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CAPACITY STRENGTHENING MEASUREMENT BRIEF

A Case Example for Measuring the Effectiveness of Training

Food Fortification in Uganda



Credit: SPRING

INTRODUCTION

As implementers design programming to meet USAID's localization goals, training is one of the most common capacity strengthening methods. Training is relatively easy to implement, limited in duration, included predictable in costs, and generally well-accepted by many stakeholders. However, practitioners must carefully design and measure their training initiatives to ensure the training successfully builds knowledge and skill that then contributes to nutrition outcomes. In a recent brief, [Effectively Measuring Training: Building Knowledge and Skills for Nutrition Programs](#), we discussed how to assess nutrition training programs using best practices from the capacity strengthening field, to create more effective and efficient programming.

This case example from Uganda illustrates the measurement process for training on food fortification.

Assessing the Capacity for Large-Scale Food Fortification

Large-scale food fortification is a high impact, cost-effective intervention aimed at reducing micronutrient deficiencies. In Uganda, voluntary fortification began in 2005 with wheat and maize flours and edible oils/fats with specific vitamins and minerals of public health interest. In 2011, an amendment to the initial legislation mandated fortification with essential vitamins and minerals for the following industries:

- **Maize flour industries producing 20 or more metric tons (MT):** Currently, eight of them meet this requirement; few others are fortifying because their market share is less than 3 percent of the national demand.
- **Edible oils and fats industries producing 10 or more MT:** Of the seven oil factories, the two currently fortifying supply 70 percent of the national demand.
- **All industries producing salt:** Most salt is imported and comes properly iodized, so 99 percent of salt in households has sufficient iodine content.

- **All wheat flour industries:** Of the 12 wheat flour mills, the six supplying 77 percent of national demand are currently fortifying.¹

Fortifying can be challenging for small industries to do efficiently and sustainably. For this reason, USAID recommends fortification for industries with minimum production sizes of 150 MT per day for flours and 50 MT per day for oil.²

A capacity needs assessment conducted by the National Working Group on Food Fortification, with support from USAID Advancing Nutrition, identified two key gaps limiting producers' ability to fortify: the lack of the proper industrial conditions for many food processors and insufficient knowledge/skill related to the regulations and the process of fortification.

The working group first gathered information to understand what content and learning approaches would be most effective for this audience (Phase I: Training Preparation and Design). Then they designed a monitoring and evaluation plan to assess the value and outcomes of the training (Phase 2: Monitoring and Evaluation Design and Implementation).

PHASE I: TRAINING PREPARATION AND DESIGN

Understanding Training Needs

With support from USAID Advancing Nutrition, the National Working Group on Food Fortification, collaborated with the Ministry of Trade, Industries, and Cooperatives (MTIC); Ministry of Health; National Drug Authority; and Uganda National Bureau of Standards to better understand the specific knowledge and skill needs for food fortification in Uganda.

First, national trainers working in food fortification received refresher training that included hands-on experience of food fortification at industry level. The national trainers then conducted a baseline assessment with 58 food processors in maize and wheat flour, salt, and edible oils and fats using an observation checklist (see [Annex 3](#)).

1 MoH (Ministry of Health) 2011. *The Food and Drugs (Food Fortification) (Amendment) Regulations, 2011*. Kampala: Ministry of Health.

2 USAID. 2022. *Large Scale Food Fortification Programming Guide*. Washington, D.C.: USAID.

Table 1. Uganda Food Fortification Training Monitoring and Evaluation Plan

Kirkpatrick Evaluation Level	Objective	Indicators	Evaluation Method	When Conducted
Level 1: Reaction	Gain participants' feedback on relevance and engagement of training experience	<ul style="list-style-type: none"> • % of learners that found training good and relevant • % of learners that found training participatory and interactive • % of learners that found the presentation easy to understand • % of learners that found trainer knowledge good • % of learners who identified trainers as having good facilitation skills • % of learners who thought trainers engaged participants • % of learners who said trainers answered questions • % of learners that found the presentation relevant to training 	Post-training survey (Annex 1)	At end of food fortification training event
Level 2: Learning	Gauge participants acquisition of intended knowledge, skills, and attitudes to the training	<ul style="list-style-type: none"> • Average % increase in test scores • % of trainees that improved from their pre- to post-test scores 	Pre- and post-test (i.e., multiple choice, true/false, open-ended response, matching, short answer, essay) (Annex 2)	Before and immediately after food fortification training event
Level 3: Behavior	Identify application of new behaviors and skills in the work environment	<ul style="list-style-type: none"> • % of standards participants reported performing • % of learners self-reporting excellent across knowledge areas 	Observation checklist (Annex 3)	Before training and 1–3 months after training event

