



## EVENT REPORT

### PLANNING, IMPLEMENTING, AND MONITORING OF NATIONAL FLOUR FORTIFICATION PROGRAMS: A Training of Trainers Event

24-28 July 2017  
Nairobi, Kenya



**Trainees from Kenya and Uganda Interpret Iron Spot Test Results**



## **Background and Rationale**

Micronutrients are vitamins and minerals, such as folic acid, iron, and zinc, which are needed in small amounts for the human body to function optimally. Most micronutrients are not produced by the body and so must be consumed via food or as supplements. In Sub-Saharan Africa, micronutrient malnutrition is prevalent due to a variety of factors, such as poverty, droughts, and disease. Micronutrient deficiencies are not often apparent until the deficit of a particular vitamin or mineral is significant. For this reason, micronutrient malnutrition is sometimes called “hidden hunger”.

The social and economic costs of micronutrient malnutrition can be extensive, including devastating birth outcomes for pregnant women and babies, impaired neurological development in young children, and reduced work capacity among adults. To decrease the risk of future cases of micronutrient malnutrition and to address existing deficiencies among populations, many countries have introduced flour fortification as part of a multi-faceted nutrition approach. Flour fortification is the addition of critical micronutrients to flour during the milling process. This initiative increases the nutrient density of flour and flour-based products for consumers.

Around the world, 86 countries have legislation requiring at least one type of wheat flour to be fortified with folic acid and/or iron. Sixteen of those countries, mostly clustered in Eastern and Southern Africa, also have national programs for maize flour fortification.

This Training of Trainers (TOT) event was planned to enhance the knowledge of individuals who are committed to food fortification in Eastern and Southern Africa and who want to further their capacity to train others about how to execute fortification activities appropriately. It is expected that the participants of this TOT returned to their respective countries with the motivation, resources, connections, and skills to improve and expand existing fortification programs or advance fortification efforts where a national program has not been implemented.

Twenty-three trainees representing 11 countries attended the TOT event. A list of participants can be found in **Appendix 1**.

## **Goal and Intentions**

The overarching goal of this event was to increase the capacity of flour fortification stakeholders in Eastern and Southern Africa to plan, implement, and monitor well developed, feasible, and effective flour fortification programs. We supported this goal by training individuals who are passionate about flour fortification on how to successfully share their knowledge and skills on the topic with others. To maximize this experience for participants and thereby increase the impact of fortification programs, we:



1. Offered an online course as pre-work for trainees to ensure that all participants arrived with a basic understanding of flour fortification planning, implementation and monitoring.
2. Engaged participants using multiple teaching methods to make the TOT material accessible and retainable by people with various leaning style preferences and backgrounds.
3. Trained participants on the following topics: fortification and monitoring basics, advocacy, multi-sector alliances, legislation and standards, premix, monitoring plans, equipping a mill for fortification, internal monitoring, and external monitoring.
4. Encouraged communication and teamwork among participants through knowledge sharing, group work, and practical experiences to promote a strong rapport among group members.
5. Provided each participant with a training manual to guide his or her future training efforts.

Participants completed reviews at the end of the TOT. This feedback will help us further improve the online course, the training manual, and the content of the TOT event.

### **Event Sessions**

A summary of each session starts below. The agenda can be found in **Appendix 2**.

#### **24 July 2017**

##### *Opening Session:*

*Sarah Zimmerman, Afidra Ronald, Becky Handforth*

The opening session covered a summary of the agenda, administrative matters, event objectives and expectations, and introductions of all in attendance. The trainees' names and countries were written on a large piece of paper, which stayed at the front of the room throughout the week to help with name recollection and to facilitate networking. Trainee expectations were recorded for reference at the end of the event.

To end this session, Afidra Ronald, Africa Network Coordinator for the Food Fortification Initiative (FFI), gave an official welcome to the training group. He noted the uniqueness of the event for Africa and stated that many more people expressed interest in attending than we could



accommodate. Afidra emphasized that the TOT was designed to include individuals from different countries and a variety of career backgrounds to facilitate sharing of experiences. To promote learning, he urged the trainees to be open and truthful with their successes and struggles in fortification planning, implementing, and monitoring. Most countries only had one or two representatives present. As such, Afidra encouraged the participants to return to their respective countries to share the knowledge and skills gained to further fortification efforts and program impact in the region. He noted that Africans have a responsibility to make flour fortification a successful public health initiative. Some countries fortify one food vehicle, other countries fortify many foods, and a few are just beginning to plan for fortification. All can learn from one another on the way to becoming experts. Afidra shared that this is the second event of its kind in Africa; the first was in September 2016 in Abuja, Nigeria. The official opening concluded with Afidra expressing greetings from United States Agency for International Development (USAID) in Washington D.C. and Kenya and wishing all participants and facilitators a good week of training.

#### *Regional Update: Afidra Ronald*

As Africa Network Coordinator, Afidra provided a regional update about fortification activities within the continent (Africa). He commenced with an explanation about the origins of FFI and FFI's roles in advocacy, technical support, and tracking fortification of industrially milled grains worldwide. He noted that grain fortification is based on experiences with salt iodization in the 1990s. Afidra also recognized the role of Smarter Futures as a public, private, and civic investment in the continent of Africa. FORTIMAS, a Smarter Futures tool for tracking fortification-related health trends using sentinel site surveillance, was introduced along with the Africa Maize Fortification Strategy. Afidra explained that while African countries mostly fortify wheat flour, maize flour, salt, oil, and/or sugar, a rice fortification feasibility strategy was recently conducted by FFI in partnership with the Global Alliance for Improved Nutrition (GAIN). This included a rice supply chain analysis for 19 African countries. If 12 of those countries, all located in West African, band together to require fortification of the rice they import, approximately 300 million people in the region would have access to this product. Next, Afidra showed maps of fortification progress worldwide and in the Eastern and Southern Africa region (% industrially milled fortified wheat and maize flour, % of households with adequately iodized salt, legislation for fortified oil - yes/no). Lastly, general challenges – which should also be viewed as opportunities - were presented. These included: unofficial trade across porous borders, insufficient internal monitoring and regulatory monitoring, lack of coordination between national and regional fortification stakeholders, inconsistent procurement of premix, and initiating rice fortification.

During the question and answer session, a participant asked why FFI has such a strong focus on industrially milled grains. Participants and facilitators explained the difficulty of monitoring small mills (which are common in the maize industry). The fact that those mills may not have a quality



or food safety management system in place makes them prone to mistakes. Program sustainability at those mills is also of concern. Afidra stated that governments do not stop village hammer mills from working when legislation for fortification is passed. In time, the industry will naturally consolidate with government support from the Ministry of Industry and the Ministry of Trade (for example); those village mills will become medium-sized and then industrial mills. Also, better roads and cheap electricity will promote the availability of fortified flour to rural areas that do not yet receive packaged flour. To reach those individuals currently without access to fortified flour, governments invest in complementary nutrition interventions like supplementation, micronutrient powders, and dietary diversification initiatives.

*Icebreaker:*  
*Sarah Zimmerman*

An icebreaker activity before the morning break promoted interaction among trainees. Sarah Zimmerman, Communications Coordinator for FFI, passed around a variety of snacks each with enriched (fortified) flour as the first ingredient. People formed small groups based on the snack they received. For example, all the people with Goldfish crackers became a group. Participants within each group had to come up with five things that they all had in common, not including the obvious similarities such as body parts and clothing. All groups then shared their similarities - things like we all have a public health nutrition background, we all like to read, we all have driver's licenses etc.

*Training and Manual Overview:*  
*Becky Handforth*

The content of the TOT largely followed a training manual that was prepared as part of this project. This session introduced trainees to that manual and covered the following:

1. Definition of a TOT event
2. Aim of the manual
3. Adaptability of the manual
4. Broad topics covered in the manual
5. Manual table of contents
6. Manual chapter format
7. Similarities between the manual and the TOT event
8. Teaching methods, in brief
9. Interpreting specific aspects of the manual



*Preparing for a Training Event:  
Becky Handforth*

Becky Handforth, a consultant for McKing Consulting Corporation and former employee of FFI, explained that the training manual can be used in its entirety for an in-depth training on flour fortification, or it can be used piece-by-piece, for instance, to advise multi-sector alliance members about developing a monitoring plan. The purpose of this TOT session was to inform the participants about planning for an in-depth training. It included three primary parts:

1. Recommended planning timeline:

Trainees were advised to start planning for such an event 1-2 months in advance especially if it will be hosted at an unfamiliar location and if a flour mill visit will be included. Actions that should be carried out in advance (one to two months, two weeks, one week), and on the first day of the event were shared.

