

Regional Capacity Building Workshop for Effective Flour Fortification

Training of Trainers Report

9-13 September 2019, Baku, Azerbaijan



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Executive Summary

Countries in Central Asia and the Caucasus Region continue to register relatively high levels of anemia, affecting over 30% of women of reproductive age and between 22 and 49% of children under age five. Overall prevalence of neural tube defects is estimated to be 9.9 per 10,000 live births.

Representatives from eight countries in these regions participated in a five-day workshop 9-13 September 2019 to develop expertise in promoting, planning, implementing, and monitoring wheat flour fortification as a strategy to address anemia and neural tube defects. Five of the eight countries have wheat flour fortification mandates (Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan) but only Turkmenistan and Uzbekistan have achieved high coverage. The remaining three countries (Azerbaijan, Georgia, and Ukraine) are at different stages of developing national programs on food fortification.

Several times during the workshop countries with established programs were paired with those without established programs. This allowed experienced fortification stakeholders the opportunity to share knowledge and gain experience as fortification trainers. Levan Silagava, executive director of the millers' association in Georgia, noted the benefit of this by saying the friendships created led to an agreement to advance fortification.

Participants discussed technical components of fortification – from design to impact evaluation – and visited an industrial flour mill where they saw a demonstration of the iron spot test for qualitative testing of fortified flour. They also met a doctor who treats children with spina bifida as well as a mother and child living with this birth defect.

At the end of the training, each country developed a flour fortification action plan for the next six to 12 months with commitments to advance effective flour fortification in their countries. Staff from UNICEF and the Food Fortification Initiative will support the countries in the future to successfully complete their action plans. The region plans to develop a web-based information sharing platform to track the commitment of countries, including plans to reduce iron deficiency anemia by 40% of current levels and neural tube defects to less than six per 10,000 live births by 2030 as part of "A Wiser Region" agenda.



Annamurat Nazarov, left, explains the Turkmenistan approach to fortification to Ilgar Khidirov, a miller from Azerbaijan.

Abbreviations Used

- DHS - Demographic Health Surveys
- FAO - Food and Agriculture Organization of the United Nations
- FFI - Food Fortification Initiative
- FortifyMIS - Fortification Management Information System
- FORTIMAS - Fortification Monitoring and Surveillance
- MICS - Multiple Indicator Cluster Surveys
- NTD - neural tube defect
- UNICEF - United Nations International Children's Emergency Fund
- USAID - United States Agency for International Development
- WHO - World Health Organization

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Background

Humans need vitamins and minerals, called micronutrients, in small amounts to function optimally. Most micronutrients are not produced by the body and must be consumed via food or supplements. The consequences of micronutrient deficiencies can be extensive, including devastating birth outcomes for pregnant women and babies, impaired neurological development in young children, and reduced work capacity among adults.

Despite these well-established facts, the World Health Organization (WHO) reports that “the burden of disease associated with poor nutrition continues to grow” in its European region, which includes Central Asia and the Caucasus.¹ WHO reports that micronutrient deficiencies in this region are often caused by a diet with low fruit and vegetable consumption. A diet low in animal-source foods also lacks key nutrients such as iron, zinc, and vitamin B12.

To decrease the risk of vitamin and mineral deficiencies among their population, many countries add essential nutrients to food during production. Called fortification, this increases consumers’ nutrient intake without requiring them to change behaviors. Though many foods can be fortified in a food systems approach to improving health, this event focused on wheat flour fortification because the wheat flour availability in each country represented is more than 250 grams per person per day, according to the Food and Agriculture Organization of the United Nations (FAO).

While fortification does not require consumer behavior change, systematic behavior change is needed among governments and industries to sustain successful flour fortification programs. Ideally, national governments will mandate flour fortification through legislation then monitor it for compliance. Flour millers must procure quality nutrients to use in fortification then maintain quality control procedures. Food processors must use fortified ingredients and properly label their products. Customs officials must ensure that imported flour meets the national fortification standard. All of these steps can be incorporated into existing procedures so that fortification is a relatively simple yet reliable health intervention.

The goal of the **Regional Capacity Building Workshop for Effective Flour Fortification – Training of Trainers** event was to increase the capacity of flour fortification stakeholders to promote, plan, implement, and monitor well-developed, feasible, and efficient flour fortification programs. Of the eight countries represented in the workshop, four have established fortification programs and four do not (Table 1).

This report features highlights of the five-day event in order of the agenda. On the second day, country teams presented the status of their fortification programs, and on the final day, each country develop a plan for moving fortification forward. Those are included in Appendix A. The participant list is Appendix B.

¹ World Health Organization Regional Office for Europe. Health Topics. Nutrition. <http://www.euro.who.int/en/health-topics/disease-prevention/nutrition> Accessed 30 September 2019.

Table 1: Wheat flour fortification snapshot of participating countries

Country	Legislative status	Wheat flour available for human consumption (grams per capita per day) ²	Percent of domestically produced, industrially milled flour that is fortified ¹	Nutrients in standards ¹
Azerbaijan	Draft created	609	0	--
Georgia	Being considered	448	0	--
Kazakhstan	Became mandatory in 2005 ¹	253	41	Folic acid Riboflavin Thiamin Niacin Zinc Iron
Kyrgyz Republic	Became mandatory in 2009 ¹	354	7	Missing data
Tajikistan	Passed in July 2019 ¹	358	0	Being developed
Turkmenistan	Became mandatory in 1996 ¹	517	95	Folic acid Iron
Ukraine	Evidence of deficiency needed to support call for legislation	288	0	--
Uzbekistan ³	Became mandatory in 2005 ¹	465	100	Updated in 2019 to include: Iron (NaFeEDTA) Zinc B1 (thiamine) B2 (riboflavin) B3 (niacin) B9 (folic acid) Vitamin B12

¹ Global Fortification Data Exchange, September 2019

² Food and Agriculture Organization of the United Nations

³ UNICEF provided support for Uzbekistan participants to participate in the workshop

Prerequisite Work

Beginning July 24, participants received one reading assignment a week for six weeks. Five of the six assignment included questions that participants could complete via an online survey; the sixth assignment included a chart for a member of the milling industry to complete regarding the types of flour produced in the country.

The assignments were in Power Point format so that the recipients could also use the slides in the future as they train others. The material was distributed in both English and Russian. Responses to the questions allowed meeting organizers to adjust the workshop itinerary to clarify points that were not understood, such as understanding flour extraction rate.