Conducted between May and June 2022, the assessment identified areas for development in production, standards and regulation, quality control and assurance, fortification technologies, premixes and fortificants, occupational health and safety, and sales and marketing. Alongside other capacity strengthening methods, **stakeholders identified training as a starting point to strengthen knowledge and skills along the food fortification value chain.**

Designing Appropriate Training

Together, the working group developed structured learning sessions tailored to the specific knowledge

and skills gaps identified in the baseline assessment. The team designed hands-on practical training, in collaboration with the industries already fortifying, to see the technical skills required in action. MTIC invited all eligible industries to the on-site training delivered by national trainers. In total, 145 people received training between August 15 and September 2, with costs covered by USAID Advancing Nutrition.

Following the training, the trainers used the observation checklist again to identify changes in food processors' behaviors, and observe the level of knowledge and skill applied on the job.

PHASE 2: MONITORING AND EVALUATION DESIGN AND IMPLEMENTATION

Using the feedback from the needs assessment, USAID Advancing Nutrition and the National Working Group on Food Fortification (including the national trainers) jointly designed a monitoring and evaluation plan (table 1) using the Kirkpatrick training evaluation model, assessing the effectiveness of training using three of the model's four levels: attendees' reaction to the training (Level 1), what attendees learned (Level 2), and how attendees' behavior changed as a result (Level 3). The activity did not evaluate training results, (i.e., whether trained staff members fortified foods to national standards [Level 4]) as this requires a significantly longer period of observation and an increased level of rigor of research design (including a control arm) to adequately demonstrate results.³

Training Feedback [Level 1: Reaction]

To understand the relevance of the training for participants and whether the trainers provided a supportive learning environment and delivered the curriculum at the appropriate level, USAID Advancing Nutrition and the National Working Group on Food Fortification designed an anonymous survey for participants to complete immediately following the event.

The survey included 10 questions, using a Likert scale for responses (strongly agree to strongly disagree). Three questions explored participants' perception of the relevance of training content and objectives, and usefulness of the training. Five questions pertained to the trainer's expertise and preparation. Qualitative questions also captured what participants found most helpful about the course and lessons learned. Participants in four regions (northern, central, eastern, and western) of Uganda completed 131 training evaluations. [Annex 1](#) includes the survey.

Pre- and Post-Test [Level 2: Learning]

To gauge participants' learning from the training program, the team designed a pre- and post-test with five open-ended questions.

The test asks participants to define key terms associated with food fortification and food safety,

identify the functions and handling requirements for premix for fortifying flour, describe food fortification audit activities, and outline the benefits of food fortification. Participants took the written assessment before training to gauge their initial knowledge level, and again after to identify any changes in knowledge resulting from the training. [Annex 2](#) includes the pre- and post-test.

Observation Checklist [Level 3: Behavior]

To identify changes in food processors' behavior based on new knowledge and skills resulting from the training, the team designed an observation checklist to gather baseline and endline data. The team administered the baseline assessment from July 25–30, 2022 and conducted the endline from December 8–15.

USAID Advancing Nutrition based the observation checklists for the maize flour, wheat flour, and edible oil and fats processors on the national food fortification training manuals for Uganda.

Each observation checklist incorporated the required fortification procedures, and the evaluator checked “yes,” or “no,” or provided no response based on the completion of the standards requirements. Questions asked food processors to rate their own knowledge (1=weak, 2=good, 3=excellent) on various categories of the fortification processes (i.e., hygiene, premix, wheat flour fortification process) and to prioritize training topics about which they are most interested in learning, including standards and regulations, Good Manufacturing Processes (GMP), vitamin A/oil fortification, and internal/external monitoring. The survey also asked food processors to indicate their knowledge level of the four key topic areas that may impact their ability to implement food fortification standards. [Annex 3](#) includes the observation checklist.

RECOMMENDATIONS FOR FUTURE TRAINING ASSESSMENTS

This case example illustrates a method for designing and measuring training and the effectiveness of the training to achieve changes in knowledge, skill, and observed behavior. These recommendations can help shape future training assessments and support programs to design more effective training:

³ Kirkpatrick, J. and W.K. Kirkpatrick. 2021. “Introduction to the New World Kirkpatrick Model.” Accessed May 4, 2022. <https://www.kirkpatrickpartners.com/wp-content/uploads/2021/11/Introduction-to-the-Kirkpatrick-New-World-Model.pdf>

- **Develop timelines, tools, and processes in partnership with local stakeholders and staff:** This was a critical step for the design of both the training and evaluation. Often when there is limited time and resources, this step can get skipped and monitoring and evaluation tools are developed with limited input from stakeholders. Directly involving the processors receiving training leads to greater buy-in and trust in the process, and facilitates a deeper understanding of how trainees apply the skills they learned. Involving implementers in the development of the training measurement approach also helps to identify more efficient and effective data collection and analysis.