2. Training adults:

Trainees were first asked to brainstorm factors that influence their ability to learn. Among items mentioned were stress, interest in the topic, and previous education experience. Six adult learning principles were then explained as a way to emphasize that adults and children learn differently. They vary in terms of motivating factors, experiences, and abilities, for instance.

3. Teaching methods:

Among a group of trainees, it is inevitable that the individuals' learning style preferences will vary; there will be auditory, visual, and kinesthetic learners included. As such, facilitators should utilize an assortment of teaching methods throughout a training to accommodate everyone involved. The teaching methods elucidated included: lecture, demonstration, practical activities, questioning, discussion, group work, case study, and role-play. Rather than lecture about the methods, small groups of participants were assigned one method each. The small groups were asked to discuss the following:

- A. How would you describe or define your teaching method?
- B. As a trainer, what should you do to make your teaching method most effective?
- C. What are some advantages and disadvantages of your teaching method?
- D. Provide us with an example of your teaching method.

Afterwards, each group presented their discussion.

Example: Demonstration

- A. Definition: Helping trainees to understand by showing them what you want them to learn. Use pictures, videos, or you actually demonstrate the concept.





- B. How to be effective: Be confident when you are demonstrating so participants respect you and the knowledge you are trying to share. Start with simple concepts and build upon them. Make sure participants understand every stage of the demonstration process; if they miss one part it is likely they will not grasp the whole concept.
- C. Advantages: Easy to understand, good for individuals with lower literacy levels, it's easy to retain what is seen. Disadvantages: Need to plan ahead of time, need to practice so you know the demonstration will work, participants likely to lose whole concept if miss one part.
- D. Example: Showing individuals how to conduct the iron spot test

#### *Why Fortify:*

*Sarah Zimmerman and Juliana Auma*

#### *Part I:*

Sarah approached this session with the mindset that the trainees were largely aware of the reasons for implementing fortification programs given that most had some relevant background experience and all were given access to an online training course as pre-work. Thus, she focused on how to share the message of “Why Fortify” with others.

Some of her talking points included:

1. Consider your audience. How does your fortification agenda link to the agenda of the person with whom you will meet? If you know the individual is from an organization that primarily supports childhood education, do not just show that individual a map of anemia around the world and mention that fortification can address iron-deficiency anemia. Rather, show the map and first explain how anemia impacts cognitive development in children, which can result in a reduced ability to learn and thrive in a school environment. Then explain how fortification can address anemia. **Or**, if you talk with government officials who are committed to reaching the World Health Organization’s Global Targets or United Nations’ Sustainable Development Goals, explain how a wide-reaching food fortification program can help the country to achieve a selection of them.
2. If a person asks you a question with a negative frame of mind, turn the question around. For instance if someone asks, how much does it cost to fortify? You say, how much is it costing your country not to fortify? Or, is it ethical to fortify if you will only reach urban areas? You say, is it ethical to not fortify at all because you cannot fully reach the rural population?



3. Create visuals that will help the information stick. For instance, the number of women with iron deficiency anemia worldwide would reach the moon and circle it if stacked head to toe.
4. Make your message as relevant as possible. For instance, try to find health and industry statistics from within the country or else use regional data.
5. Make your message relatable. For instance, ask people you know what it felt like to have anemia or a child who was born with a birth defect (or put a message on social media). Share quotes from those conversations as you advocate.
6. And, of course, have some impact data ready to share. For instance, Cameroon conducted a baseline nutrition study leading up to the flour fortification program in 2009??. Three years later, another nutrition study was conducted. It revealed that the program had a positive impact on folate, iron, vitamin B12 and zinc levels among the population.

## *Part II:*

For the second part of this session, Sarah acted as a news reporter who interviewed Juliana Auma, Secretary General for the Spina Bifida and Hydrocephalus Association of Kenya and mother of Phoebe, a daughter born with spina bifida and hydrocephalus.

Juliana received yellow tablets from an antenatal clinic when she was four months pregnant. However, the doctor did not explain the purpose of the tablets. Juliana initially took them as directed, but they made her feel sick, so she stopped. She was not aware of folic acid and its purpose until her daughter, Phoebe, was five years old.

Juliana explained spina bifida and hydrocephalus along with some complications of each condition. Spina bifida occurs when the neural tube (which starts as a flat plate), fails to close properly during the first 28 days after conception. If it fails to close at the bottom, the result is spina bifida. This birth defect can cause other health challenges like clubfoot, urinary tract complications, paralysis and hydrocephalus. Hydrocephalus is characterized by having “fluid” on the brain. Generally, cerebral spinal fluid is used to the extent needed by the brain and spinal cord and then absorbed into the body. With hydrocephalus, the natural production of cerebral spinal fluid outweighs absorption. An individual with hydrocephalus must be shunted to relieve the head of the excess fluid, which will otherwise lead to blindness, issues with cognition, or even death in some cases. Though hydrocephalus can be a result of spina bifida, it also has other causes.

Juliana explained that Phoebe uses intermittent catheters to assist with her urinary issues. Her bladder must be emptied every three hours to prevent kidney and bladder infections. She also needs to empty her bowel every evening after dinner.





When Phoebe was born, some of Juliana’s family viewed her as a bad omen because they had never seen a child with spina bifida. Thankfully, other family members and friends were encouraging and helpful.

Only Kenyatta National Hospital in Nairobi provides free care for children with spina bifida under the age of five. This free care is a policy in Kenya but the need is such that the wait is very long; Juliana was told two years. Sadly, a lack of treatment for that length of time is life threatening for children with spina bifida. Juliana appealed to a local newspaper as a charity case. Funding provided through that helped Phoebe to receive care at a private hospital. Phoebe is now 22 years old and has had 9 surgeries. Sometimes she is in bed for six months after a surgery, so it is important for family members and friends to be hands-on caregivers. Juliana explained that mothers who have children with birth defects like spina bifida need to be resourceful. They may not be able to easily work outside the home, but they can work with their hands. Juliana makes jewelry as one way to earn income.

With an aim to bring together families who are raising children with spina bifida and hydrocephalus, Juliana initiated the Spina Bifida and Hydrocephalus Association of Kenya (SHAK). Its mission is to provide hope and a sense of belonging to families impacted by spina bifida and/or hydrocephalus and to help them to better understand the conditions. Juliana mentioned that in many hospitals, the professionals who are supposed to provide hope instead focus on the negative, worst-case scenario when a child with spina bifida is born. SHAK has 13 chapters across Kenya. The main international supporter of SHAK is the International Federation for Spina Bifida and Hydrocephalus. In addition to SHAK, Juliana is involved with House of Hope, a temporary home near Bethany Kids Hospital where families can stay while their children undergo surgery and recovery.

Juliana emphasized that providing folic acid supplements to prevent neural tube birth defects, like spina bifida, will never be enough in Kenya. Women do not receive folic acid supplements before their pregnancies, their purpose is not explained, and women often stop taking them anyway. She asked the audience:

- How available are supplements?
- How many women know to visit an antenatal clinic before pregnancy?
- Does anyone follow pregnant women to make sure they are actually taking the supplements?

But if folic acid is added to commonly eaten foods in small amounts, it is possible to reduce the prevalence of pregnancies impacted by spina bifida.

As the event included representatives of multiple sectors, Juliana noted, “We can help you because we have the evidence of spina bifida, we also have the experience of caring for children



with spina bifida. Let's work together. Working with you will also give us more credibility to talk about fortification. This is not an option, we must fortify. We saw 1,600 patients last year at Bethany Kids Hospital and so many of them had spina bifida and hydrocephalus."