Opening Ceremony

During the opening ceremony, moderated by Dr. Amirhossein Yarparvar, UNICEF Regional Health and Nutrition Specialist, the following four people each endorsed wheat flour fortification as a viable option for improving vitamin and mineral intake in Azerbaijan:

- Mr. Goshgar Tahmazli, Chairman, Azerbaijan Food Safety Agency
- Mr. Edward Carwardine, Representative UNICEF Azerbaijan
- Mr. Musa Guliyev, Deputy Chair, Health Committee of Parliament, Azerbaijan
- Mr. Jaidev Singh, Mission Director, US Agency for International Development (USAID), Azerbaijan

These leaders spoke of the health benefits of fortified flour, and well as the economic benefits of a more productive workforce and from children developing their full mental capacity.

Ms. Sarah Zimmerman, Communications Coordinator for the Food Fortification Initiative, concluded the opening ceremony by noting that four countries represented at the event have a long history of fortifying flour and will have valuable insights for other countries represented.

Several media reporters attended the opening ceremony, and Mr. Tahmazli, center, answered their follow-up questions in interviews after the ceremony ended.



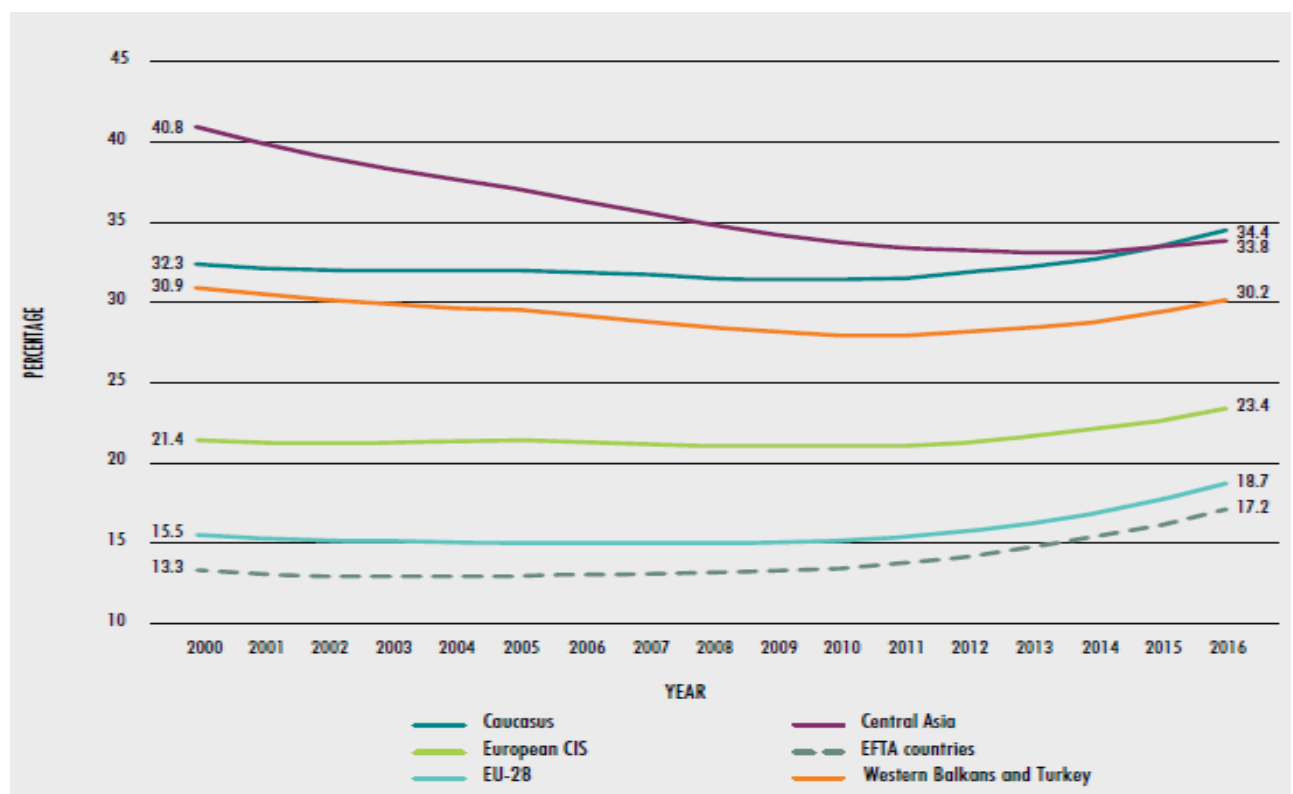
Burden of Nutritional Deficiencies

Regional Overview

Dr. Yarparvar presented a review of nutritional status in Eastern Europe and Central Asia, including the Caucasus region. He noted health problems associated with lack of dietary diversity, low percentage of children who are exclusively breastfed during their first six months, and increasing rates of obesity. He added that unlike stunting and other forms of visible malnutrition, micronutrient deficiencies are often unnoticed and invisible from the eyes of parents and policy makers; hence they are referred to as “hidden hunger.”

Regarding anemia among women of reproductive age, Dr. Yarparvar shared an encouraging insight for the benefits of flour fortification. As noted in the chart below, the anemia prevalence among women of reproductive age (15 – 49 years) in Central Asian countries declined from 40.8% to 33.8% in the years from 2000 to 2016; four countries in this region are fortifying flour with iron to reduce the risk of iron deficiency anemia. In contrast, the anemia prevalence among women of reproductive age in the Caucasus region increased slightly from 32.3% to 34.4%; no countries in the Caucasus are yet fortifying flour.

These results are consistent with research associating each year of flour fortification with a statistically significant 2.4% decrease in anemia prevalence in women.¹ The research also showed that countries that did not fortify flour observed no statistically significant reduction in anemia prevalence over time.²



² Barkley, J. S., Wheeler, K. S., & Pachón, H. Anaemia prevalence may be reduced among countries that fortify flour. *British Journal of Nutrition*, 2015.

Outcomes of Anemia

Next, Ms. Zimmerman lead a discussion on the outcomes of anemia. As part of the prerequisite work, participants were to ask three women if they had ever had anemia, and if so, to ask how anemia made the women feel. During the workshop, participants reported responses such as extreme fatigue, wanting to sleep constantly, being irritable, dizziness, and lack of appetite. Ms. Zimmerman also noted that anemia drains national productivity and increases the risk of maternal deaths and low-birth weight infants. In addition, iron deficiency in childhood limits cognitive development which in turn reduces potential earnings. One participant's response was "Why should women who are anemic deliver babies with these problems if it is so easy to address?"

