Data DENT
Data for Decisions in Nutrition

Strengthening Household Survey Measures of Food Fortification:
Learnings from Bangladesh and Ethiopia

BRIEF

Key messages

- To reduce the burden of micronutrient deficiencies, it is important to determine whether fortified foods are reaching target populations.
- Survey respondents can identify whether fortifiable foods are reaching households: measuring fortified food coverage requires sample testing.
- We conducted mixed-methods research in Bangladesh and Ethiopia to refine questions about fortifiable foods from the 2013 GAIN FACT toolkit.
- We recommend a short set of questions for multi-topic household surveys that can provide insight into the reach of large-scale food fortification programs.

Background

Large-scale food fortification (LSFF) is the addition of safe levels of vitamins and minerals to widely consumed foods during food processing. LSFF is a key component of most countries' strategies to combat micronutrient deficiencies. The most popular vehicles and fortificants used for fortification globally are salt (iodine and sometimes iron), oil (vitamin A,vitamin D), wheat flour (iron, zinc, B vitamins), and rice (iron, zinc, B vitamins, vitamin A).

For food fortification programs to have impact they must: 1) reach population groups at risk of micronutrient deficiencies and 2) provide quality-controlled fortified staple foods across the program area.

Household surveys are important for measuring LSFF coverage because they can identify whether foods reach nutritionally vulnerable populations including households who are relatively poor, less educated, or geographically isolated. Population-based surveys collect data from all households— whether or not they are reached by fortified foods. Household surveys can also collect data on consumer demographics, behaviors and health outcomes. In contrast, data from producers or retailers (e.g., factory data, market surveys) only reflect those who can access food from these sources. Data from producers or retailers cannot offer the same insights about reach and consumption of fortified foods as household surveys.

Tests are available to measure fortificant levels in different types of staple foods. However, at present, low-cost field-ready kits are limited to qualitative measurement of iodine in salt and iron in flour. Cost is a barrier to collecting and transporting samples

Box 1. The real-world challenge of identifying who is reached by fortified foods

Imagine an ideal scenario where a country passes and enforces a law to fortify edible oil with vitamin A. This country does not produce oil locally: it imports a single type of sunflower oil and sends it directly to a central factory where vitamin A is added. Batches are quality tested to ensure adequate fortification. The oil is packaged in standard containers and clearly labelled as fortified with quality controls. The fortified oil is distributed through the open market and safety net programs: all households receive factory-sealed and labeled bottles. Households across the country use the fortified oil to prepare every meal. There is no unregulated oil market or leakage of supplies from neighboring countries. In this ideal country, it is reasonable to assume that fortified oil is reaching every household.

Now, consider a realistic scenario where a country passes a law to fortify specific types of edible oil (e.g., vegetable, palm). The government has limited resources for monitoring multiple types and hundreds of brands of edible oil from different producers, both domestic and imported. Some are produced locally in small amounts and sold or traded through informal channels; others are industrially produced and sold in formal and informal markets. Some consumers get the oil in its original sealed and labelled bottle. However, oil is often repackaged as market vendors purchase large containers of oil and pour it into smaller bottles to sell. Some households prefer different types of cooking oil that are not covered by the fortification law. In this real-life scenario it is not reasonable to assume that fortified oil is reaching every household or that the population knows whether the product they are using is fortified or not.

March 2026

for laboratory-based testing of other micronutrients in staple foods such as iron in wheat flour or vitamin A in oil. Without testing, household surveys can include questions about staple foods that are fortifiable—likely or expected to be fortified—rather than confirmed as fortified.

The Fortification Assessment Coverage Toolkit (FACT) was developed by the Global Alliance for Improved Nutrition (GAIN) and released in 20131. Since then, more than 20 FACT surveys have been conducted across more than 16 countries. Full implementation of the FACT includes household and market surveys with collection and laboratory testing of food samples.