- **Allocate time and resources for evaluation:** Ideally, teams can conduct a situation analysis to better understand how the training could be complemented and reinforced through other forms of capacity strengthening support, such as technical assistance provision or mentorship. Layered capacity strengthening initiatives like these result in greater change that is sustained over time.


- **Improve survey comprehension and data quality:** To reduce opportunities for error and confusion, shorten the survey and ask a limited number of questions, translated into the local language. In addition, piloting the survey with local respondents before implementation is a key strategy to refine the questions and catch ambiguities in wording.


- **Train data collectors carefully:** To ensure you can interpret and use the data collected, ensure that administrators of the survey are trained and respondents have the opportunity to ask questions, if needed.


- **Ensure adequate time between completing the training and assessing the development of new behaviors:** Following training, ideally evaluators would observe changes in practice every 2–3 months to ensure continuous progress and sustained improvement. At least two opportunities for observed practice post-training creates a clearer picture of the skills trainees have built and their ability to apply these on-the-job.


- **Design training programs to include supportive on-the-job learning activities (e.g., coaching, peer learning) to reinforce the concepts learned in training:** Research⁴ has shown mentorship following didactic training has many benefits, compared to mentorship or training alone. Training of new food processors embarking on fortification is critical, but routine mentorship can help effectively track performance and sustain desired change.


- **Where possible, budget for an impact evaluation of the training:** The training evaluation focused on whether training participants acquired new knowledge and skills, and were able to apply them in their work. Conducting an impact evaluation (Kirkpatrick stage 4), would have allowed us to understand whether the training intervention subsequently led to the production of correctly fortified foods. In addition, some of the industries trained were already fortifying foods, and the evaluation did not measure whether there were improvements in the quality of fortification post-training.



⁴ Manzi, A., L. R. Hirschhorn, K. Sherr, C. Chirwa, C. Baynes, J.K. Awoonor-Williams, and the AHI PHIT Partnership Collaborative. "Mentorship and Coaching to Support Strengthening Healthcare Systems: Lessons Learned across the Five Population Health Implementation and Training Partnership Projects in Sub-Saharan Africa." *BMC Health Service Research* 17 (Suppl 3): 831. <https://doi.org/10.1186/s12913-017-2656-7>

ANNEX I. TRAINING EVALUATION

Thank you for participating in the training on food fortification and its application in industrial processes for wheat flour, maize flour, edible oils and fats. Kindly provide some feedback on the training. A rating scale with five options (strongly agree, agree, neutral, disagree, and strongly disagree) is used below to evaluate various aspects of training and the trainers' competency. Please return after completion.

Evaluation Criteria	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Training					
Overall training was good and relevant					
Presentations easy to understand					
Training was participatory and interactive					
Trainers					
Trainer knowledge was good					
Good facilitation skills					
Trainers engaged participants					
Answered questions					
Presentation relevant to training					

1. What did you like about this training? _____

2. Tell us any lessons you learned during this training? _____

3. Please write any additional comments below. _____

ANNEX 2: FOOD FORTIFICATION PRE/POST TEST EVALUATION SURVEY

Date: _____

Respondent: _____

Company: _____

Section I. (Multiple Choice)

I. In the table below are basic definitions of key terms associated with food fortification and food safety. Match the terms to the appropriate definitions.

s/n	Definition	Answer	Terms to Match
1	Concept that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use is		Vitamin A
2	Step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level		Internal monitoring
3	Action to eliminate the cause of a potential nonconformity or other undesirable potential situation		Correction
4	Staple foods, such as cereal grains and rice, might get fortified with this nutrient to prevent visual impairment		Preventive action
5	Action to eliminate the cause of a detected nonconformity or other undesirable situation		Corrective action
6	Quality management procedures, actions, and tests carried out by flour millers in order to manufacture fortified flour and ensure a high-quality product for consumers		Food vehicle
7	Specified way to carry out an activity		Food safety
8	Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level		Premix
9	A food stuff selected to carry specific micronutrients		Procedure
10	A process whereby essential micronutrients are added to food (relatively in small quantities) to maintain or improve the quality of diet of a group, community, or population with minimal risk to health		Critical control point
11	Action or activity that can be used to eliminate a detected food safety hazard or reduce it to an acceptable level		Control measure
12	A single ingredient containing multiple vitamins and minerals		Food fortification

