

REPORT

TRAINING WORKSHOP ON QUALITY ASSURANCE AND QUALITY CONTROL FOR FLOUR FORTIFICATION

HARARE, ZIMBABWE 11 – 14 May 2015



INTRODUCTION

Vitamin and mineral deficiencies, in particular deficiencies of iron, iodine, vitamin A, and folic acid, cause significant economic losses through excess morbidity and mortality of women and children, reduced cognitive development in children and work productivity of adults and increased disabilities.

Wheat and maize flour fortification involves adding essential vitamins and mineral to flour as it is milled, which in turn make foods prepared with fortified flour more nutritious. Iron, zinc, folic acid, and other B vitamins are commonly added to wheat and maize flours. This has proven to be a cost-effective means of reducing the prevalence of iron deficiency anemia and neural tube birth defects and improving overall health. Vitamin A can also be added to flour but is more commonly added to edible oil. Iodine is frequently added to salt.

Many countries in Africa are implementing (mandatory) maize and wheat flour fortification or are considering the adoption of this intervention nationally. The success of the fortification programme hinges on industry participation and good quality assurance and quality monitoring systems. This requires the private and public sectors to collaborate to produce quality-fortified food that ensures that the consumers get all the nutrients they are supposed to get from the food. The need for a smart partnership and collaboration between government, industry and the civil society is imperative for each has a key role to play in the success of food fortification and the fight against malnutrition.

To foster these smart partnerships and ensure effective quality assurance and quality control, training based on the World Health Organization (WHO) and Food and Agriculture Organization (FAO) *Guidelines on Food Fortification with Micronutrients (2006)* is an essential requirement for countries that are implementing or planning to embark on flour fortification. Since 2009, Smarter Futures, a Partnership for Africa of the Food Fortification Initiative (FFI), The International Federation for Spina Bifida and Hydrocephalus (IFSBH), AkzoNobel, Helen Keller International (HKI), and the Dutch Government, has offered technical training in quality assurance and quality control of fortification programmes for millers, food control regulatory personnel and public health laboratory personnel from countries in Africa. Such Regional Training workshops have been held in Senegal (Dakar, 2009), Tanzania (Dar Es Salaam, 2011) and Morocco (Casablanca, 2014).

OBJECTIVE OF THE WORKSHOP

The overall objective of the Training of Millers and Regulatory Staff on Quality Assurance and Quality Control was to provide training to those that have been identified by the national stakeholders in countries in Southern, Central and Eastern Africa (government food control officials, regulatory inspectors and milling industry personnel) as responsible for the key components in the national maize and wheat flour fortification programme.

EXPECTED OUTPUTS

The workshop expected to achieve the following outputs by the end of the training sessions:

1. Maize and wheat flour millers will have increased capacity and commitment to implement adequate quality control and quality assurance systems to consistently produce a safe and quality product that meets national standards and specifications.
2. Regulatory authorities will have increased capacity and commitment to monitor fortified food production in an effective, efficient and sustainable way. For most countries this is expected to include a greater emphasis on monitoring the quality and safety of premix/fortificant, production/fortification and internal quality assurance systems and the fortified food at production level as opposed to market and retail level surveys.
3. An improved dialogue between maize and wheat flour millers and government authorities and an improved understanding of requirements, roles and responsibilities of the national stakeholders.
4. Documentation of existing national regulatory monitoring systems and practices and proposals for improvement from selected countries.
5. Those trained in the workshop will provide training on the components of national flour fortification programme for other personnel and employees in their respective countries and stakeholder organizations.

WORKSHOP FORMAT

The meeting followed the WHO/FAO schematic for regulatory monitoring as published in the WHO and FAO *Guidelines on Food Fortification with Micronutrients*, 2006. The workshop was separated into sessions covering (i) food fortification legislation, regulations and standards, (ii) internal monitoring, and (iii) external and commercial monitoring. There were presentations by international experts, and national experts from participating countries. There was a day set aside for practical exposure and training on fortification of both maize and wheat flour at the National Foods Limited and the Government Analyst Laboratory both in Harare, Zimbabwe. Participants then worked in groups by background and area of interest before reconvening into their respective countries to prepare a presentation on the inventory of what is currently available in their countries and develop recommendations and next steps which were then presented on the last day of the meeting.