The full set of household survey questions and sample testing protocols are too resource intensive to include in most multi-topic surveys: they are currently not included in the Demographic and Health Surveys (DHS) or Multiple Indicator Cluster Surveys (MICS) core questionnaires.

Key terms[1]

Fortifiable refers to foods that are produced by large, centralized, and relatively well-developed industries and are not produced at home; they are suitable for having micronutrients added but do not necessarily contain added micronutrients.

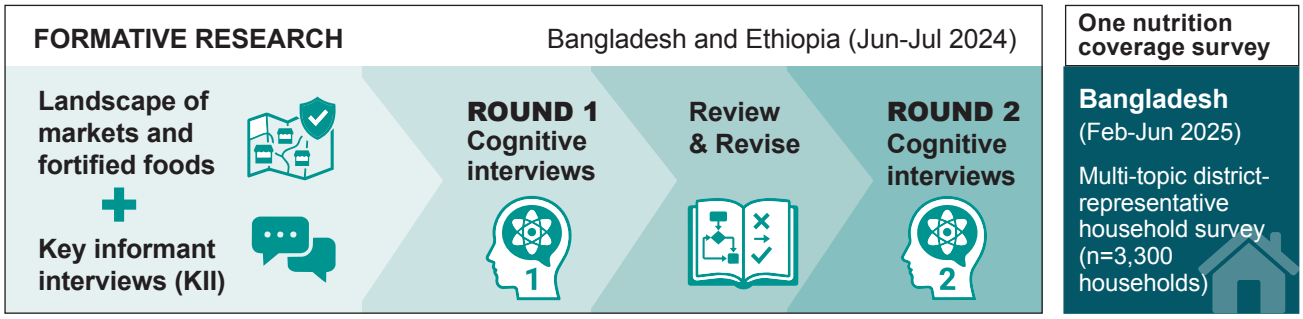
Fortified refers to foods that are confirmed to have micronutrients added to them during a food processing stage. Confirmation requires testing a sample of the food to measure the level of micronutrients.

To increase availablility of LSFF coverage data, DataDENT worked with GAIN to select and refine a subset of the FACT questions that would be feasible to include in the DHS, MICS or national nutrition surveys. We aimed to identify a minimum subset of questions to include in multi-topic household surveys, which often have limited space for additional questions. We did not consider all FACT indicators and questions, for example, on price and quantity of purchased food vehicles because these questions are not used to construct core coverage indicators.

Research findings: improving recall of fortifiable foods

In 2024, we carried out research in Bangladesh and Ethiopia to assess how well respondents understand the FACT household survey questions, and to identify ways to improve question comprehension and response validity **(Figure 1)**.

Figure 1. Overview of formative research and One Nutrition Coverage Survey



Formative research began with landscape assessments that included visiting markets, talking to vendors, and observing and taking photos of products. We conducted interviews with women who purchase household food as well as staff from food distribution programs to learn about their exposure to, and understanding of, food fortification. Starting with the FACT questions, we conducted cognitive interviews with women who benefited from social protection programs, including those that deliver fortified foods. We modified questions that elicited cognitive errors and retested these questions in a second round of cognitive interviews with different women. Detailed findings from this phase are available in manuscripts[2].

[1]Global Alliance for Improved Nutrition, Mduduzi N. N. Mbuya, & Lynnette M. Neufeld. 2019. The Fortification Assessment Coverage Toolkit (FACT). GAIN Briefing Paper Series #1. https://www.gainhealth.org/resources/reports-and-publications/fortification-assessment-coverage-toolkit-fact

[2]Scott, Samuel et al., 2025. "Measuring food fortification coverage in household surveys: formative research findings from Bangladesh and Ethiopia." https://verixiv.org/articles/2-432/v1

The refined questions were used in the district-representative *One Nutrition Coverage Survey (ONCS)*, a methods-focused survey conducted across four districts in Bangladesh[3]. The FACT questions ask where the product was procured, as well as the type and brand of food vehicle the household last purchased. Type and brand data are used to match the product with a list of branded products that are confirmed to be fortified. In many contexts, obtaining such a list requires the added cost of a market survey with sample testing. Testing assumes that sampled products are representative of all products of a particular type and brand, which may not be true if there is poor fortification compliance. Further, micronutrients in products may degrade over time, especially when storage conditions are not ideal.