*[After the TOT, the following information was shared via email about Phoebe's education – a topic that is close to Juliana's heart. Phoebe sat her national exam to complete primary school in 2010 but her results weren't high enough to move on to high school. She enrolled in an institution to learn information technology (IT), which she loved. However, Phoebe was deregistered soon thereafter since she could not prove that she had completed high school. Years later, a church reverend learned about Phoebe's desire to continue her learning. Phoebe was enrolled in a new school and is currently in grade 7. She maintains the goal to become proficient in IT. People have spoken negatively towards the family that Phoebe is 22 years old but remains in primary school while her mom runs a national spina bifida and hydrocephalus association. It used to hurt Juliana deeply – these comments – but she eventually learned to rise above the critics and remain strong for her daughter and her daughter's goals.]*

#### ***Fortification and Monitoring Basics: Becky Handforth and Sarah Zimmerman***

To start this session, trainees were asked to describe the terms food fortification and monitoring in their own words and to provide reasons for instituting both.

Next, participants engaged in a game that tested their knowledge about the basics of food fortification and monitoring. This purposefully led to a conversation about "elevator speeches" – brief but persuasive messages about a specific topic that is delivered in approximately 30 seconds.

Some trainees were familiar with the term while others were not.

Sarah encouraged participants to make their elevator speeches personal. Rather than explain to a minister that "the country needs to introduce flour fortification because..." one should say, "I am committed to food fortification because..."

She also presented four key parts to every good story as an elevator speech guide - 1) an enemy, 2) a hero, 3) an antagonist, and 4) a love story. Thinking about flour fortification, the enemy is not the government inspectors or millers but rather anemia and neural tube defects (such as spina bifida). The heroes are iron and folic acid respectively, which combat the enemies. The antagonist depends on the country. In some places it is a minister or a flour miller or even the general public. The love story is when everyone works together to properly fortify flour to increase nutrient intakes and decrease the risk of anemia and spina bifida. This analogy was very popular among trainees and was referred to throughout the remainder of the event.



To close the session, trainees were given time to develop elevator speeches. Each was tasked with introducing flour fortification to someone unfamiliar with the concept and explaining why they support flour fortification. A few individuals were asked to present.

*Multi-Sector Alliance:  
Sarah Zimmerman*

In this session, Sarah introduced the topic of multi-sector alliances (MSAs), which are also known as food fortification coalitions, national fortification alliances, and so on. To emphasize the importance of MSAs, Sarah shared the old adage: *If you want to go fast, go alone; if you want to go far, go together.*

Sarah drew a diagram of interlocking circles on a large piece of paper. In one she wrote “public”, in another, “private”, and in the last, “civic”. She asked trainees to identify potential MSA representatives from their countries and to determine the appropriate sector for each.

To help participants understand the function of an MSA, Sarah asked trainees to list the roles MSA members might have in program planning, implementing, and monitoring. A discussion ensued about whether a flour fortification program can succeed without an MSA. In some situations it is possible, such as when the government directs the program and supplies the premix or when the milling industry is highly supportive of the initiative. However, these situations are unusual and working without an MSA is not recommended in the typical settings.

The session ended with two role-plays on the topic of recruiting individuals to join the MSA.

**25 July 2017**

*Strengthening Kenya’s National Food Fortification Program: An EU Funded Project  
Professor Daniel Sila*

In January 2017, Kenya started a €4 million project to help strengthen food fortification initiatives in the country. Eighty percent is European Union funded while 20 percent is funded by Kenya. The lead partner of the project is Jomo Kenyatta University of Agriculture and Technology (JKUAT) working in close collaboration with the Ministry of Health, Nutrition and Dietetics Unit. The project will span six years. Professor Daniel Sila from JKUAT is the manager for the project.

To start the presentation, Daniel provided an overview of the food security situation and nutrient deficiencies in Kenya. He stated that among children under 5 years old, the incidence of stunting is 26%, wasting is 4%, underweight is 11%, anemia is 46.3%, zinc deficiency is 81.6% and



vitamin A deficiency is 78% according to the 2014 Kenya Demographic and Health Survey (KDHS).

A brief history of food fortification efforts in the country was then provided:

- 1970 – Voluntary salt iodization initiated
- 1978 – Salt iodization became mandatory
- 2005 – The National Fortification Alliance was formed
- 2006 – National standards for oil and fats were enacted
- 2006 – Food fortification logo was developed
- 2009 – National standards for wheat flour and maize meal were enacted
- 2010 – National standards for sugar were enacted
- 2015 – East African food fortification standards were adopted for all packaged wheat and maize flour, and vegetable oil/fats.

The current legislation specifies that all producers of packaged wheat and maize flour must fortify regardless of mill size. In reality, many small- and medium-sized mills are not doing so.

A trainee raised a question about the high vitamin A and zinc deficiencies in the country despite an active fortification program. Phillip Makhumula, another TOT facilitator, explained that the data for the KDHS were probably collected in 2012/13. One must consider how the fortification program was running at that time. He noted the importance of external monitoring in program effectiveness. Considering a case study in Malawi, when the sugar factories were monitored consistently, compliance was high and nutritional impacts were realized. However, the prioritization of monitoring has decreased. As such, lower compliance and fewer positive nutritional impacts are probable. The same could be true for Kenya.

The members of Kenya's National Fortification Alliance include: Ministry of Health, Kenya Bureau of Standards, food industries, development partners, premix suppliers, and consumer organizations.

The focus of the current project is on fortifying maize flour. The partners (Jomo Kenyatta University of Agriculture and Technology, the Ministry of Health of Kenya, and other relevant stakeholders) will work on the inclusion of small and medium-sized mills by identifying the needs of each group and tailoring trainings based in part on those needs. The project will also strive to raise awareness through nutrition education programs, policy advocacy, and behavior change communication. To support monitoring and evaluation efforts, the University will establish a fully equipped laboratory and a pilot milling plant for training. Mills will be monitored every quarter and results will be communicated to the enforcing agents.



The project will involve students from the university, including two doctoral candidates and four master's degree candidates as trainees and other graduate students as interns.

*Flour Fortification Monitoring (Distance-learning Course) Discussion:*  
*Becky Handforth*

As pre-work for this TOT event, all trainees were expected to complete *Flour Fortification Monitoring*, a distance-learning course created by FFI, GAIN, and the International Grains Program Institute of Kansas State University (IGP Institute). *Flour Fortification Monitoring* was developed in 2015 and was first made public for the participants of the 2016 pilot TOT held in Abuja, Nigeria.

Becky led a discussion with the trainees to gain feedback on *Flour Fortification Monitoring*. Overall, the trainees were pleased with their experience. They noted that the online platform was easy to navigate and that the information provided through the distance-learning course was relevant and useful. Some individuals had to download the videos and watch them later due to slow Internet connections. Two people also mentioned issues with the quizzes timing out; this was not a problem last year, but the online platform has changed a bit. Participants appreciated the external source videos that were embedded into the module videos, which covered topics such as flour milling, fortification with iron to address anemia, and the check-weigh process. One person also liked the extra resources that were provided for those who wanted more in-depth information. Participants felt the length of the course was just right though they suggested having a longer period to complete the course. By the time all trainees were registered, the face-to-face TOT event was only two weeks away. When asked whether they preferred a self-directed course or one that included a moderator and small assignments like discussion board questions, they expressed a desire to maintain the self-directed format.

*Review of 24 July:*  
*Sarah Zimmerman*

Each morning - Tuesday through Friday - began with a recap of the previous day's sessions and follow-up information on the topics discussed. Both the facilitators and the participants contributed.

Trainees remarked that the most memorable sessions from the previous day included Juliana's story about raising a child with spina bifida and the role-plays about recruiting the Minister of Health to be part of the MSA. Sarah reminded participants about the large number of tasks the MSA is responsible for during the planning phase of the flour fortification program in comparison to implementation and monitoring. As such, she recommended that MSA's create a timeline and deadlines for each task. In terms of evidence that food fortification creates health and economic impacts, Sarah told participants that she would add four two-page briefs about the benefits of



flour fortification on the flash drives to be distributed at the end of the week. Finally, Sarah offered to stay after the day's activities to discuss the cost of flour fortification with anyone who was interested (*approximately six people did stay for this hour-long session*).

*Legislation, Standards, and Technical Regulations:*  
*Phillip Makhumula*

This session started with a brief overview of the terms legislation, standards, and technical regulations. Phillip Makhumula, representing LifeSciences Consulting, explained that in addition to flour specifications, some fortification standards include specifications for the premix content and the premix addition rate that must be used to achieve the flour specifications.