Impact of Spina Bifida

Spina bifida is a common birth defect that can be mostly prevented with adequate intake of folic acid (vitamin B9). Thirty-six studies from 13 countries show that fortifying flour with folic acid effectively reduces the prevalence of these neural tube birth defects.³

To demonstrate the real impact of spina bifida, Dr. Elturan Ismayilov, Azerbaijan National Nutrition Consultant for UNICEF, interviewed Dr. Tarana Seyidmammadova, a child neurologist in Baku. She described how spina bifida develops very early in a pregnancy – usually before women know they are pregnant. Consequently, waiting until a pregnancy is confirmed is too late to prescribe folic acid supplements to protect against spina bifida.

An Azerbaijan workshop participant noted that awareness of the importance of folic acid among the population and medical personnel is crucial. Dr. Tohfa Jamilova, Health and Nutrition Officer for the UNICEF Azerbaijan country office, said the national government does not provide supplements. If physicians recommend supplements, women decide whether to buy them. Because fortifying flour would lead to increased folic acid intake during the time it is needed, Dr. Seyidmammadova estimated it could reduce the number of Azerbaijan's cases of spina bifida by at least half.

Next Dr. Seyidmammadova introduced a mother and the mother's four-year-old daughter who has spina bifida. The mother said she did not know about folic acid or how to get it before she was pregnant. An ultrasound in her 29th week of pregnancy confirmed that the baby had spina bifida. She said it was shocking to everyone in the family, but they decided to deliver the child and give her a name that translates in English as "Victory." The child had her first surgery when she was eight days old, and as she has grown, her bones are not forming fully, yet her mother described her as very active.

A child being born with spina bifida "completely changes" the lives of the family, Dr. Seyidmammadova noted. Depending on the extent of the birth defect, the child may need to see multiple medical specialists such as physical therapists, orthopedists, and neurologists. Dr. Seyidmammadova said rehabilitation services for disabled children in Baku are available, but she is not sure if adequate

³ Food Fortification Initiative (FFI). Fortifying Flour with Folic Acid to Prevent Neural Tube Defects. Atlanta, USA: FFI, 2017. Available from www.FFInetwork.org. Accessed 18 September 2019.

treatment facilities and quality care for children with spina bifida are available outside the city.

Mrs. Mutriba Latypova, a participant and flour fortification consultant from Tajikistan, said her nephew has spina bifida, and the costs of caring for him are huge. For example, the boy is six years old but still wears diapers because, like many children with spina bifida, he does not have bladder control. Mrs. Latypova passionately noted that fortification protects the future of your children and the future of your nation.

A participant from Uzbekistan asked if some women are more at risk than others for having a child with spina bifida. Dr. Seyidmammadova said that women who have diabetes are at a greater risk but that neural tube defects can happen to anyone.

Global Fortification Status

Quentin Johnson began this session with a map of 83 countries that have mandatory legislation for wheat flour fortification. He next discussed the reported successes with fortifying to prevent neural tube birth defects, reduce the risk of anemia, and create economic benefits. He included examples from Canada, his home country.

When people in Central Asia and the Caucasus region see a map of countries with fortification legislation, they commonly ask why they should fortify when Turkey and countries in Western Europe do not. To address that question, the next session was a webinar panel discussion with the following four guests:

- Professor Sir Nicholas Wald from the United Kingdom where flour is fortified with iron and other nutrients but not folic acid
- Anna Verster, Smarter Futures Senior Advisor, from Netherlands
- Dr. Lutz Popper, Scientific Director, Stern-Wywiol Gruppe, from Germany
- Walter von Reding, Bühler Head Milling Solutions Flour Service, from Switzerland

Each panelist noted the lack of political will, the impact of vocal opponents, and the sense that people get enough nutrition through their diets. Ms. Verster noted that too often terminating pregnancies affected by spina bifida is seen as preventing the birth defect. Asked for their advice, the panelists urged the workshop participants to identify a political champion to lead the efforts, engage local associations for people with spina bifida in advocacy, and ensure that media professionals support fortification.

Country Comparisons

Next Ms. Zimmerman highlighted differences between countries invited to the workshop and seven countries in Western Europe (Austria, Belgium, Denmark, Finland, Germany, Netherlands, and Sweden). The Western European countries were chosen because their combined population is close to the combined population of the countries invited to the workshop (Table 2). Yet the number of live births in 2015 in the countries represented at the workshop is more than 1 million greater than the number of live births in the Western European comparison countries. "That is one million more reasons to fortify your flour," Ms. Zimmerman said.

Ms. Zimmerman noted that the prevalence of anemia among non-pregnant women and preschool children in the countries invited to the workshop was twice as high as anemia among the same groups in the seven comparison countries. Infections and inherited red blood cell disorders can cause anemia, but there seems to be very little difference in these factors between the two groups of countries being compared.

Tea consumption is often cited as the cause for anemia in Central Asia as tea can inhibit absorption of non-heme iron in plant-based foods. FAO data indicate that tea availability in the countries invited to the workshop is slightly higher than in the comparison countries, but the difference is not so great as to be the likely explanation for the higher anemia prevalence among workshop countries.

Calcium in milk products can reduce absorption from heme iron in animal-sourced foods. In Central Asia, consuming smetana (a type of sour cream) and yogurt with meals is common practice. FAO data, however, indicate that consumption of milk products (including cheese and yogurt) is almost twice as high in the Western European countries selected for comparison. If anemia prevalence in the countries being compared was largely due to milk consumption, it would seem that countries in Western Europe would have higher anemia prevalence since the availability of milk in the food supply is much greater there.

Another cause of anemia is vitamin and mineral deficiencies, and this is often caused by poor diets. In all countries used for comparison in this exercise, the four most common foods available, per FAO, are milk, wheat, vegetables, and potatoes. The availability of meat, however, is 43 kilograms per person per year in the countries invited to the workshop contrasted with 82 kilograms per person per year in the countries being used for comparison. Since meat is a natural source of iron, Ms. Zimmerman speculated that the difference in meat availability may be a significant factor for the higher prevalence of anemia in the countries invited to the workshop.