PARTICIPANTS

Participants to the workshop were drawn from the region with the following countries being represented: Namibia, Botswana, Burundi, Malawi, Mozambique, Rwanda, Swaziland, Zimbabwe, Zambia, and Lesotho. The countries were represented by their food industry, government nutrition and regulatory monitoring staff from Ministries of Health, and Trade and Industry. As the hosts, Zimbabwe had the largest contingent drawn mostly from Ministry of Health and Child Care departments and industry representatives. See the full [participant list](#).

The following is a summary of attendance by day of workshop. See links to all the presentations [here](#).

Day	Registration	Comment
Monday 11 May	109 (Morning), 85 (Afternoon)	Monday saw a number of people register from our local participants who wanted to attend the official opening of the workshop
Tuesday 12 May	83	This was the day for the Industrial and laboratory visit
Wednesday 13 May	80	Report Back sessions
Thursday 14 May	70	Group and country level reviews and presentation of next steps

Day 1, Registration, Welcome and Introductions

Registration of participants was being done as they arrived and they were also provided with their workshop package which included a programme, notepad, pen and a small bag from one of the partners.

Anna Verster and Ronald Afidra opened the workshop and launched a welcome statement on behalf of Smarter Futures, the organizing committee and the supporting organizations. Pre-test questionnaires were handed out to participants to get a view on the current knowledge of the participants and their expectations towards the training. A total of 16 countries were represented in the workshop, either through country teams or through partner organisations and the facilitator team.

Official Opening: Minister

The Minister of Health and Child Care, Dr David P. Parirenyatwa who was accompanied by Dr B. Madzima, Director Family Health and Dr O. Mugurungi, Acting Principal Director Curative Services officially opened the meeting. The emphasis placed by the Minister was on the importance and urgency of food fortification in Zimbabwe. He highlighted the benefits to be gained after implementing a successful food fortification



program for improving the population health status. He stated that flour fortification will be mandatory in Zimbabwe from January 2016, and it is of the highest importance that both government and industry should be well prepared and trained to implement the fortification program. For this reason, the government of Zimbabwe was very honored to be able to host this training.

Day 1, Plenary Session,

Topics presented in the plenary sessions on day 1, included updates on flour fortification status, legislation, micronutrient deficiencies, industrial fortification practices and national food control systems. All presentations can be accessed through the hyperlinks in the [agenda](#).

Consequences of micronutrient deficiencies by Afidra Ronald

The presentation mainly focused on the consequences of iodine, iron, zinc, folate and vitamin A deficiencies and extended to broad micronutrient deficiencies. It was highlighted that 2 billion people are deficient in key vitamins and minerals, with more than 165 million children under 5 being stunted, 293 million children of the same age group are anaemic. It was made clear that micronutrients are a necessity and will need to be addressed as a way to counter the negative impacts of the deficiency. Micronutrient deficiencies are common in both stable and unstable conditions with pregnant women, lactating women and young children at most risk. It is difficult to recognize micronutrient deficiencies when laboratory assessments are inaccessible, expensive, and difficult to do.

Flour Fortification Overview – Global and Regional update by Afidra Ronald

The presentation provided an introduction of the Food Fortification Initiative and its evolution from Flour Fortification Initiative with a focus to support national partnerships in advocacy, technical assistance for planning, implementation and monitoring while tracking and sharing global progress in food fortification. Fortification adds vitamins and minerals during the milling process so that foods made with fortified grain products are more nutritious. During the milling process a substantial amount of nutrients are lost. There has been an increase from 33 to 82 countries from 2004 to 2015 that have mandates to fortify wheat flour with at least iron or folic acid. It was highlighted that 81 countries have legislation in place to mandate wheat flour, maize flour and/or rice fortification.

Food Fortification Legislation and Standards by Philip Randall



The presentation provided insights in the development of standards and legislation, how they differ with standards being voluntary while compliance with legislation is mandatory. It is however encouraged that countries develop technical regulations and standards that are based on product performance requirements rather than on design requirements as this creates fewer obstacles to trade. Countries should stipulate the minimum amount of a micronutrient that must be present in a food vehicle rather than a specific process for the addition of that micronutrient.

Fortification in practice: Production and Distribution by William Kapfupi, National Foods

Maize is a cheap, filling and available food and also a good fortification carrier. The presentation explained the use of a premix as well as the complex National Foods milling plant that is computerized/automated with a capacity of milling 25 metric tonnes per hour. Premix and finished product are mixed together in specially designed paddle conveyors which simultaneously blend and transport the two together. The micro-dosing unit and the paddle conveyors are inter-linked to ensure that one cannot operate without the other. Interlink between equipment will prevent faults and is done via programmable logic control systems (PLC).