Phillip showed trainees the micronutrients included in flour fortification standards from a snapshot of countries around the world. He then covered numerous topics that should be discussed when developing flour fortification standards in order to achieve the desired public health impact. They included:

- Nutrition status of the population
- Consumption of the food vehicle
- Magnitude of the nutritional gap to be filled by fortification, taking into consideration the desire to help the at-risk population reach a biological efficacious threshold while keeping high consumers below a level that may cause adverse effects
- Fortificant compounds to be used and bioavailability of those compounds
- Equipment variations within the industry
- Cost implications

Next, Phillip introduced participants to the *Formulator*, an Excel-based tool developed in 2005 to help countries establish fortification standards that maximize the potential health impact while minimizing risks. It is especially useful for countries where multiple food vehicles are to be fortified with the same micronutrient. This link was shared for those interested in learning more: <http://www.a2zproject.org/node/49>. After inputting required data points, the *Formulator* provides a summary page of recommendations for each staple food of interest that includes:

1. The expected additional daily intake of each micronutrient due to fortification
2. Production specifications – minimum, target average, and maximum level of each micronutrient in flour at the factory
3. Regulatory (retail) specifications - minimum, target average, and maximum level of each micronutrient in flour at the market
4. Premix formulation
5. Estimated premix cost





While some fortification standards only include specifications for flour at the production level, others include specifications for flour at the retail level. In reviewing some example standards as a plenary group, Phillip pointed out that the specifications for minerals, like iron, would be the same at production and retail because minerals are stable. However, the specifications for vitamins, like vitamin A, at production and retail would differ due to instability. Vitamin losses need to be accounted for when creating the fortification standards. In fact, stakeholders should start with the quantity they desire for individuals to consume at the household level and build up to what should be put in at production level.

Another issue to consider when developing standards is intrinsic micronutrients. For example, flour already contains iron; the flour specification should take that into account. Vitamin A is not naturally found in flour, however, so the amount added will equal the amount specified for the production level.

The following points were raised by trainees:

1. If a product is eaten soon after it is produced, will the micronutrient levels be too high? Phillip answered that fortification is intended to help the majority of a population reach the estimated average requirement (EAR) for each micronutrient. These are much lower than the upper tolerable limits (ULs) at which consumers may notice adverse effects. Thus, eating flour-based products prepared with recently milled flour is not a concern.
2. How often should flour fortification standards be reviewed? Phillip recommended every 5 years as the levels of micronutrients added may need to be reduced or raised based on changing food consumption patterns.

This session ended with an activity about common fortificants to emphasize the health importance of the vitamins and minerals that are used in fortification. Though fortification stakeholders are often aware of the basics – that fortification with iron reduces the risk of iron-deficiency anemia and fortification with folic acid reduces the risk of pregnancies affected by spina bifida – many do not have a nutrition background. For this activity, three small groups were formed. Each group received a large piece of paper labeled with the names of various vitamins and minerals. They also received numerous slips of paper, each including a characteristic or descriptor of a vitamin or mineral. The aim was to match the characteristic or descriptor with the correct nutrient.

Here are some examples of the characteristics/descriptors provided:

- This nutrient is also known as cobalamin [vitamin B12]
- Of the 86 countries that have adopted a standard for wheat flour fortification, all but the Philippines, the United Kingdom, the Congo, Venezuela, and Viet Nam include this nutrient. [Folic acid]
- Deficiency of this nutrient is the most common in the world [iron]



- Severe deficiency of this nutrient is uncommon; symptoms include hair loss, diarrhea, delayed sexual maturation, and eye and skin lesions, to name a few. Mild deficiency, however, is more prevalent – especially in economically disadvantaged regions. [Zinc]
- Deficiency of this nutrient is the predominant cause of preventable blindness around the world. One symptom is night blindness or the inability to see well in dimly lit settings. [Vitamin A]
- The skin is able to produce this nutrient when it is exposed to sunlight. That compound is then transported to the liver and kidneys where it is converted into a form that the body can actively use. [Vitamin D]

*Global Fortification Data Exchange:  
Sarah Zimmerman*

Sarah provided a brief introduction to the Global Fortification Data Exchange, a joint project of FFI, GAIN, the Iodine Global Network, and the Micronutrient Forum. The Exchange was not available at the time of the event (*launched September 2017*), but trainees were able to see a prototype. The Exchange provides data on fortification of wheat flour, maize flour, rice, vegetable oils, and salt. At this time, project partners are collecting and uploading the following indicators for the aforementioned food vehicles: legislation status, fortification standards, food intake, and availability. Other indicators are planned for the future.

Link: <http://www.fortificationdata.org>

*Premix:  
Becky Handforth*

Trainees were first asked to name and explain the components of premix – vitamins and minerals, excipients (fillers), and anti-caking agents.

Becky then talked about the importance of purchasing premix as a ready-made product rather than blending ingredients on-site to make premix or adding vitamins and minerals individually to the flour. A brief demonstration followed to show the difficulties faced when trying to blend premix ingredients on-site by someone who is not skilled and who does not have the proper equipment.

Next, participants were asked to think about the planning phase of a fortification program in relation to premix – specifically the tasks that stakeholders need to address at this point in the process. Answers included: researching reputable premix companies, requesting bids from premix companies, creating an approved supplier list, and requesting government reduction of import duties and other taxes on premix.



Premix procurement and storage were covered thereafter. Becky noted that mills are encouraged to create a premix inventory system to balance the inflow and outflow of premix so that they never run out of stock and are also never overwhelmed with more premix than can be used before the product expires. To review proper storage procedures, a picture of a premix warehouse facility was shown with numerous problems. Trainees were asked to name the issues.

The cost of premix followed as the next topic with an explanation of the base costs – number of micronutrients included, type of micronutrient compounds used, amount of each micronutrient added, and availability of the micronutrient compounds on the world market. Some example costs of premix were provided both from personal communication with entities who prepare or source premix and from a study conducted in Africa. Facilitators shared ways to reduce premix costs, such as by purchasing in bulk. Additionally, the group discussed who procures the premix. While it is often the individual flour mills, there are some exceptions. For instance, sometimes the country's flour millers association will purchase the product to facilitate a large shipment (and lower costs). The product received will then be distributed to flour mills according to a prior agreement. In rare cases, the government procures all premix.

To emphasize that premix and flour improvers should not be mixed in the same feeder, the results from an experiment conducted by Mühlenchemie were explained. The experiment combined ascorbic acid (an improver) with each type of iron compound that can be used in fortification. After 24 hours at tropical temperatures, the appearance and texture of each mixture had drastically changed. Some were even solidified or seemed melted.

To close this session, Becky asked participants about the safety precautions for handling premix. To illustrate, she showed a picture taken at a mill in Kansas. The individual adding premix to the feeder is clothed in a mask, goggles, and long protective gloves. Becky explained that as a powdery substance, premix easily releases dust when it is poured into the feeder. Without protection, the dust can get into the handler's eyes and lungs and on the skin, which can lead to health concerns given the high concentrations of micronutrients in premix.

#### *Flour Fortification Monitoring Plan: Sarah Zimmerman*

This session introduced key components of a flour fortification monitoring plan, including goals, objectives, activities, indicators, and strategies for disseminating monitoring results.

For practical application, participants were split into six groups. Groups were tasked with developing a simple flour fortification monitoring plan for their countries. For this exercise, the plan was to include: one goal, three objectives, 3 indicators, one pre-fortification activity, two ongoing activities and a brief description of how the monitoring findings would be disseminated.



After about 30 minutes, groups paired up to explain their plans with one another. Sarah then asked each group to present a portion of their plan. Given time constraints, the groups did not get to the final part about disseminating monitoring findings. Sarah led everyone in a brief discussion on that topic.

### *Equipping a Flour Mill: Afidra Ronald and Becky Handforth*

To start this session, Afidra talked briefly about the setup and operational flow of a flour mill. This section was added in preparation for the scheduled mill visit. Upon conclusion, we shifted into equipping a flour mill to conduct the fortification process.

Afidra noted that a micro-ingredient feeder is the primary piece of equipment necessary to fortify flour. Even prior to implementing fortification, most flour millers will be familiar with feeders because they also use them to add improvers to flour. Similarly, every flour mill that fortifies must have the capacity to adequately integrate the premix into the flour, either with a mixing conveyor or a batch mixer. Industrial mills will already have one of these installed prior to the fortification program. Furthermore, Afidra emphasized that it is highly recommended for flour mills to invest in both an interlock mechanism, whereby the feeder halts if the milling systems stops, and a premix low-level detector that alarms when the premix is low.