A paper published in 2014 estimates that most anemia in Western Europe is caused by sickle cell disease while most anemia in Eastern Europe and Central Asia is caused by iron deficiency.⁴ Ms. Zimmerman suggested that based on the higher levels of anemia among the countries represented in the workshop, it is not logical for them to not fortify flour because simply because Western Europe are not fortifying flour.

⁴ Kassebaum et al. A systematic analysis of global anemia burden from 1990 to 2010. *American Society of Hematology Blood*, 2014.

Table 2: Country comparison with Western Europe

	Countries invited to workshop	Seven comparison countries in Western Europe
Population ¹	131,868,000	138,409,000
Live Births ²	2,339,486	1,301,175
Neural tube defects per 10,000 ²	12.8	9.3
Anemia prevalence among non-pregnant women ages 15 to 50 years ³	35%	18%
Anemia among preschool children ages 6 to 59 months ³	34%	14%
Tea available (kilograms per person per year) ⁴	0.76	0.54
Milk available (kilograms per person per year) ⁴	158	306
Meat available (kilograms per person per year) ⁴	43	82

¹ United Nation Population Division

² Blencowe et al., Estimates of global and regional prevalence of neural tube defects for 2015: a systematic analysis. [Annals of the New York Academy of Sciences](#). 2018 and personal communications

³ [Demographic Health Surveys](#) and World Health Organization estimates. [The global prevalence of anemia in 2011](#)

⁴ Food and Agriculture Organization of the United Nations data from 2013

Tajikistan example

To end the session on global experiences, Dr. Hotambek Khairov shared how Tajikistan achieved mandatory fortification legislation in 2019. He said a draft law was created in 2004, but it took many years to move from one agency to another for approval. In addition, the advocates had to overcome resistance from people who opposed fortification. The law passed in July of 2019, and Dr. Khairov said the country now needs to develop secondary laws to support it. Mrs. Latypova added that a task force representing nine ministries worked on the full text of the legislation and that millers were consulted.

Advocacy Practice

After Ms. Zimmerman shared suggestions for advocacy – mainly that messages have to influence the audience to take action rather than simply inform them of data – each participant was asked to develop a short answer to why he or she supported fortification. This exercise was to guide participants to internalize and articulate the messages they heard earlier in the day. Participants then worked in country groups to develop a short speech they would make if someone in the Ministry of Health asked them to justify fortification when they returned home. Each group seemed to focus on scientific messages, which was appropriate for the imagined audience with the Ministry of Health. But the next day Ms.

Zimmerman reminded them to include an emotional appeal, such as the example of a child with spina bifida, in their communications.

Planning Fortification Programs

Industry perspective

Given that understanding the industry perspective is key aspect of planning fortification programs, this session began with a panel discussion featuring six millers from among the participants. Levan Silagava from Georgia said the biggest challenge is cost as millers are focused on revenue. He said non-compliance from competitors and non-fortified imported flour create an economic disadvantage for millers who do fortify. Arsen Anarbekov from Kyrgyz Republic agreed that non-fortified imported flour is a challenge; he added that the civil society needs to be informed of the benefits of consuming fortified flour. Dovran Allaberdyev, Chief Engineer of the Turkmenkalla Milling Enterprise in Turkmenistan, said in addition to millers fortifying correctly, government inspectors have to monitor it fairly. Alisher Umarov from Tajikistan said ultimately it is millers who sustain the process, and they need the government to create an environment so that all millers fortify. He said millers are not discouraging fortification – they have families who would benefit from improved nutrition too – but they need support from all stakeholders.

Costs of fortification

The next session explained the economic benefits of fortifying flour. Mr. Quentin Johnson said the first year of a fortification program is likely to have all costs and no economic benefits as start-up costs for milling equipment can be expensive. By the third year and every following year, however, a country should see all of the projected benefits. Mr. Johnson noted that a country needs quite a bit of national data to conduct a cost:benefit analysis. The data are used to determine the cost of fortification and estimate the economic losses prevented by improving nutrition. Subtracting the costs of fortification from the economic losses prevented yields the financial benefit.

In Azerbaijan, which has conducted a cost:benefit analysis, Dr. Jamilova said the cost:benefit ratio was almost 1:11. The costs are minimal compared to the results of treating anemia and neural tube defects, she noted. She added that social subsidies resulting from a disability diagnosis costs the Azerbaijan government 59 million manat annually, and that fortification would prevent some of these disabilities such as spina bifida.

In discussion that followed, participants reviewed different regional models for paying for fortification. In Turkmenistan, the government pays for all fortification costs as it controls most of the milling industry. Ms. Zimmerman noted that this is an unusual example as FFI only knows of two other countries (Jordan and Iran) where the government completely funds fortification. In most countries, millers bear the cost of fortification and governments are encouraged to exempt fortification equipment and premix from customs fees and value added taxes. In Uzbekistan, the government purchases premix and maintains a revolving fund mechanism for millers to buy the premix from the government. Mr. Johnson said this ensures a steady supply of premix in the country and is a good model. Dr. Shamil Tazhibayev from Kazakhstan noted that ultimately the consumer pays for fortification – either by paying increased taxes for the government to fund the program or by paying a small increase in the price of flour for millers to fund the

program. Mr. Johnson added that the major expense for millers is the price of wheat, and it fluctuates dramatically over time. Premix costs are more stable and can be incorporated into the mills' business model.

Legislation

Mandatory rather than voluntary fortification programs are preferred, said Dr. Mawuli Sablah, Nutrition Specialist from UNICEF headquarters. The key benefits of mandatory programs are that they:

- Lead to higher coverage than voluntary programs
- Equalize costs for millers
- Enable regulatory monitoring

For guidance on the legislative process, Mr. Musa Guliyev, Deputy Chair of Azerbaijan's Health Committee of Parliament, spoke to participants. He said legislation is a critical basis for implementation, but to pass legislation, the social and health justification for improving nutrition has to be well documented. He said draft legislation to mandate wheat flour fortification in Azerbaijan is being considered, and he echoed the point from Monday's webinar that advocates need to find a person to be a champion of fortification through the legislative process. Azerbaijan has 125 members of Parliament, and they will have to be persuaded to support fortification. He said the legislative process is not easy and is time consuming. He said he personally support fortification because prevention is much easier than treatment and this is a means of fighting for the health and well-being of the population.