The presentation concluded with a slide on responsibilities of the millers and best practices that include following industry best practices as stipulated by organisations such as the Grain Milling Federation, International Association of Operative Millers (IAOM), ISO and best practices that include Hazard Analysis Critical Control Point (HACCP), Good Manufacturing Practice (GMP), and Fumigation Management Plan (FMP) etc. It is essential to ensure all milling equipment is regularly repaired, maintained, cleaned and calibrated to ensure hygiene, operational efficiency and reliability. At the hammer mill level there is no quality control of raw material, and these mills will only mill what is brought by the customer thus will not clean grain on behalf of the customer.

In the discussion after the presentation it was highlighted that it is important to ensure that when purchasing microdosing units, there is after-installation support, easy calibration and spare parts availability. The paddle conveyer 3-5 m + conveyer design is important: horizontal or partially vertical transport: order inclination of the blades (catch up the product which falls back). Drum batch mixing is less convenient when used in fortification.

National Food Control Systems by Philip Randall

The presentation focused on opportunities and constraints that affect National Food Control systems effectiveness based on the FAO 5 pillars of food control: Food Control Management, Food Legislation, Food Inspection, Food Control Laboratories and, Information, Education and Communication. The strategy should focus on maximizing risk reduction through prevention throughout the food chain. There



should be recognition that food control is a shared responsibility between stakeholders. Food control is made difficult in some instances due to competing priorities in government, however there is need also to improve on information sharing among multilevel inspection agencies while also implementing random unannounced inspections. Legislation needs to be updated often as new information and gaps are established. Food inspection protects consumers by ensuring that domestically-produced or imported food is handled, stored, manufactured, processed, transported, prepared, served and sold in accordance with the requirements of national laws and regulations. Laboratory credibility is important as they play a crucial role in the analysis of food samples to assess physical and chemical characteristics; and microbiological contamination and to verify the safety and quality of food that is produced domestically, imported and/or exported, and to enable appropriate actions to be taken to protect consumers whenever necessary. During the discussion, industry highlighted that there are many inspections dealing with different legislation from various agencies and in some instance the same agency, and this was said to be time consuming and difficult and industry was urging government to combine inspections and share information. Industry should also provide inspectors with all relevant documentation in a simple and structured format and allow inspectors opportunity to see what they are doing in practice.

Flour Fortification at the Mill-Fortification Quality and Process controls by Philip Randall

A system to control all parts of the milling process to ensure the consistent production of flour that meets both regulatory and commercial requirements. Process control of Fortification at the mill is a key component of the Quality Assurance system. The presentation went on to highlight key aspects of quality assurance and control at all stages of production from the premix to the final milled product.

Day 2, Industrial and Laboratory Visits

The participants were split into 2 groups with one group going to National Foods (comprised of participants from government agencies and NGO's) and the other going to the Government Analyst Laboratory (GAL) (comprised primarily of people from industry/millers). Due to the large number of people who went to National Foods, the group was then split into 3 subgroups to facilitate ease of access and allow participants to fully engage in the visit as they ultimately toured the milling plant and the quality control laboratory. The visit was done in the morning and participants were back at the hotel at lunch and in the afternoon groups were then tasked to prepare presentations of the visit and one person was to present on behalf of the group the following day.

Day 3, Report back from the Mill and Lab Visits



The presentations were to focus on lessons learnt and what participants would want improved or changed. It is however important to note that National Foods was not fortifying when the visit was done. In the milling plant (5 floors) participants were not able to visit/see the Premix storage area, raw material storage and grading, pest control, packaging of final product and warehousing. It was also highlighted as a constraint that the premix and test kits are not manufactured in the region thus quality control becomes a challenge, while the fortification cost usually given does not take into consideration the quality control and equipment installation.

It was also noted that milling is a complex process, and that fortification is possible since most of the millers have equipment for fortification in place and that it will not disturb the milling process. Millers were also worried about the acceptance of the fortified product by consumers thus were urging government and its partners to carry out consumer education on food fortification. At the industrial laboratory it was shown that using iCheck it was possible to carry out both qualitative and quantitative tests for iron and vitamin A. The process of testing is not labour and time intensive while the kit (iCheck) is portable and user friendly as it can be used at room temperature.