Section II (Open-Ended Response)

2. Premix is a powdery mixture of micronutrients, excipients (inactive diluents), and anti-caking agents used to fortify flour. What is the function of adding the anti-caking agents to premix? _____

3. What safety precautions should be taken when handling open bags of premix? _____

4. List any three sectors that are typically represented in a multi-sector alliance for food fortification?

5. Can you describe any activities that may occur as part of an audit for an industry producing fortified wheat flour? _____

6. Define the term food fortification. _____

7. Outline any benefit of food fortification. _____

ANNEX 3. OBSERVATION CHECKLIST FOR MAIZE INDUSTRY

Date: _____

Name of Industry and District: _____

Name and Contacts of Industry Representative: _____

Names of Interviewer(s): 1. _____ 2. _____

Introduction

Industrial food fortification is one of the cost-effective interventions that the government of Uganda adopted to combat micronutrient deficiencies that lead to low blood hemoglobin, goiter, blindness, birth defects, and cognitive inability, among others in the population. Maize/wheat flour and edible oil and fats are some of the food vehicles being fortified in Uganda. The Ministry of Trade, Industry, and Cooperatives (MTIC) and Ministry of Health with support from USAID Advancing Nutrition is assessing the training needs of industries fortifying or those with the intention to fortify maize, wheat, and edible oils and fats, through the observation checklist as below. The findings will inform key stakeholders, public institutions, and partners of the training needs of industries for action depending on available resources and scope of institutional mandates.

Observation Checklist (MAIZE FLOUR)

Category	Observation			Comments
	Yes	No	N/A	
I. Good Manufacturing Practices				
I.1 Hygiene and Sanitation (GMP)				
I.1.1 Production area				
I.1.2 Packaging area				
I.1.3 Warehouse				
I.1.3 Staff facilities and toilettes				
I.2 Personnel				
I.2.1 Hygiene as required in standards				
I.2.2 Wearing protective clothing				
I.2.3 Trained in the tasks they perform				
I.3 Written Procedures or Instructions for...				
I.3.1 Receipt and storage of premix				
I.3.2 Premix dilution (If applicable)				
I.3.3 Feeder verification				
I.3.4 Sampling of maize flour for quality control				
I.3.5 Iron spot test for maize flour				

Category	Observation			Comments
	Yes	No	N/A	
2. Micronutrient Premix				
2.1 Premix inventory is up-to-date				
2.2 Certificate of analysis is received per lot				
2.3 Premix is stored under adequate conditions				
2.4 “First in first out” system in place				
2.5 Premix is handled well in fortification site				
3. Maize Flour Fortification				
3.1 Premix dilution procedure				
3.1.1 Homogeneity assessed				
3.1.2 Adequate storage and handling				
3.2 Records of feeder performance are available				
3.3 Premix level in feeder adequate during visit				
3.4 Records of flour produced/premix used				
3.5 Flour samples taken for analysis in every shift				
3.6 Premix is handled well in fortification site				
3.7 Corrective actions taken when...				
3.7.1 Ratio maize produced/premix is not right				
3.7.2 Iron content above factory minimum				
4. Fortified Maize Flour				
4.1 Records of flour samples analyzed using...				
4.1.1 Spot test for iron				
4.1.2 Quantitative method—Iron (External lab)				
4.1.3 Quantitative method—Vitamin A (External lab)				
4.2 Daily composite samples are available				
4.3 Last 30 samples are available				
4.4 Labeling meets specifications				
4.5 Blue F logo visible on fortified flour packages				
4.6 Fortified maize flour is stored adequately				
4.7 “First-in, first out” system applied to dispatch				

Please rate your knowledge on the following using the scale below:

(1=Weak, 2=Good, 3= Excellent). Please circle the appropriate response to each knowledge area.

Knowledge Area	Rate Scale		
Knowledge Area 1	1	2	3
Knowledge Area 2	1	2	3
Knowledge Area 3	1	2	3
Knowledge Area 4	1	2	3

What training topics/areas list below are you most interested in learning more about?

Please tick topics/areas you need.

Topics/Areas	Tick
Standards and regulation	
GMP implementation	
Vitamin A compound (Quality/handling/storage/application)	
Maize flour fortification process	
Internal monitoring and external monitoring—Labeling and marketing	
Specify other topics/areas _____	

1. Which are the key strengths/best practices in implementing the food fortification standards that have helped in compliance? _____

2. What are the key challenges in implementing the food fortification standards that affect compliance?



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