The second part of the session focused on the following:

1. Feeder options (screw, roller, or revolving disk)
2. Premix addition options (continuous addition or batch addition)
3. Mechanisms for measuring premix (by volume or weight)
4. Premix delivery (gravity-based delivery or pneumatic delivery)

The third part of this session provided a step-by-step explanation on how to calibrate a feeder; this should be done when a feeder is first installed, after any mechanical failure, and generally on a periodic basis. The check weigh process, which is actually one component of calibration, was also described. The check weigh process is used to verify the premix feed rate and should be conducted multiple times per day.

Lastly, Becky conducted a feeder calibration demonstration. Four funnels of various sizes represented a feeder opening (or feeder mortar speed) at different settings – 25%, 50%, 75% and 100%. In place of premix, fine sugar was used.

The steps taken were as follows:

1. The smallest funnel was filled with sugar.
2. A timer was set for four seconds (instead of a minute, which would be the case if actually calibrating a feeder) and the sugar was released.



3. During that time, the sugar was collected in a bowl.
4. The sugar was then weighed.
5. A point was plotted on a graph, which displayed “feeder settings” on the x-axis and grams of “premix per four seconds” on the y-axis.
6. Steps one through five were then repeated with the three other feeders.

A calibration curve was drawn between the four plotted points. The use of a calibration curve when setting a feeder for the delivery of premix was explained.

**26 July 2017**

*Review of 25 July:*

*Sarah Zimmerman and Phillip Makhumula*

Sarah explained that in addition to creating a monitoring plan for the purpose of tracking a program’s progress, monitoring plans make it easier to submit proposals for donor funding. They provide an outline of the work to be done, estimate the resources required, and list the responsibilities of involved stakeholders – all of which will be well received by donor agencies.

Participant comments included appreciation for the calibration demonstration and a question about whether governments should create an approved premix supplier list or leave it up to the flour millers to decide on the best company.

To compliment the calibration demonstration from the previous day, Phillip led a brief segment about calculating a mill’s target premix feed rate (g/min). For this exercise one needs to know the mill’s flour production rate per minute and the premix producer’s recommended premix addition rate per ton.

*Internal Monitoring (QA/QC):*

*Afidra Ronald and Phillip Makhumula*

At the start of this session, Afidra explained the term external monitoring in brief and then asked trainees to define or describe the two components of internal monitoring – quality assurance and quality control.

The remainder of this session focused on detailing the various quality assurance and quality control activities. They included:

#### Quality Assurance

1. Using only premix that is provided by a certified supplier and accompanied by a Certificate of Analysis (COA)
2. Storing premix appropriately and using it by the expiration date



3. Checking premix feed rates
4. Packaging, labeling, and storing fortified flour appropriately
5. Verifying premix usage against production of fortified flour (premix reconciliation)

Quality Control:

1. Confirming that flour is fortified using a rapid qualitative test
2. Confirming with quantitative analyses that the amount of each micronutrient in the fortified flour complies with the specifications of the fortification standard

The practical activity for the segment on quality assurance was a worksheet to practice premix reconciliation calculations. Afidra also demonstrated an Excel tool, which simplifies the process of premix reconciliation calculations. Flash drives given to all participants at the end of the week included the Excel tool. While our examples showed calculations done at the end of each month, premix reconciliation is done by some mills weekly or even daily.

To illustrate one aspect of quality control, Philip led a demonstration of the iron spot test. After providing an explanation of the iron spot test and a picture of possible test results, participant groups were given four numbered samples of flour on a plate. They conducted the iron spot test using the chemical solutions provided and determine which ones were fortified. Each plate included fortified maize and wheat flour and unfortified maize and wheat flour. The fortified maize flour was easy to identify as fortified. However, the fortified wheat flour showed only 1-2 spots for each sample. At the time, we were under the impression that both wheat and maize flour were fortified with NaFeEDTA in Kenya, so only two reagents were used for the iron spot test. During the flour mill visit, we noticed that the premix for wheat flour contained ferrous fumarate instead of NaFeEDTA. Thus, the iron spot test should have included hydrogen peroxide as a third reagent.

Prior to closing this session, Afidra gave participants the following scenario: Imagine that a country's fortification program is scheduled to commence in two weeks. The primary mill in the country has premix on-hand and has a feeder installed. What steps need to be taken to prepare for a four-hour test run of the fortification process, and what actions need to happen during the test run? This exercise encouraged participants to think about how they would assist a flour mill if asked to provide technical support.

### *Unga Flour Mills Visit*

After lunch, the entire group visited Unga Flour Mills located in Nairobi's industrial zone. To facilitate a better experience and more opportunities for conversation, the trainees were split into three smaller groups. On the tour, we saw four places: the mill control room, a laboratory, the micro-ingredient feeder, and the premix storage area. Given that the sessions about premix, equipping a flour mill, and internal monitoring had previously been covered in the classroom, the trainees asked many questions about the qualitative and quantitative testing used, the mill's





fortification records, checking the premix feed rate, premix procurement, and the premix storage processes. The mill employees were very generous with their information.

Perhaps the most unexpected aspect of the tour was seeing the use of a potassium ferricyanide solution to detect the presence of added iron in maize flour. The result was a green tinge with a few spots. For wheat flour, the iron spot test methodology is used.

Another aspect of the tour that differed from our explanation in the classroom was labeling premix for storage. Rather than label the boxes with A, B, C and so on to indicate which boxes should go to the feeder first, this mill puts all the boxes from the first shipment to arrive in one area and places a green wooden sign with the word “issue” on top. The next shipment to come in is placed nearby but farther from the exit. On top of these boxes is a red wooden sign with the word “hold”. In that way, the mill ensures the first-in-first-out system is followed.

**27 July 2017**

*Review of 26 July:  
Sarah Zimmerman*

The review for this day consisted of comments about the mill visit. Everyone was very appreciative of the opportunity to tour Unga Flour Mills and was impressed with the mill’s setup for fortification. Even though this was not the first flour mill tour for most, they were more informed about what to look for and ask about this time. As explained earlier, the potassium ferricyanide test was surprising because the facilitators had not introduced it before the visit. The trainees found it interesting that the mill quantitatively tests random single samples rather than composite samples. Some individuals saw actual fortification-based records during the tour. Though the records were up-to-date, some felt they would serve the mill staff and inspectors better if more details were included. For example, adding a space for comments to address any issues that arise.

*External Monitoring:  
Phillip Makhumula*

Phillip started the session by asking trainees to define or describe the term “external monitoring”, a form of monitoring conducted by government inspectors at flour mills. Two responses were:

- Verification of adherence to the mill’s established internal monitoring procedures
- Verification that internal monitoring activities by the industry are adequate to facilitate consistent compliance with the country’s standards



He then asked participants to explain the difference between audits and inspections, the two primary components of external monitoring. For the purpose of flour fortification, *audits* refer to a review of the protocols that food manufacturers establish and carry out to ensure that the products coming off the production line are adequately fortified. During an audit, inspectors confirm that QA/QC procedures are documented and followed. They also review records pertaining to those QA/QC procedures. Finally, the inspectors observe the fortification process. *Inspections* refer to the process of verifying that the end product is fortified and actually complies with the specifications of the fortification standard. During an inspection, the inspector collects samples for qualitative and quantitative analyses.

In most countries, food inspectors are already tasked with visiting flour mills periodically for food safety purposes. Phillip encouraged countries to merge the activities required for food safety and those required for auditing flour fortification into a single checklist, which promotes efficiency and consistency.

Phillip explained that during a mill inspection multiple flour samples should be collected from various areas of the mill - from the end of the production line or in the packaging area, from the mill's warehouse, and from the inventory of composite samples. He also talked about the importance of using composite samples for quantitative analyses as opposed to single samples in addition to the pros and cons of testing a sample for an indicator (marker) nutrient. In most cases the indicator nutrient is iron. The methods used to quantitatively assess iron content are simpler than for folic acid and vitamin A. Furthermore, the higher quantity of iron in flour makes it easier to analyze. In Kenya multiple marker nutrients are tested: iron, vitamin A, and zinc.