The GAL team indicated that the lab has motivated staff who are aware of the laboratory's limited capacity and resource constraints. Swaziland and Lesotho millers learnt that Zimbabwe government tests premix suppliers, while they must do the testing on their own or rely on supplier Certificate of Analysis. The requirements for fortification certification are clear, and the laboratory has some testing capacity for iron and vitamin A using i-Check however, GAL has to outsource analysis of all other micronutrients, which leads to delays for results to be returned and a concern for industry. Guidelines or a public standard operating procedures are required to link legal framework and implementation, putting the law into practice. Lab is not accredited or ISO certified, which means that the results are not generally accepted outside of the country. The GAL is in the process of ISO 17025 certification and the laboratory team accept the comments and concerns of industry and partners and will work on improving their services.

The reports from the visits can be accessed among the presentations [here](#).

Open Discussion-Question and Answer Session with Premix Suppliers (DSM, Hexagon, Muehlenchemie)

Representatives from each supplier were given an opportunity to provide information about their company and what they provide and where they are based. Only Muehlenchemie and DSM have local representation while Hexagon indicated they will look to have a local representative in the near future.

DSM stated that it can support small to medium enterprises to fortify and are currently piloting this avenue in Tanzania. They would like to use their experience there to roll out the same in other countries. DSM is prepared to partner with different organisations and governments to ensure fortification is done to serve the most vulnerable members of society as they can also provide micronutrient powders for those not covered by commercially fortified foods.



- DSM and Muehlenchemie indicated that they can also supply microfeeders.

During the discussion it was highlighted that premixes they supply are suitable for everyone as they take a lifecycle approach in their production; if needed, a specific premix for a specific age group can be produced. It was also clarified that safety issues related to vitamin toxicity due to fortification of multiple food vehicles is unlikely and is more dependent on the programme than the premix. It is not advisable for premixes to be added at the same time with flour improvers.

Participants would have liked to also see manufacturers of microdosers /microfeeders participate in the workshop.

Day 3: Plenary Presentations

Baking Trials-FNB article and updates Filip van Bockstaele

The presentation focused on a study titled “Fortification of wheat flour and maize meal with different iron compounds: Results of a series of baking trials” with the objective of, determining if there were any adverse interactions due to the selection of iron compounds in the finished products produced from wheat flour or maize meal, and if differences were not, to quantify those differences. The general conclusion was using WHO guidelines for fortification of flour do not lead to changes in the baking and cooking properties of wheat flour and maize meal, though there is still need for further research using a broader range of products and concentrations. Responding to a question on whether sugar used in industry i.e. for drinks and baking should be fortified or not, it was stated that all sugar, domestic and imported should be fortified to minimize leakages otherwise there has to be very close monitoring, an example was also given of Netherlands where salt used in the baking industry had high iodine levels.

Folic Acid and Neural Tube Defects: What do we actually prevent by Anna Verster

The presentation described what neural tube defects (NTD) are and how they come to be with some pictures to show their presentation and appearance. Neural tube closure occurs by day 28 post conception, before a woman even knows that she is pregnant, yet supplementation programmes start in the second trimester thus folic acid is provided late to prevent them. This is critical for understanding strategies for prevention! The most common NTD is spina bifida in which the baby’s spine does not form correctly. This results in loss of some sensation and movement, and in severe cases results in paralysis and different levels of loss of bowel and bladder control. Data for NTDs is scant thus there is need to consider training and documentation of their incidence in new born babies. During the discussion it was indicated that the data on NTDs is not reliable thus not fully confident of the statistics. It would also stated that it would be good to find out if there a local name for spina bifida, as the term NTD’s does not really give information

on what the lesion is actually. Flour (wheat and maize) fortification is an effective way to prevent NTDs as it provides folic acid well before pregnancy occurs supporting the woman to have enough to meet their needs. Basically spina bifida affects the spinal cord and is at the back. It was indicated that folate supplementation is associated with high malaria mortality especially in malaria endemic areas and countries should use World Health Organization (WHO) guidelines on supplementation, however fortification with folate uses much lower doses and is considered safe for everyone.

Monitoring and Evaluating Food Fortification Programmes by Filip van Bockstaele, Rebecca Spohrer and Anna Verster

This session had 3 presentations as follows:

- Government Regulatory Monitoring by Filip
- Fortification Assessment Coverage Tool (FACT) by Rebecca
- FORTIMAS by Anna

i. Government Regulatory Monitoring by Filip

Regulatory monitoring is done to ensure fortified foods meet nutrient and safety standards throughout their shelf life and involves internal monitoring, external monitoring and commercial monitoring. It seeks to answer questions related to whether Good Manufacturing Practices (GMP) are applied and whether Hazard Analysis Critical Control Points (HACCP) are in place. Internal monitoring is done at enterprise level when they do their quality control and quality assurance while external and commercial monitoring is done government. There is a need to establish indicators which allow measurement of success/failure of the implemented programme.

