka	85%	15%	167	96.7	78	36%	172	35%
Northern	16%	84%	454	67.7	221	100%	479	96%
Northwestern	15%	85%	389	78.6	188	84%	419	84%
Southern	21%	79%	65	99.6	29	13%	74	15%
Western	14%	86%	336	83.1	140	63%	304	61%
National	**35%**	**65%**	**248**	**87.2**	**128**	**58%**	**250**	**50%**
Urban	100	na	158	96.0	82	37%	168	34%
Rural	na	100	268	82.5	146	66%	302	61%

FIGURE 5: Coverage of fortifiable maize flour by region and nationwide in Kenya, Uganda and Zambia



software that combines HCES with food composition table data to produce a wide range of food consumption and nutrition-related national and subnational indicators and analyses.[43] With version 2 soon to be released, it is evident that HCES have become a standard tool in the continuing fight against global food insecurity and malnutrition.

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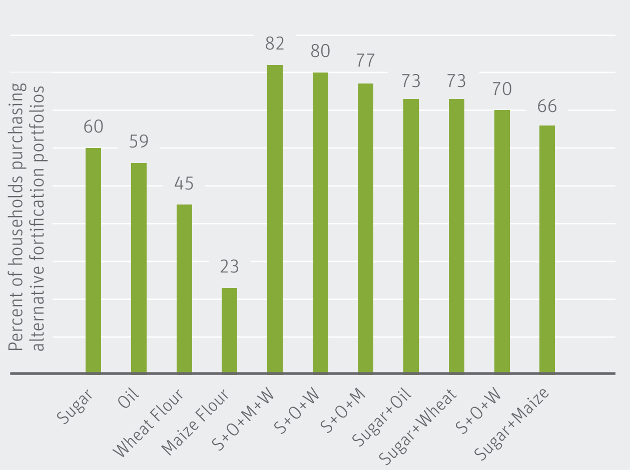
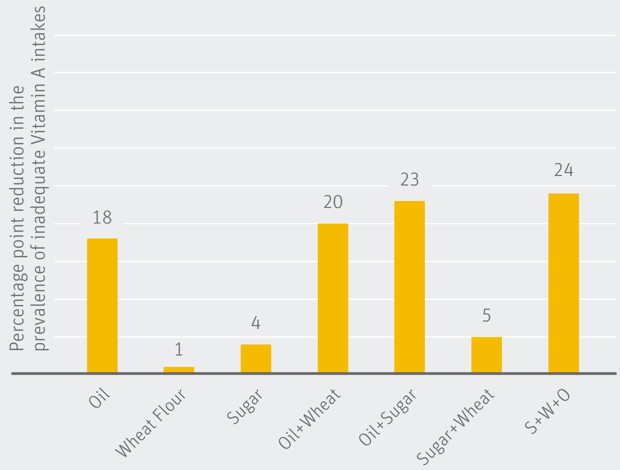
FIGURE 6: Identifying coverage of alternative fortification portfolio options, Zambia



S: Sugar, **O:** Oil, **M:** Maize flour, **W:** Wheat flour

FIGURE 7: Simulating alternative fortification program portfolio impacts, Bangladesh



S: Sugar, **O:** Oil, **W:** Wheat

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