Here, we present findings from Bangladesh about the ability of ONCS respondents to report on key product characteristics including the place of procurement, type, packaging and brand. Overall, we found very high coverage of fortifiable oil (99%) and salt (100%) and lower coverage of fortifiable rice (66%) and wheat flour (72%). We did not do sample testing to measure whether products were fortified.

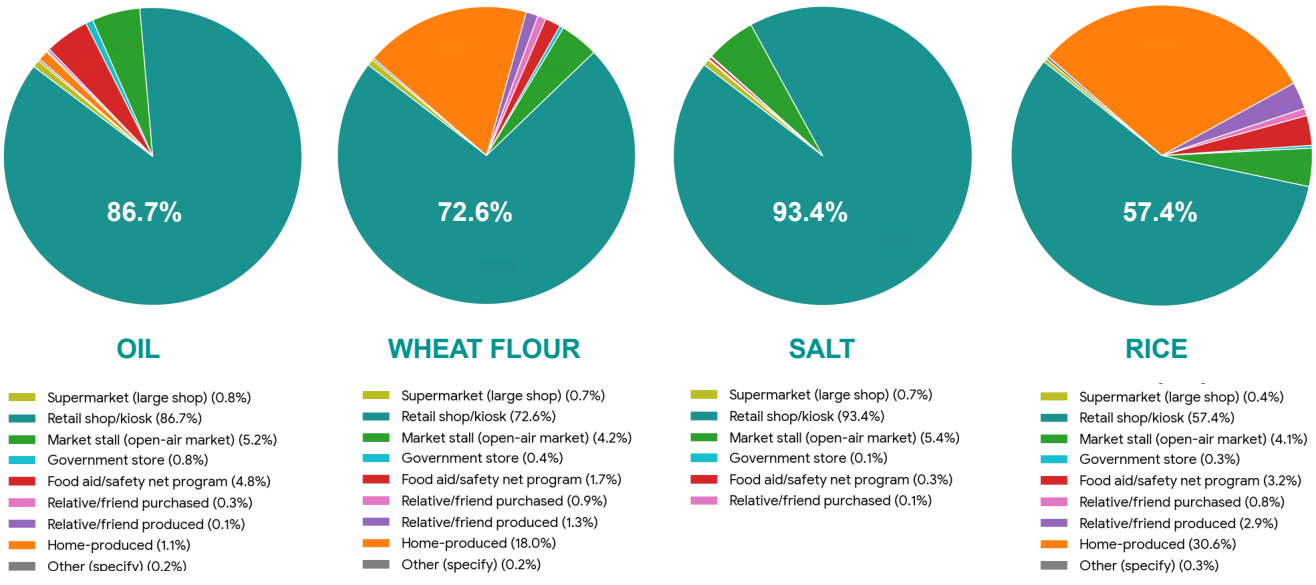
Place of procurement: The FACT asks where the respondent procured the food vehicle they use to prepare most meals—either currently or the last time they procured it. In the ONCS, most households obtained their edible oil, rice, salt, and wheat flour from small retail shops or kiosks. Some households produced their own rice (31%) and wheat flour (19%) but oil and salt were purchased, as expected (**Figure 2**).

Packaging: Most households in the ONCS had the various food vehicles in their home on the day of the interview, but they were not stored in their original packaging (**Figure 3**). Among those in the original package, less than half had a fortification logo or statement claiming that the product was fortified.