Trainees received a worksheet that displayed fictitious quantitative results for two mills along with their respective standard specifications for flour. They were asked to determine if, *based on the quantitative results alone*, the mills would be considered compliant. Several discussion points followed, including:

- What if the country provides only minimum levels for each micronutrient but the quantitative results indicate over-fortification by 20%? What if over-fortification by 120%?
- What if 80% of the composite samples comply with the standard specifications for flour but all the results are on the low end of the range of variation?
- What if the results for one sample show that iron is compliant but folic acid is not compliant?
- What if the result is 0.5-1 outside of the range of variation? Is that close enough?

Phillip suggested that two to four weeks following an audit and inspection visit, flour mills should receive a final written report that includes the completed audit (checklist), observations



taken at the mill, results of the various analyses conducted, and notification of corrective actions required. Trainees received a hypothetical audit and inspection report. Facilitators asked questions to assess the trainees' ability to interpret it.

*Reporting and Using Monitoring Data:  
Sarah Zimmerman*

The aim of this brief session was to get the trainees thinking about the entire process of monitoring. Sarah wanted them to realize that fortification monitoring is not just about collecting data and sending information to the designated receiving entity. For flour fortification to achieve the desired health impact, the process of monitoring needs to also include data analysis, interpretation of results, and dissemination of findings. From there, it is essential that the flour fortification stakeholders use the data to inform program improvements.

Sarah used the example of corn masa flour in the United States of America (USA) to emphasize her point about using data to inform program improvements. In the USA, wheat flour has been fortified with folic acid since 1998. As a result, the prevalence of neural tube birth defects has dropped in the population as a whole. However, the prevalence remains higher than expected among the Hispanic population. This population uses a lot of corn masa flour to prepare tortillas, tamales, and other commonly consumed items, but corn masa flour was not included in the legislation for fortification. Advocates in the USA used the data on birth defect prevalence to seek a change in the legislation. In 2016, the law was amended to allow corn masa flour to be fortified with folic acid.

Furthermore, this session got participants thinking about the manner in which monitoring findings should be shared and with whom. At the very least, an annual report of the flour fortification program should be prepared. While some fortification stakeholders will receive the entire report, perhaps the general public will see a few highlights on social media. For high-level stakeholders, a one-page brief might be sufficient.

Sarah offered some ideas for dissemination of results using FFI as an example. Each year, the percent of industrially milled wheat flour, maize flour, and rice that is fortified worldwide is shared with the public using social media, FFI's electronic newsletter, and FFI's annual report. This is information that the public may find interesting or useful. However, data about FFI's website (number of visits, most popular pages, average time spent on most popular pages) would not be interesting to the public. Thus, this information is only given to FFI's Executive Management Team, which acts like a board of directors.

Sarah suggested that if resources and time are limited, the multi-sector alliance should partner with university students to help analyze data and author the annual report. Mills that consistently pass their audits and inspections should be celebrated in the annual report and their achievement



announced publically. The multi-sector alliance may also create posters to put in mill lobbies or break rooms congratulating the staff on their commitment to making people stronger, smarter, and healthier through food fortification.

*External and Commercial Monitoring in Kenya:  
Sammy S. Kamwaro*

Sammy Kamwaro graciously shared his experiences as a Senior Public Health Officer in Nairobi, Kenya. About 70% of all the big millers are based in Nairobi County. The country has a population of about 6 million people, meaning that flour consumption is very high taking into consideration that maize and wheat are staple foods in the country. Sammy explained that it is the mandate of the public health officers to carry out commercial monitoring in the marketplace and, to some extent, external monitoring at the flour mills. Kenya has a total of about 250 inspectors, but the country lacks a sufficient number to monitor the fortification program. Highlighting a challenge of external monitoring, when Sammy arrives at a mill, he may not be permitted to enter the facility for hours before commencement of his duties. He assumes the mill staff is trying to tidy up or refill their feeders at that time. Phillip concurred that this happens in other countries as well. The long wait time creates inefficiencies and wastes money for a program that already lacks resources. Sammy explained that in the marketplace, inspectors tend to monitor whether the flour package has the fortification logo printed and the words “fortified flour”. Simple iron spot tests are not often done, thus it is impossible to know for sure if the product is fortified.

Sammy noted that there is still a lot of sensitization that needs to be done between the millers and the inspectors. They are partners in fighting this common enemy of micronutrient deficiencies.

As a way forward, inspectors are now required to include fortification monitoring activities on their monthly reports. Training for additional inspectors for the purpose of fortification monitoring is a priority; the goal is to have around 50 officers equipped with the appropriate knowledge and skills in the near future.

*Training & Advocacy Practice:  
All Trainees*

The aim of this training and advocacy practice session was to have the participants demonstrate what they had learned. They were split into groups of 3-4 individuals. Facilitators provided scenarios to each group to guide their presentations. Here are three examples:

- You are a primary or secondary school teacher who wishes to support fortification by making it the class topic one day. Pretend we are your students and you have 10 minutes to teach. What would you do during that time?



- Best Flour Mills is supposed to fortify but compliance has been low. The Minister of Health believes the mill would do better if the staff were informed about the importance of fortification from a health and nutrition standpoint. Imagine you have been invited to meet with the staff one afternoon – we are the staff. Convince us.
- You have been called to a country where compliance is consistently low despite five years of mandatory flour fortification. As a QA/QC expert, pretend you are tasked with providing training to the QC managers of 10 mills and we are in attendance. Train us on 1-2 components of internal monitoring.

The groups were given 45 minutes to prepare followed by 10-minute presentations. Importantly, this exercise proved that the trainees had significant knowledge about the topic of flour fortification. Some groups were most comfortable responding to their scenario in lecture format while others were strong on audience participation. A few groups involved all members in their presentation while others designated a single presenter.

**28 July 2017**

*Review of 27 July:  
Sarah Zimmerman*

The review this day touched upon various topics from the week. Sarah shared some simple fortification logos while highlighting the fact that using one or two colors keeps printing costs low for flour millers. Simple fortification logos are also easier for the consumer to identify and interpret.

She reminded participants that when cynics question the cost of fortification, they should raise the point about the cost of not fortifying in terms of lost productivity and lost lives. Still, it is important to keep in mind that flour millers typically bear the costs of flour fortification while the healthcare system and the general population benefit. Therefore, it is imperative to treat industry leaders with respect and as equal partners.

Sarah also suggested that trainees refrain from using the acronym “NTDs” in Africa when talking about neural tube defects, as many people understand the letters to signify neglected tropical diseases. To accommodate those who are not aware of anencephaly and spina bifida, it may be best to say birth defects of the brain and spine instead.

Lastly, Sarah noted that flour fortification programs can achieve the intended public health impact under three conditions. They must be well implemented and monitored. They must optimize coverage and therefore consumption. Lastly, they must follow the World Health Organization’s



recommendations for fortifying wheat and maize flour (specifically, the appropriate micronutrient compounds and levels).

*Case Studies:  
All Trainees*

The participants were split into four groups, each receiving a case study that presented a fortification-related problem that might occur at a flour mill. Each group was asked to answer the following questions based on their assessment of the scenarios

1. What problem is presented in the case study?
2. What are some potential causes of the problem?
3. What steps would you take to identify the problem?
4. What do you think is the *actual* cause of the problem?
5. What steps would you take to resolve the problem?

The aim of this activity was to get the participants thinking outside the box. Troubleshooting is inevitable, especially at the start of a flour fortification program.

*Key Issues In Fortification:  
Phillip Makhumula*

In this session, Phillip expanded upon some of the topics that were introduced previously, often including country-specific details.

1. Standards
  - They should specify the iron and zinc compounds to include.
  - The flour specifications are best written as a target value encompassed by a minimum and maximum (or acceptable range of variation). However, some countries differ. For example, Mozambique's flour specifications stipulate minimums for each micronutrient. However, for those micronutrients that are of concern if consumed in excess, a safety level is also included, which acts a maximum.
  - For regulatory purposes, the factory level flour specifications are applicable to flour imports as well.
  - Some countries require flour millers to add the same amount of each micronutrient to high and low extraction flour. Even though the amount added is the same, the flour specifications for high and low extraction flour should differ for the total amount of each micronutrient. This is due to the fact that high extraction flour has more intrinsic nutrients remaining after the milling process.
  - Interpretation of quantitative results as compared to the flour specifications.