Standards

Mr. Johnson began a discussion on flour fortification standards with a review of the following key points:

- Standards should be based on the best public health science as offered in World Health Organization recommendations which focus on average nutrient levels, not levels in regulatory standards.
- Standards should be consistent with Codex standard structure and be clear about what is required
- The legal minimum and maximum nutrient levels should be developed to achieve public health goals and at the same time recognize your country's milling capacity to fortify correctly
- Basing national requirements on the best science available for health and nutrition is acceptable to the World Trade Organization; not basing standards on the best science available could cause trading partners to challenge the standard.

Regional Flour Fortification Standards

Dr. Shamil Tazhibayev, Director of International Projects and the Head of Micronutrients Department of the Kazakhstan Academy of Nutrition, presented the rationale for regional flour fortification standards. He said wheat flour fortification in the region would be highly effective if the following the conditions are met:

1. Flour fortification is mandatory with harmonized standards and regulations
2. At least 90% of flour is fortified, including domestic production and imports/exports
3. At least 90% of bread is produced with fortified flour

In this region, wheat flour availability is high, meaning fortifying wheat flour would protect most of the population with adequate nutrient consumption.

The regional standards offer the following parameters for premix for low extraction flour. Based on responses from millers to questions in the prerequisite work, nearly all the wheat flour in countries represented at the workshop is low extraction.

Table 3: Regional standards for nutrients to include in premix for low extraction wheat flour

Nutrient	Fortificant compound	Selected FL (mg/kg flour)	Amount of fortificant (mg/kg flour)	Fortificant (g/kg premix)	Nutrient (g/kg premix)
Vit. B-1	Thiamin mononitrate	2,0	2,5	9,9	8
Vit. B-2	Riboflavin	3,0	3,0	12,0	12
Vit. B-3	Niacinamide	10,0	10,1	40,4	40
Vit. B-9	Folic Acid	1,0	1,1	4,4	4
Vit. B-12	Vit B-12 0.1% WS	0,004	4,0	16,0	0,02
Iron	NaFeEDTA	15	115,4	461,5	60
Zinc	Zinc oxide	30	37,5	150,0	120
	Filling material		26,0	305,7	
		TOTAL	199,6	1000,0	

Uzbekistan Example

In 2005, the President of Uzbekistan signed a decree to require wheat flour fortification. The vitamin and mineral mixture standard was amended in 2011, and in 2013, the government passed a regulation to exempt imported vitamin and mineral mixes from customs payments. Mr. Amankul Baykulov, leading hygiene and nutrition specialist on the food product fortification program of Zdoroviye 3 Project under the Ministry of Health, explained the revisions. He said the national standard for vitamin and minerals to use in fortifying first-grade flour was amended again in 2019 to include the following:

- Vitamin B1 (Thiamine) - 1.6 mg
- Vitamin B2 (Riboflavin) -2.4 mg
- Vitamin B3 (PP) Niacin - 8.0 mg
- Vitamin B9 (Folic Acid) -1.2 mg
- Iron (Electrolytic) - 40.0
- Zinc - 17.6

This was a good regional example for other countries to see the need to revise their national flour fortification programs as needed.

Working Groups

For a working group session, we paired teams from countries with active fortification programs with teams from countries without fortification programs. The pairing was:

- Turkmenistan with Ukraine
- Uzbekistan with Azerbaijan
- Kyrgyz Republic with Tajikistan
- Kazakhstan with Georgia

We asked the delegates with fortification experience to guide the inexperienced countries in setting standards. They used part of a checklist of items related to standard to guide their discussions. The checklist was created based on a review of grain fortification monitoring documents from 68 countries.⁵

Implementing Flour Fortification

On Wednesday, 11 September, the participants visited an industrial flour mill near Baku (pictured below). While Azerbaijan is not yet fortifying flour, the participants saw a feeder used for other flour improvers. Mr. Johnson demonstrated the iron spot test in the mill's lab, using enriched flour brought from the United States for the test. Though the spot test is part of internal monitoring, which was discussed later in the workshop, we demonstrated the test at the mill so that mill staff who were not attending the workshop could see it as well.



Monitoring Flour Fortification

Internal Monitoring

Mr. Johnson noted that in addition to iron spot test results, keeping records on premix order history is a form of internal monitoring. If the premix order is consistent with flour production, one can assume the fortification has occurred. If premix orders decline despite consistent flour production, fortification has likely not occurred at some point. Each batch of premix should also come with a Certificate of Analysis that needs to be reviewed to ensure that the included nutrients comply with the premix order at the specified rate.

⁵ Marks et al., Review of Grain Fortification Legislation, Standards, and Monitoring Documents, *Global Health Science and Practice*, 2018.

After Mr. Johnson's presentation, participants asked if there was a qualitative test for folic acid. There is not. They also asked if premix needs to be tested or if the suppliers can be trusted. Mr. Johnson said if reputable suppliers provide the premix, it does not need to be tested frequently. It should be tested, however, as part of the initial assessment of premix from a new or existing supplier.

External Monitoring

Mr. Annamurat Nazarov, representing the Ministry of Health and Medical Industry in Turkmenistan, described the country's system for external monitoring. He said the system is well document and each piece has an important component. Asked if the country pardons any miller who fails to fortify, he noted that at first, external monitors are not in a rush to punish non-compliance. Instead their goal is for the flour to be fortified. He said the process now is sustainable, and they do not find non-compliance.

Mrs. Yuliya Beloslyudtseva representing the Union of Grain Processors of Kazakhstan explained FortifyMIS, an online management information system for fortification monitoring. Mrs. Beloslyudtseva, who had translated FortifyMIS into Russian for another project, said it simplifies data collection through all stages of fortification for both millers and government inspectors. It can be customized based on the country's fortification parameters, including use by customs officials for imported flour.

Import Monitoring

Dr. Gregory Gerasimov, who facilitated the meeting, shared his experiences with salt iodization in the region as an example of the importance of import monitoring. He cited the Republic of Georgia as an example. There iodized salt is exempt from import and value added taxes, and the program is successful due to import monitoring.