Type and Brand: The ONCS respondents were able to report the type of staple food (e.g., vegetable vs. sunflower oil), but were not consistently able to report the brand. Enumerators asked women to first recall the brand and then, if available, directly observed the product. In our analysis, we confirmed accuracy of response by checking whether the recalled and observed brand matched. Other than for salt (56%), less than half of the women were able to report a brand for other staple foods, irrespective of accuracy (**Figure 4**). Among the minority of respondents who reported the brand, recall for edible oil was most accurate (71%), followed by salt (47%), rice (45%), and wheat flour (33%).

Based on these findings, we concluded that if brand is used to estimate coverage of fortified foods, direct observation of products in their original packaging supports more accurate estimates than respondent recall of brand. However, there are limitations to consider. For instance, households often repackage and store products in different containers, which can make observations challenging and may affect the accuracy of the findings.

Figure 2. Households procured food vehicles in Bangladesh household survey (n=3,246)



[3] Manohar, Swetha et al., 2025. "Methodological considerations and cost to measure coverage of multi-sectoral nutrition interventions: Protocol for the One Nutrition Coverage Survey in Bangladesh." https://verixiv.org/articles/2-37/v1

Figure 3. Packaging of food vehicles observed in our Bangladesh household survey

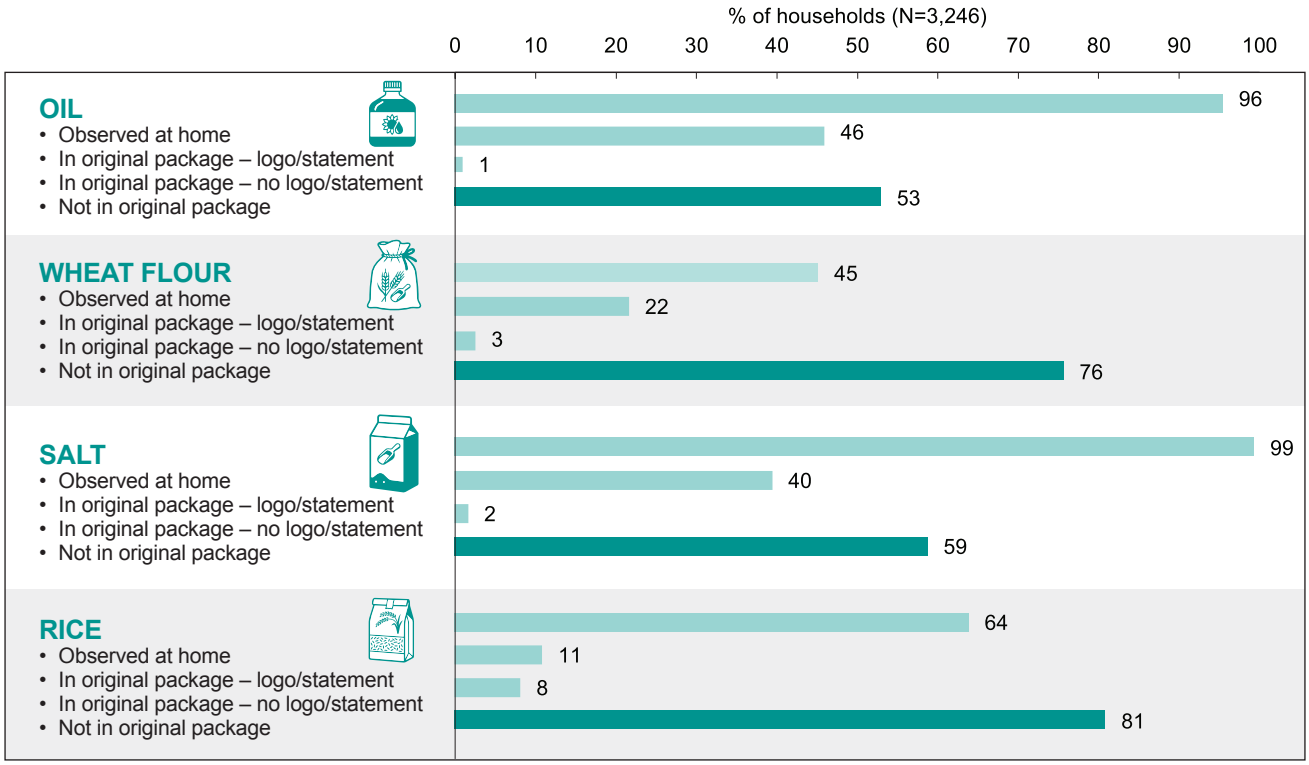
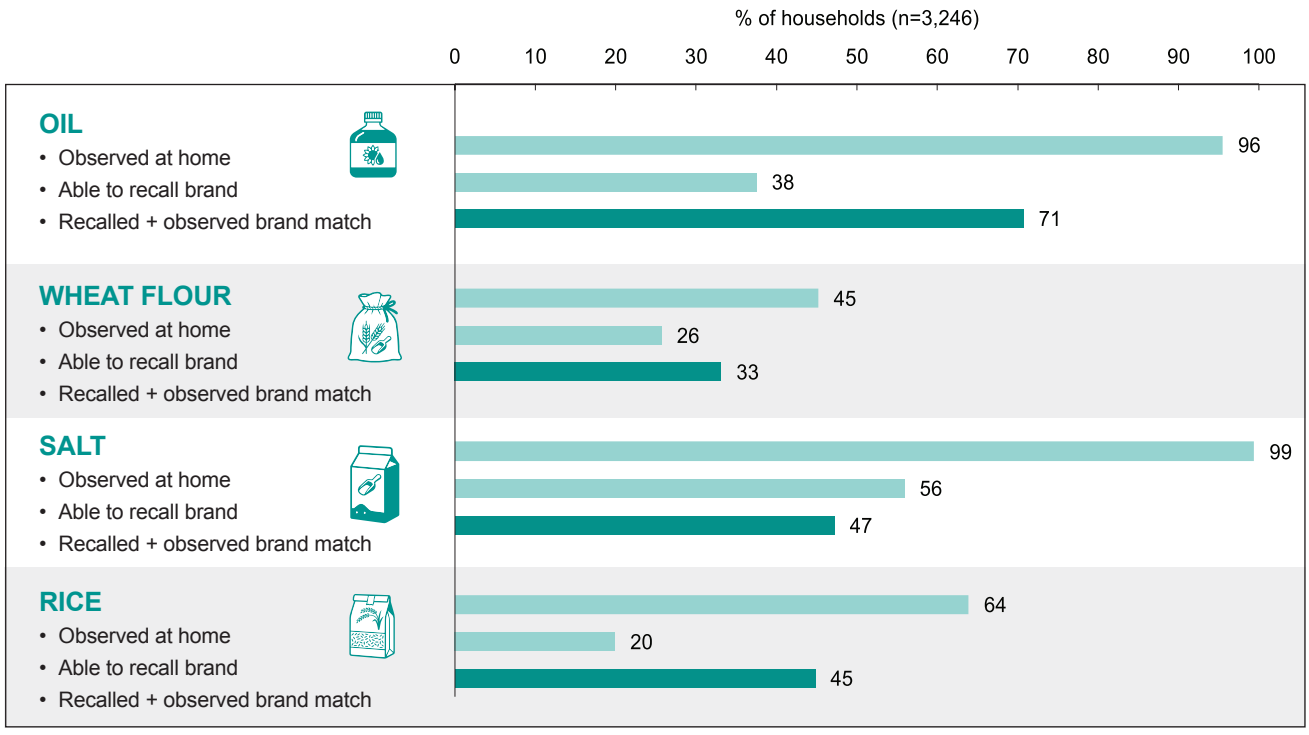


Figure 4. Brand recall ability in our Bangladesh household survey



Recommended indicators and questions

Based on our research findings and consultations with global experts, we recommend the following set of indicators (**Table 1**) and survey questions (**Table 2**) for multi-topic household surveys

For the two core indicators, only three questions are required for each food vehicle: whether or not the household uses the food vehicle at home (Q1); a request to observe the food vehicle (Q2); and where they got the food vehicle from (Q3 or Q9).