2. Food fortification monitoring and evaluation flow chart
3. Use of a central collection center to collate monitoring data
4. Iron spot test – for flour samples that are fortified, the distribution of red spots is indicative of a flour mill’s mixing capabilities
5. Fortification monitoring reports – they should be easy for both fortification experts and lay people to interpret
6. Labeling issues – In one example, instead of labeling each vitamin and mineral followed by the quantity per serving, only “nutrient” was written multiple times followed by the quantity per serving

#### *Closing Items:*

#### *All Facilitators and Trainees*

The last session was designed to bring closure to the event. The expectations shared by trainees on the first day of the TOT event were reviewed to make sure no lingering questions remained. Next, each trainee completed a short evaluation, which can be found with a sampling of responses in **Appendix 3**. At this time we received a surprise moment of appreciation from the hotel staff, which included singing, dancing, pictures, and a cake. They wished to thank us for hosting the TOT event at the hotel. Lastly, Afidra shared some thoughts about the event and encouraged participants to spread their knowledge and skills with others back home. He also honored all those who made the event possible – USAID – for the generous financial assistance - our local consultant, other facilitators, and even the trainees. Each trainee received a certificate of participation to commend them for their involvement. At this time, flash drives and the TOT instructor manuals were also made available to each person to support further learning and their future training experiences.

#### **Lessons learned:**

1. The event was four and a half days. Given the addition of a field trip and the “training and advocacy practice” session to this year’s event, some of the other sessions felt rushed. It would be ideal to extend the event to a full five days.
2. Refine some of the scenarios for the “training and advocacy practice” session to be more prescriptive and also require multiple people from each group to present.
3. Hand out the manual after the fourth day so that trainees have the opportunity to look through it and ask questions before leaving the event.
4. Both years, trainees have expressed interest in import monitoring, commercial monitoring, and impact evaluations. Consider if those can be incorporated into the TOT or if another TOT should be developed to cover those topics.



### **Appendix 1: List of Participants**

| NAME                  | COUNTRY    | POSITION  |
|-----------------------|------------|---|
| Albert K. Moono       | Zambia     | Vice President, National Association for Professional Millers of Zambia       |
| Aruonga Zola          | Kenya      | Nutrition Consultant  |
| Berguete Mariquele    | Mozambique | Food Technologist, World Food Program   |
| Daniel Sila           | Kenya      | Professor, Jomo Kenyatta University of Agriculture and Technology             |
| Dexter Chagwena       | Zimbabwe   | Nutrition Consultant  |
| Didier Nkubito        | Rwanda     | Senior Advisor Food and Nutrition Security, SNV Rwanda                        |
| Eric Ruracenyeka      | Burundi    | Deputy Head of Training and Technical Assistance, Burundi Bureau of Standards |
| Gift Chikabvumba      | Malawi     | Certification Officer, Malawi Bureau of Standards                             |
| Gugulethu T. Moyo     | Zambia     | Nutritionist, Nutrition Action Zimbabwe                                       |
| Joash Ochieng'        | Kenya      | Quality Controller, Bakhresa Grain Milling (K) Ltd.                           |
| Jonas Chigariro       | Namibia    | Professor, University of Namibia  |
| Juliana Auma          | Kenya      | Secretary General, Spina Bifida and Hydrocephalus Association of Kenya        |
| Lucy Murage           | Kenya      | Senior Program Officer, Nutrition International                               |
| Mauricete Ângelo Ruco | Mozambique | Food Fortification Coordinator, Helen Keller International                    |
| Mike Mazinga          | Uganda     | Program Associate for Food Fortification, SPRING Uganda                       |
| Sabelo M. Masuku      | Swaziland  | Environment and Public Health Manager, Matsapha Town Council                  |
| Sammy S. Kamwaro      | Kenya      | Senior Public Health Officer, Nairobi City                                    |
| Stellah Ngere         | Kenya      | Quality Control Officer, PS Kenya   |
| Thelma S. Kanwa       | Zambia     | Research Scientist, National Institute for Scientific and Industrial Research |
| Thokozire Mbano       | Malawi     | Consultant and Researcher   |
| Tlhako Mokhorro       | Lesotho    | Principal Consultant, Paradym Consulting                                      |
| Wilson Enzama         | Uganda     | Private Consultant  |



## Appendix 2: TOT Agenda

**\*Please note, some sessions were shifted to different times/days due to time constraints. The event flowed as presented in the report**

**24 JULY 2017**

| SESSION TIME         | SESSION NAME   | SPEAKER  |
|----------------------|--|--|
| 9:00 – 9:15          | Introduction of Participants & Facilitators                | Facilitated by Ronald Afidra, FFI  |
| 9:15 – 9:30          | Introduction to Agenda & Administrative Matters            | Sarah Zimmerman, FFI   |
| 9:30 – 9:45          | Event Objectives & Expectations                            | Facilitated by Becky Handforth, McKing Consulting                                    |
| 9:45 – 10:15         | Opening Welcome  | Ronald Afidra  |
| 10:15 – 10:30        | Regional Status of Flour Fortification                     | Ronald Afidra  |
| 10:30 – 11:00        | Icebreaker Game  | Facilitated by Sarah Zimmerman   |
| <b>11:00 – 11:15</b> | <b>Break &amp; Group Photo</b>                             |  |
| 11:15 – 11:30        | Training & Manual Overview                                 | Becky Handforth  |
| 11:30 – 12:15        | Preparing for a Training Event                             | Becky Handforth  |
| 12:15 – 1:00         | Why Fortify?   | Sarah Zimmerman<br>Juliana Auma, Spina Bifida and Hydrocephalus Association of Kenya |
| <b>1:00 – 2:00</b>   | <b>Lunch Break</b>   |  |
| 2:00 – 2:45          | Session 1: Fortification & Monitoring Basics, Parts I - IV | Becky Handforth<br>Sarah Zimmerman   |
| 2:45 – 3:15          | Session 2: Multi-Sector Alliance, Parts I – II             | Sarah Zimmerman  |
| <b>3:15 – 4:00</b>   | <b>Break</b>   |  |
| 4:00 – 4:15          | Session 2: Multi-Sector Alliance, Part III                 | Sarah Zimmerman  |
| 4:15 – 4:30          | Online Training Course Discussion                          | Facilitated by Becky Handforth   |



## 25 JULY 2017

| SESSION TIME         | SESSION NAME  | SPEAKER   |
|----------------------|---|---|
| 9:00 – 9:30          | Strengthening Kenya's National Food Fortification Program | Prof. Daniel Sila, Jomo Kenyatta University of Agriculture and Technology |
| 9:30 – 9:45          | Review of Key Points & Comments                           | Facilitated by Sarah Zimmerman  |
| 9:45 – 11:00         | Session 3: Legislation & Standards, Parts I - VI          | Becky Handforth   |
| <b>11:00 – 11:15</b> | <b>Break</b>  |   |
| 11:15 – 12:00        | Session 4: Premix, Parts I – VII                          | Phillip Makhumula, Lifesciences Consulting                                |
| 12:00 – 1:00         | Q & A Review Game   | Facilitated by Sarah Zimmerman and Becky Handforth                        |
| <b>1:00 – 2:00</b>   | <b>Lunch Break</b>  |   |
| 2:00 – 3:30          | Session 5: Monitoring Plan, Parts I – III                 | Sarah Zimmerman   |
| <b>3:30 – 3:45</b>   | <b>Break</b>  |   |
| 3:45 – 4:45          | Session 6: Equipping a Flour Mill, Parts I – IV           | Ronald Afidra   |

## 26 JULY 2017

| SESSION TIME         | SESSION NAME                                 | SPEAKER                           |
|----------------------|--|-----------------------------------|
| 9:00 – 9:15          | Review of Key Points & Comments              | Facilitated by Sarah Zimmerman    |
| 9:15 – 11:00         | Session 7: Internal Monitoring Parts I - IX  | Ronald Afidra                     |
| <b>11:00 – 11:15</b> | <b>Break</b>                                 |                                   |
| 11:15 – 12:00        | Session 7: Internal Monitoring, Parts X - XI | Ronald Afidra                     |
| <b>12:00 – 1:00</b>  | <b>Lunch Break</b>                           |                                   |
| 1:00 – 5:00          | Unga Flour Mill Field Trip                   | All Participants and Facilitators |