Mr. Johnson said each country should have a policy or protocol for how imported products are checked at border points for safety and quality. This policy or protocol should include:

- How and when to inspect imported foods for pests and food pathogens to ensure compliance with national standards, including food fortification standards
- What agency is responsible for inspecting imports
- What audit or testing methods should be used on the imported products
- How and when samples should be taken based on the applicable food laws and standards and on the resources available in the country
- What to do when non-compliance with national standards is found

Household or Consumption Monitoring

Kalida Amanova, specialist with the Civil Alliance for Nutrition and Food Security in the Kyrgyz Republic, described a process to determine if people were consuming fortified flour. Alliance representatives visited households, vendors, and commercial markets to test samples of flour for fortification. They found that almost 50% of households were using fortified flour, and the goal is for 80% of households to consciously buy fortified flour. A related goal is for consumer demand for fortified flour to effectively remove unfortified, imported flour from the market. The Alliance has created videos for social media to increase awareness of the value of fortified flour.

Impact Monitoring

Dr. Jamilova said monitoring flour fortification's health impact requires a regular and systematic data collection along with analysis and dissemination of program progress for management control and decision-making. She added that no single reporting system or survey or database can address all the process, outcome and impact questions about fortification programs. Yet countries may be already conducting three types of surveys that could be potential modified to capture outcomes related to flour fortification. These include:

- Micronutrient surveys
- Multiple Indicator Cluster Surveys (MICS)
- Demographic Health Surveys (DHS)

Dr. Yarparvar said several things make it challenging to use these surveys for fortification monitoring. First, data from one survey to another cannot be compared if there are significant differences in data collection process or methodology. Also, these are expensive programs, and if they are intended to determine a fortification baseline or fortification results, a relevant monitoring and evaluation framework must be planned and forecasted well in advance.

Next Mr. Baykulov shared results from a nutrition study UNICEF conducted in Uzbekistan in 2017. It showed that anemia among women of childbearing age fell from 60% in 1996 to 33.5% in 2008 and to 20% in 2017. Among children under 5 years old, anemia was reduced from 61% in 1996 to 49.2% in 2002 and to 15% in 2017. The survey also pointed out regions of the country where fortified flour was not consumed and unfortified, imported flour was more common. Before the survey, Mr. Baykulov said flour millers asked why they had to fortify their flour, and these results help them see clear evidence for the value of fortification.

FORTIMAS (fortification monitoring and surveillance) is a way to continuously track trends in population coverage and the health impact of flour fortification. It relies on gathering information from existing programs, such as prenatal clinics.

Turkmenistan is developing a FORTIMAS program using data from 11 health facilities in a mixture of urban and rural areas. It will gather hemoglobin and neural tube defect information from women in their first trimester of pregnancy. Mr. Nazarov said they will also ask school children to bring small samples of salt and flour from their homes so that the salt and flour can be test for micronutrients.

Georgia also used a FORTIMAS approach to track trends on indicators of vitamin and mineral deficiencies among the population. Dr. Robizon Tsiklauri with Georgia's National Centers for Disease Control said they selected eight sites – two from each region to represent urban and rural as well as minority populations. For neural tube defects, they included pregnancies that were terminated when the birth defect was diagnosed. They measured iron deficiency, not only hemoglobin, but Dr. Tsiklauri said each lab test cost money, and the amount of funding for tests can determine the size of the population covered by the FORTIMAS approach. Georgia is not yet fortifying, but the data collected can be used as baseline information that will identify where a fortification program should be adjusted in years to come.

Concluding remarks and the way forward

Throughout the five days, we recognized again that nutritional deprivations in this region still affect the wellbeing of almost 30% of children and 40% of mothers. Specifically, micronutrient deficiencies leading to anemia and neural tube defects alter the wellbeing and cognitive development of children, their future lives, and ultimately the cognitive capital of the nations. We discussed and learned all stages in designing and implementing flour fortification programs, and most importantly we identified priority actions and the way forward for participating countries. The study visit to a big mill near Baku highlighted the practical aspects of fortification.

We all agree that prevention of micronutrient deficiencies demands investment of governments on very cost-effective and sustainable interventions such as flour fortification. Without such investment, achieving Sustainable Development Goals related to global nutrition targets is almost impossible. We also believe that setting the enabling environment with strong legislation and then improving the coverage and quality of flour fortification programs demands commitment of multi-systems. This includes, but is not limited to, legislative, health, food and agriculture systems, where health and food systems avenue can play a convening role in bringing synergy to the collective work of all sectors.

To support countries in accelerating their actions, below are the major action area to be followed primarily by UNICEF and FFI:

1. Consolidate country commitments to determine our actions in next 6-12 months
2. Send the report of the workshop, together with country commitments, to all participating countries
3. Establish an online portal, as part of Regional Nutrition Partnership Platform in Central Asia and Caucasus, to report the progress and plan the future actions which will enable us to monitor our progress on frequent basis and determine future communications
4. Reinforce technical capacity on food fortification in the region
5. Provide technical inputs into standards and regulatory frameworks of countries
6. Support capacity development on monitoring and surveillance to promote effective compliance to mandatory standards on food fortification in the region
7. Mobilize resources to assist national and regional strategies and action plans on food fortification
8. Support effective public-private partnership dialogues and engagements to sustain high coverage of adequately fortified flour in the region
9. Continued advocacy and awareness creation for an enabling environment on food fortification

Children and adolescents, not only because they are future makers of the countries but because they have right to be healthy, are entitled to grow, survive and thrive to their maximum. Hence we as duty bearers have a big role to play to fulfill their right to health and wellbeing.

APPENDIX A

At various times throughout the training, country teams presented information on the status of their national flour fortification programs. At the end of the week, they were asked to identify their next steps. A summary of each country's status as well as the next steps follow, in order of the most advanced program.

Uzbekistan

Uzbekistan in many ways is a model for other countries throughout this region. As noted in this report, it has a system to finance consistent procurement of premix, it has recently revised its flour fortification standard to be in harmony with the latest scientific evidence, and it has seen a decline in anemia among women and children. The country fortifies only first-grade flour.

Next steps: National coverage of fortified flour could be improved by ensuring that imported flour is fortified. Consequently, the next step for Uzbekistan is to develop and adopt an amendment to flour fortification legislation to ban importation of non-fortified flour. The Ministry of Health will be responsible for this.

Turkmenistan

With its external monitoring program and newly established FORTIMAS system to track trends in population coverage of fortified flour, Turkmenistan is also a model for other countries. Unlike most countries though, the government in Turkmenistan finances procurement of premix and fortification equipment. Currently 21 mills and two private mills are fortifying first-grade flour with iron and folic acid. About 95% of the population consumes fortified flour.