All other indicators and questions are optional depending on priorities and available resources.

For all questions, the respondent should be the household member who has the most knowledge about the foods purchased and used by their household. We recommend using direct observation of the food in its package rather than participant recall for identifying brand; direct observation is preferred for type but recall is sufficient.

Table 1. Indicators to assess coverage of LSFF in multi-topic household surveys

Indicator Name	Indicator definition	Remarks	Questions (Table 2)
Core			
Coverage of food vehicle	Proportion of households that consume a food vehicle.	Useful for countries planning fortification programs needing to identify food vehicles that reach target groups.	1
Coverage of fortifiable food vehicle	Proportion of households that procured the food vehicle from a source that may sell/provide a vehicle that is processed by large-scale industry.		3 or 9
Optional			
Coverage of fortified food vehicle (tested)	Proportion of households that have a version of the food vehicle with added fortificant based on a confirmed test.		4
Coverage of the food vehicle by type	Proportion of households using each type of the food vehicle.	Can be calculated using observed (Q5) and/or reported (Q10) type. Indicator can inform programming decisions about which type(s) of staple foods to fortify.	5 or 10, 6
Coverage of the food vehicle by brand (observed)	Proportion of households using each brand of the food vehicle.	If a list of brands confirmed to be fortified is available, this can be used to calculate coverage of fortified foods by combining with brand information observed at the household level.	7
Coverage of fortified food (labeled)	Proportion of households with the food vehicle having a visible fortification logo or statement.		8

Table 2. Questions to assess coverage of LSFF in household surveys

	Question	Skip pattern	Remarks
1	**Does your household use [INSERT FOOD VEHICLE] to prepare or add to foods at home?** • Yes = 1 • No = 2	If 1 → continue with the remaining questions If 2 → Go to next food vehicle	
2	**May I see the [INSERT FOOD VEHICLE] that is used for most meals in your household?** • Yes = 1 • No = 2	If 2 → Go to question 9	Even if sample collection and testing do not occur, we recommend this question since having the physical product may help the respondent recall the source (next question) and can be used to identify other product characteristics (packaging, type, brand, fortification labeling).
3	**When your household got this [INSERT FOOD VEHICLE], where did your household get it from?** • Purchased from market/shop/kiosk/ wholesaler/street vendor/[insert other local places] = 1 • Received from food aid/social protection program = 2 • Homemade or obtained from local farm or local small factory/ processor = 3 • Other (specify): _____ = 6 • Don't know/remember = 8		Surveys should determine which sources sell/provide the industrially processed food vehicle. If certain types of shops in the context only sell locally produced versions, those shops should be split from response option 1 into a separate response category. The same applies to food aid or social protection programs. Important: Careful pre-testing of this question is required to differentiate between sources that sell fortifiable and non-fortifiable (home-made or locally produced) products.
4	**May I take a small sample of this [INSERT FOOD VEHICLE]?** • Yes, sample taken = 1 • No, sample not taken, refused = 2 • No, sample not taken, insufficient quantity = 3	Only ask if not homemade or locally produced	Optional due to cost/resource requirements to collect and test food samples.
5	**[enumerator only] Observe the product packaging and record type** Select type **from** type list • Other (specify): _____ = 6 • Type cannot be observed = 99		A list of common types (e.g., for edible oil: sunflower, rapeseed, olive, canola, etc.) should be pre-determined. For salt, even if the package is not labeled, the type (e.g., fine or coarse) can be observed and recorded if distinguishable. In most other cases, we do not recommend recording type only based on visible product features (e.g., color, size, shape).