## 27 JULY 2017

| SESSION TIME         | SESSION NAME                                     | SPEAKER                        |
|----------------------|--|--------------------------------|
| 9:00 – 9:15          | Review of Key Points & Mill Visit Comments       | Facilitated by Sarah Zimmerman |
| 9:15 – 10:30         | Session 8: External Monitoring, Parts I – VI     | Phillip Makhumula              |
| <b>10:30 – 10:45</b> | <b>Break</b>                                     |                                |
| 10:45 – 12:30        | Session 8: External Monitoring, Parts VII – VIII | Phillip Makhumula              |
| 12:30 – 12:45        | Session 8: External Monitoring, Part IX          | Sarah Zimmerman                |
| 12:45 – 1:00         | Introduction to Training Exercise                | Becky Handforth                |
| <b>1:00 – 2:00</b>   | <b>Lunch Break</b>                               |                                |
| 2:00 – 2:45          | Preparation for Training Exercise                | All Participants               |
| 2:45 – 3:45          | Training Exercise Presentations                  | All Participants               |
| <b>3:45 – 4:00</b>   | <b>Break</b>                                     |                                |
| 4:00 – 5:00          | Training Exercise Presentations                  | All Participants               |

## 28 JULY 2017

| SESSION TIME  | SESSION NAME   | SPEAKER                        |
|---------------|--|--------------------------------|
| 9:00 – 9:15   | Review of Key Points & Training Exercise Comments  | Facilitated by Sarah Zimmerman |
| 9:15 – 10:15  | Real World Experiences: Monitoring Flour Fortification   | Phillip Makhumula              |
| 10:15 – 11:00 | Concluding Session: Revisit Objectives & Expectations, Participant Questions, Final Key Points | All Facilitators               |
| 11:00 – 11:15 | Final Evaluation   | Facilitated by Becky Handforth |
| 11:15 – 11:30 | Distribution of Certificates   | Ronald Afidra                  |



### **Appendix 3: Evaluation Questions (with select participant responses)**

- 1. What was your level of knowledge about flour fortification prior to attending this event? Circle one number below with 10 being a fortification specialist.**

Range from 3 to 8

*Some of the participants had significant fortification experience coming into the TOT.*

- 2. What do you feel your level of knowledge about flour fortification is today? Circle one number below with 10 being a fortification specialist.**

Range from 7 to 10

- 3. What is your opinion of the online course (Flour Fortification Monitoring) that was designated as pre-work for the event?**

*Very useful though time allocated prior to attending course was short (the short length of time for the online course was noted by a few other trainees)*

*Excellent and very simple to follow, well designed, quite informative, coverage is wide.*

*It is good and gives good background to the main course. It also provides material that I can continue to use throughout my career.*

*It helped to put our expectations into perspective. I think it was a good guide to what to look for at the training and made the whole program easy to grasp.*

- 4. Tell us at least one thing that you learned during this training of trainers that you feel will be useful for your future flour fortification efforts?**

- Elevator speech
- Engagement of stakeholders to build a strong fortification alliance
- Planning for fortification with clear QA/QC parameters from the beginning involving all stakeholders
- Premix reconciliation
- External monitoring of industries – protocols and what to check
- Ideas for advocacy and communication
- The enemies in fortification are not the flour millers or the inspectors but rather the micronutrient deficiencies, anemia, and birth defects.
- Internal and external monitoring are the basics to ensure impact





- Fortification standards
- Feeder calibration
- Internal monitoring – where appropriate QA/QC practices are implemented, the fortification program is likely to be successful especially with compliance to the standards and regulations.
- Appreciation of the science behind fortification
- Developing a national fortification plan
- Consistent monitoring is necessary and results must be acted upon

#### **5. What did you appreciate most about this training of trainers?**

Very participatory; group work was very involving

Quality of facilitators and methodologies used

Hands-on approach to learning, participatory methodology, flour mill visit, approachable facilitators

It had a number of facilitators who have different experiences, engagement of trainees made us learn more, well organized, industry visit a big plus

Directly addressed the gaps and challenges that various countries are facing at the moment

The different techniques used to involve the trainees to participate during the training; the trainers were from different backgrounds, cultures and countries; the organization and time management; the online course; the extra resources

Commitment of the facilitators; the content of the training was inclusive. Also the audience was drawn from different backgrounds.

The trainers were very resourceful, as they have mastered food fortification. They also have cross country expertise and this helps in comparing progress in the region.

It was comprised of people/experts from different fields – we shared experiences and knowledge.

#### **6. What would you change about (or add to) this training of trainers?**

[Add] Import monitoring, a visit to the national reference lab, and a visit to a medium scale mill for comparison



I would have each country present the status of its fortification program in say 15 minutes for the rest of the participants to appreciate. Plus, a practical session on calibration and feeders at the mill.

A little more time on adult learning approaches/methods.

[Add] some component of impact evaluations since the ultimate goal of all our efforts is to fight our “enemies” – anemia, spina bifida, night blindness etc. By evaluating efforts, I would see how far we have to reach in terms of fighting the enemies.

Allow more time for the training. More industry/mill visits. Include premix suppliers in the training.

Increase real-life examples from country experiences especially when talking about issues such as cost, effectiveness, and monitoring. Use real figures and be more specific not generalizing aspects.

**7. Do you feel that this event should be replicated in the future?**

Yes to reach more trainers and a follow-up session for former participants who demonstrate use of information gained.

Of course, and a follow-up on our work as trainers needs to be done to ensure the lessons learned are being applied in our specific areas of work.

Yes, because we need to build the capacity of more trainers in order to sustain the efforts made.

Yes. This would increase the number of stakeholders who have a better understanding of flour fortification.

**8. How can the information, techniques, and skills shared at this event be directly applied to you daily work?**

As an advocate, I have credible back up of valid resources to facilitate my work. I have a greater reason to reach out to the consumers at large on the important role played by fortification.

Use of training materials to develop country specific training modules



The information can be shared during advocacy and communication activities. Training techniques will be used when facilitating trainings/workshops on fortification and other topics in general.

Proper monitoring (internal) at our mill for successful fortification.

Communicate with my coworkers so that we can all speak the same language in terms of fortification and relay this information to all our clients (food industry). Also, improve on our capacity to analyze the micronutrients and strengthen our country's external monitoring activities.

**9. Do you see an opportunity to inform, advise, or train others in your home country using some of what you learned? If so, who will be your audience?**

Yes, because most of the inspectors have an inclination to food safety only.

Yes, national micronutrient fortification alliance would be the first target: millers, QA/QC officers, inspectors, and lab technologists among others.

Yes, through the partnerships and alliances of community service organizations working in the nutrition sector.

Yes. Healthcare professionals who can serve as potential advocates/communicators on fortification. District food and nutrition security committees (multi-sectoral). Also, food science and nutrition students.

Yes, we will conduct TOT trainings with different stakeholders, such as industry and government officials (laboratory staff, inspectors, bureau of standards). Also, develop advocacy packages for different audiences.

Yes, professional millers.

**10 The length of time for this TOT was:**

- A. Too long**
- B. Just right**
- C. Too short**

All but two trainees indicated that the length of time for the event was "just right". The other two felt the event was too short.



**Please write any additional comments, critiques or suggestions below.**

I would like to thank the organizers and resource persons for the privilege given to me to be part of this training and for your labors to make this event a success. I will endeavor to do my best to be part of this “love story” not only for my country but for the region at large.

Use some participants as trainers next time.

No time to share feedback on some activities.

Having to wait until the final day to get the manual.

Include impact evaluation aspects as all this is done for that ultimate goal. Stakeholders/trainers should appreciate that fact as they build capacity and always link monitoring activities to evaluation that will be done after a few years of implementation.

It was good to combine countries that are already strides ahead with those that are still at infancy stage in the fortification program. This helps in understanding the feasibility of the program. It would have been better though if there were at least more than one participant from all countries to assist each other during planning and implementation of the program.

Country presentations would add flavor to the course. You could identify case studies in countries already fortifying and get them to present on the specific topics – fortification alliance, regulatory monitoring, advocacy etc.

Sharing the notes in a flash disk is very helpful. It is great to share the contact list of the trainers and facilitators for future reference.