Next steps: Improve the standard to include zinc and vitamin B12. This will involve providing technical advice, including recommendations for quality control. If a revised standard is adopted and approved, the following steps are needed:

- Determine long-term financing
- Update instructions for external and internal quality control
- Conduct training on a new standard and approaches to external and internal quality control
- Inform government agencies, producers, importers and consumers / populations about new enrichment standards

In addition to revising the flour fortification standard, the Turkmenistan delegation said it needed to strengthen the coverage and impact monitoring system, and make importers and consumers aware of flour fortification policies. The groups responsible for this are:

- Ministry of Agriculture and Environmental Protection
- Ministry of Health and Medical Industry
- Ministry of Trade and Foreign Economic Relations
- Union of Entrepreneurs and Industrialists

Kazakhstan

Flour fortification in Kazakhstan has been mandatory since 2009, but the Cabinet of Ministers did not issue secondary laws to create an enabling environment until three years ago. A continual problem is that many millers do not want to buy

premix, and bakeries use non-fortified flour for their products because it is cheaper than fortified flour.

Next Steps: Fortification advocates are appealing to the Ministry of Health to extend supervision to bakeries to require use of fortified flour. Also, as Kazakhstan is a leading flour exporter in the region, the Kazakhstan delegation said it is important to increase the demand for fortified exports. Millers will create the product ordered by importers, and if they had to fortify more flour for the export market, they would likely fortify flour for domestic consumption as well because it would be easier to fortify all the flour.

Kyrgyz Republic

Flour fortification legislation was passed in the Kyrgyz Republic in 2009, though some scientists and academics were against it. Responsibility is clearly outlined for business entities engaged in the production and supply of flour, and for managers of social facilities to use fortified flour (schools, kindergartens, medical institutions, state educational institutions, etc.). Monitoring of the implementation of these legislative norms is carried out.

Next Steps: In 2013, Kyrgyz Republic imported 140,260 metric tons of wheat flour, according to FAO data. Given this volume of imports, a goal in the Kyrgyz Republic is to further promote the draft of a Eurasian/Custom Union decree on amendments to the technical regulation of TS 021/2011 "On Food Safety" permitting establishment of mandatory enrichment of flour with premix on the territory of the Kyrgyz Republic. The Ministry of Health and Ministry of Economy will be responsible for this.

Advocacy with flour importers is also needed and is likely to include meetings and round-table discussions. This will be led by the Ministry of Health, the milling committee and the civil sector after a list of flour importers is defined.

Tajikistan

As noted earlier in this report, Tajikistan passed a mandate to fortify flour in 2019. Yet many more steps are needed for implementation.

Next Steps: The Tajikistan delegation identified the following necessary actions:

- Map individual and agency responsibilities
- Communicate approved legislation to all relevant stakeholders
- Revise the national standards and develop by-laws
- Assess government's capacity to monitor fortification
- Plan the necessary trainings, develop needed curriculum, establish pool of trainers
- Define financing scheme for premix
- Develop internal and external monitoring procedures
- Identify experts and provide technical assistance
- Procure and install equipment and supplies
- Train all relevant staff
- Launch flour fortification

Parties responsible for these actions include the Deputy Minister of Health and Social Protection and Coordination Council on Food Safety. The Tajikistan delegation said it will need support for all these steps.

Azerbaijan

A law for flour fortification has been drafted in Azerbaijan. As noted earlier, the members of Parliament will have to be persuaded to support the legislation.

Next steps: Advocacy is needed in Azerbaijan to ensure that the parliament and other political entities support the draft legislation.

Georgia

Georgia leaders were reluctant to consider flour fortification without evidence of the need to improve vitamin and mineral intake. With results from the FORTIMAS-type surveillance, they now have evidence of iron deficiency and neural tube defects among the population. The Georgia team submitted the following plan for 2019 – 2022 to advance fortification:

#	Action	Period of realization	Responsibilities	Expert Recommendations and Results of actions
1	<p>Marketing study: Define the categories and grades of flour for fortification; kinds of bread consuming mostly by population and categories of flour used for this sort of bread.</p> <ul style="list-style-type: none"> - Imported wheat /flour? - Local produced wheat/flour? - Extraction level / proportion? 	4 th Quarter /2019	<p>Working group: Included Ministries and related organizations/ Ministry of Health; Millers and Bakers Associations; Ministry of note environment protection and agriculture (MEPA); Ministry of revenue; National Service of Statistics.</p>	<p>Recommended by FFI: Flour of Top and 1st Grades</p> <p><u>Starting with 1st Grade</u></p>
2	Defining the premix for fortification (iron and folic acid) and which dosage to use depending flour daily consumption level by population	ASAP	Working group	<p>Recommended by FFI:</p> <ul style="list-style-type: none"> - NaFeEDTA - 15 ppm (Iron) - Folic acid - 1.0 ppm - Wheat starch as carrier – 22% of whole premix. <p>in NaFeEDTA iron is about 13% Premix additional rate -150 gr/MT of flour. Premix cost (KG) – about 8 USD.</p>

				Fortification cost- about 1.2 USD per MT of flour. <i>Note: average per capita wheat flour availability is 300< g/day</i>
3	Defining the amount of flour for fortification (one year store) by grades	4 th Quarter /2019	Working group	
4	Defining the premix amount for flour fortification (one year store)	4 th Quarter /2019	Working group	
5	Defining the number of feeders for mills to purchase /total cost	4 th Quarter /2019	Working group	Amount: 20 Total cost: 20 X 7,000 = 140,000 USD
6	Finding financial resources for premix and feeders procurement	1 st and 2 nd Quarters /2020	Working group	
7	Meetings with millers and bread bakers (producers)	1 st and 2 nd Quarters /2020		
8	Meetings with consumers' right protection NGOs, and other stakeholders.	1 st and 2 nd Quarters /2020		
9	Meetings with MEDIA representatives	1 st and 2 nd Quarters /2020		
10	Preparing legislation: Reviewing the existing legislation Making changes or amendment. Or preparing draft of new law and technical regulation or fortification, etc.	3 and 4 Quarters /2020		

11	Setting the Monitoring systems: - External monitoring - Internal monitoring	1 st and 2 nd Quarters /2021		
12	Implementing food fortification strategy	3 and 4 Quarters /2021 and after		
13	Evaluating of strategy implementation	2022		
14*	Maintain the National Nutrition and Monitoring system functioning to identify the nutrition status of population and tendencies in terms of micronutrients deficiencies elimination.	Constantly		
15*	Top level meetings	Periodically 2019 2020 2021 2022	Ministry Government Parliament	

Ukraine

A draft decree for flour fortification was considered in September 2018 but was not approved. Dr. Tetiana Skapa, State Expert of the Group for Health Promotion and Risk Factors of the Public Health Directorate within the Ministry of Health, said the country requires national evidence on vitamin and mineral deficiencies among the population; the country will not act solely on global evidence.