	Question	Skip pattern	Remarks
6	**What type of [INSERT FOOD VEHICLE] is this?** Select type from type list • Other (specify): _____ = 6 • Don't know/remember = 8	Only ask this question if type could not be observed	See question 5
7	**[enumerator only] Observe the product packaging and select the brand** Select brand from brand list • Other (specify): _____ = 6 • Brand cannot be observe*d = 99*	NA	A list of common brands by type (e.g., for sunflower oil, brands might be Sunny, A1, Farm Fresh, etc.) should be pre-determined. The brand is the name of the company that produces the product. Note that, unlike for type, we have not found that brand recall yields accurate information: hence there is no follow-up question on brand if the brand cannot be observed.
8	**[enumerator only] Observe the product and record whether a fortification logo or statement is visible on the package**. • Fortification logo/statement is visible = 1 • Fortification logo/statement is not visible = 2	NA	Examples of fortification logos and statements in the survey context should be provided during enumerator training. Having a fortification logo/statement doesn't guarantee that the food vehicle is fortified. The only way to know if it is fortified is to conduct a test on a sample. However, given the limited resources available in most surveys, observation may be the only option. As countries improve product packaging and labeling, coverage estimation through observed household data will become more reliable.
9	**The last time your household got [INSERT FOOD VEHICLE] where did your household get it from?** • Purchased from market/shop/ kiosk/wholesaler/street vendor/ [insert other local places] = 1 • Received from food aid/social protection program = 2 • Homemade or obtained from local farm or local small factory/ processor = 3 • Other (specify): _____ = 6 • Don't know/remember = 8	Only ask if response to question 2 is "no" (food vehicle cannot be observed)	See question 3
10	**The last time your household got [INSERT FOOD VEHICLE] what type was it?** Select type from type list • Other (specify): _____ = 6 • Don't know/remember = 8	NA	See question 5

Conclusions and looking ahead

Household surveys can provide valuable information for design and monitoring of food fortification programs. They can show which types of households consume fortifiable staple foods, and whether consumption is associated with certain household behaviors or characteristics, or nutrition outcomes among individual household members.

Technology continues to advance and low-cost rapid tests for additional vitamin and mineral fortificants may become available. Household surveys can also show which households consume fortified foods if food samples are collected and tested.

Coverage estimates based on Table 2 questions should be considered a lower-bound estimate given that they do not account for foods prepared or consumed outside the home. Much of the world is undergoing a transition from home-prepared food using staple food ingredients to purchasing prepared foods.

Even as AI-enabled dietary assessment methods advance (e.g. photo-based identification[4]) there is still a need for questions about fortification. Many industrially fortified foods do not have a distinct color or other visible features compared to unfortified foods.

In addition to adding questions in household surveys, LSFF coverage measurement can be further strengthened by:

- Clear reporting of coverage indicators generated from survey data, with full details on questions and responses, numerators and denominators.
- Continued development of low-cost field-friendly tests that accurately measure levels of fortificants in various staple foods.
- Enforcement of regulations on packaging and labelling of fortified foods to enable observation-based coverage estimation.
- Development of cost-efficient methods to estimate local coverage of fortified foods among population groups vulnerable to micronutrient deficiencies.

[4] Nguyen PH et al. Relative validity of a mobile AI-technology–assisted dietary assessment in adolescent females in Vietnam. American Journal of Clinical Nutrition 2022. https://pubmed.ncbi.nlm.nih.gov/35945309/

Project Note

DataDENT (Data for Decisions in Nutrition, www.datadent.org) aims to transform the availability and use of nutrition data by addressing gaps in nutrition measurement and advocating for stronger nutrition data systems. This work was carried out by the following DataDENT partners: International Food Policy Research Institute (IFPRI) (Scott S, Jungjohann S, Neupane S, Ara G, Berhane H, Banerjee A, Ruel M, Kim S). Collaborators include icddr,b, Addis Continental Institute of Public Health, and Global Alliance for Improved Nutrition (GAIN). This work was funded by the Gates Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Gates Foundation.

Recommended Citation: DataDENT 2026.Strengthening Household Survey Measures of Food Fortification: Learnings from Bangladesh and Ethiopia. International Food Policy Research Insititute.