Next Steps: Analyze the nutritional situation and consider a study of the nutritional status of the population by examining marker indicators (iron, folic acid, etc.). Then analyze the data obtained, supplementing them with results from a STEPS survey. The survey was conducted in 2013, and results are expected in December 2019.

The Ministry of Health of Ukraine is a curator of data; the Public Health Center of the Ministry of Health of Ukraine can implement the project. To move forward, Ukraine will need donors to provide advisory, technical and financial assistance for conducting a baseline analysis, organizing and conducting research and developing policies in the field of food fortification, developing and implementing an electronic data collection and analysis system that works online on a 24/7 basis with the aim of using it both to study the background (as of the current time period) state of affairs, and to be able to use it in the future for monitoring needs after the adoption of food fortification policies.

APPENDIX B

Participants

Title	First Name	Last Name	Country	Position
Dr.	Dinara	Abbas	Azerbaijan	Iodine Global Network
Mrs.	Tarlan	Gorchieva	Azerbaijan	Adviser of Research on Plant Diseases and Plant Origin Product Division of Risk Assessment Department of the Azerbaijan Food Safety Institute
Mr.	Javid	Guluyev	Azerbaijan	Chief Specialist of Food Safety Risk and Crisis Management Department
Mrs.	Shahla	Ismayilova	Azerbaijan	Public Health and Reforms Center
Mr.	Ilgar	Khidirov	Azerbaijan	Chief specialist on quality control and inspection from Karmen mill,
Mrs.	Valida	Sadikhova	Azerbaijan	Deputy Head of Food Safety department
Mrs.	Narmina	Shabanova	Azerbaijan	Deputy head of Department for Value Chain control and work with regional divisions
Mr.	Gachai	Shakhbazov	Azerbaijan	Lawyer for the Union of Free Consumers
Ms.	Nargiz	Shukurova	Azerbaijan	Azerbaijan Food Safety Agency adviser from legal, human resources and administration
Ms.	Nino	Saganelidze	Georgia	Center for Disease Control and Prevention, Georgia
Mr.	Levan	Silagava	Georgia	Executive director of the millers' association
Mr.	Kakha	Sokhadze	Georgia	Chief of Quality Assurance, National Food Agency
Mr.	Robizon	Tsiklauri	Georgia	National Centers for Disease Control
Ms.	Elene	Zhorzholadze	Georgia	Chief Specialist of the Parliamentary Committee of Healthcare and Social Issues
Ms.	Almagul	Abisheva	Kazakhstan	Novo Aldzhanskiy flour mill
Ms	Yuliya	Beloslyudtseva	Kazakhstan	Specialist of the NGO "Union of grain processors of Kazakhstan"
Ms	Aigerm	Sadubayeva	Kazakhstan	Senior expert of Department of public health development
Dr.	Shamil	Tazhibayev	Kazakhstan	Director of International Projects, and the Head of Micronutrients Department of Kazakh Academy of Nutrition
Mrs.	Kalida	Amanova	Kyrgyz Republic	Specialist of Civil Alliance for Nutrition and Food Security
Mr.	Arsen	Anarbekov	Kyrgyz Republic	Miller
Dr.	Bubuzhan	Arykbaeva	Kyrgyz Republic	Head of Division on Noncommunicable Diseases Prevention, Department on Disease Prevention and State Sanitary

				Epidemiological Surveillance under Ministry of Health of the Kyrgyz Republic
Dr.	Khotambeg	Khayrov	Tajikistan	Director of Nutrition Center under the Ministry of Health and Social Protection
Ms.	Mutriba	Latypova	Tajikistan	Food fortification consultant
Mr.	Amirjon	Majidov	Tajikistan	Laboratory technician, LLC Zernovya Company
Mr.	Ahluddin	Qandakov	Tajikistan	Chief Specialist from Sanitary Epidemiologic Center, MoHSPP
Mr.	Ismonsho	Sultonov	Tajikistan	Head of Monitoring Department, Tojikstandard
Mr.	Alisher	Umarov	Tajikistan	Commercial Director of Barakat milling
Mr.	Dovran	Allaberdyev	Turkmenistan	Chief Engineer of the Turkmenkalla Milling Enterprise
Mr.	Nurmyrat	Gurdov	Turkmenistan	Production Engineer of the Grain & Bread producing Enterprise
Mr.	Annamurat	Nazarov	Turkmenistan	Ministry of Health and Medical Industry
Dr.	Tetiana	Skapa	Ukraine	State Expert of the Group for Health Promotion and Risk Factors of the Public Health Directorate (MOH)
Mr.	Amankul	Baykulov	Uzbekistan	Leading hygiene & nutrition Specialist on the food product fortification programme of Zdoroviye 3 Project under MoH
Mr.	Sherzod	Inogamov	Uzbekistan	Deputy head of standardization and coordination of state control department at Uzstandard Agency
Mr.	Khojiakbar	Rakhimov	Uzbekistan	Leading Expert at Uzdonmakhsulot LLC
Organizers				
Dr.	Elturan	Ismayilov	Azerbaijan	Nutrition Consultant, UNICEF Azerbaijan Country Office
Dr.	Tohfa	Jamilova	Azerbaijan	Health and Nutrition Officer, UNICEF Azerbaijan Country Office
Mr.	Quentin	Johnson	Canada	Technical advisor
Ms.	Zarema	Khassenova	UNICEF ECARO	Program Associate- UNICEF ECARO, Almaty Bureau
Mr.	Amir	Yarparvar	UNICEF ECARO	Regional Health and Nutrition Specialist- UNICEF ECARO, Almaty Bureau
Mr.	Mawuli	Sablah	UNICEF HQ	Nutrition specialist, UNICEF headquarters
Dr.	Gregory	Gerasimov	USA	Facilitator
Ms.	Sarah	Zimmerman	USA	Communications Coordinator, Food Fortification Initiative