ii. Fortification Assessment Coverage Tool (FACT) by Rebecca

This presentation was done to further strengthen the monitoring and evaluation need in fortification programmes. The need to measure impact of an intervention basically is to provide evidence of impact of government and donor investments while it can also assist in programme improvement through modification as a result of evidence and changing environment. The FACT measures effective coverage looking at

- Coverage of fortified foods, bottlenecks and enhancers and coverage of additional micronutrient interventions
- Utilization-quantity consumed at household and individual level

- Nutrient contribution-linking fortification level to household use, sample collection at community level and contribution then calculated from consumption and quality
- Strategic sampling where a large representative sample stratified by factors that might modify coverage, utilization and risk of inadequate diet e.g. area of residence, education, poverty

FACT can be implemented when the programme starts and at the end. An example of a FACT survey that was done in Senegal was presented.

iii. **FORTIMAS by Anna Verster**

This is a monitoring and surveillance tool that helps track trends in the effectiveness of a flour fortification programme over time in populations known to regularly consume fortified flour however it doesn't provide statistically representative estimates of the prevalence or incidence of micronutrient deficiencies. Hard copies of the tool were given to participants and for the soft copies participants were referred to www.smarterfutures.net/FORTIMAS. The tool uses sentinel data collection and purposive and convenience sampling approaches.

During the discussion that followed highlighted that monitoring and evaluation should be planned for the beginning of the programme and that it is the responsibility of governments and their partners. The issue of attributing impact to fortification was also questioned, and in response it was said that it is difficult, but if there is an intervention in place, one has to look at the changes in nutrition status.

Economic Consequences of Deficiencies: Potential Economic Benefit of Fortification by Anna Verster

The presentation was made to highlight the cost of micronutrient deficiencies as well as the benefit derived from interventions especially fortification. This was based on the Copenhagen Consensus which consistently ranks nutrition interventions high among interventions that provide good benefit cost ratios. Some of the costs associated with micronutrient deficiencies include a 17% lower productivity in heavy manual labour as a result of anaemia, under five and maternal mortality due to Vitamin A and iron deficiencies. Advantages of food fortification were also highlighted e.g. wide population coverage, affordable and sustainable financing. A model on the 4 pathways of "damage" to measure baseline economic loss was also shared which had mortality, higher morbidity, adult work deficits and cognition and growth which lead to loss to gross domestic product.

National Food Control Systems by Philip Randall

The presentation on food control with a specific focus on quality audits was then given by Phillip and it was highlighted that Food Laws mandate inspectors to check mill records thus all mills keep records of



their activities. This should however not prevent regulators from conducting finished product sampling. It is therefore imperative that a Code of Practice be developed and agreed upon by all stakeholders with clear roles and responsibilities and timelines for all agreed items. The presentation highlighted what needs to be done at every stage from premix imports to the finished product /imports inspection while external audits are done in different ways and frequency. Sampling was then discussed in view of the World Trade Organization requirements of fair treatment of imports; thus they cannot be treated stricter than local production.

Chemical Assays QC tests theory by Anna Zhenchuk

The presentation covered measurement methods, validation methods, and measurement uncertainty. Some sample case results for iron and vitamin A fortified flour were shown to highlight these concepts. Each measurement method then has to be validated for a specific food and the type of micronutrient. It was then indicated that for proper quality control, the following conditions must be met:

- Measurement uncertainty should be known
- Sample should be representative
- Standard should be set and,
- A permitted tolerance level should be set.

SANKU System for Medium Size Mills by Philip Randall

The presentation was done on behalf of Felix Brooks-Church who could not participate in the workshop. The presentation first gave a brief background of Sanku which is a socially driven, intervention based initiative of Project Healthy Children. It is focused on providing access to fortified foods for those who cannot access commercially/centrally processed foods. It equips at risk communities with fortification technology and nutrient premix. The Sanku dosifier for small and medium scale applications was approved and recommended by GAIN in 2014 and the dosifier has a +/- 10% coefficient of variation. The business model is based on Sanku and a financier/donor providing the device at very low to no cost to the end user, however the miller has to purchase premix through Sanku partnership programme. The device provides real time data and is able to monitor miller compliance, over/under fortification etc. See a list of additional [resources for small mills](#).

Day 3: Review and plans presented in the Workshop by Country Teams



On the last day of the training, group-working sessions were organized. In the first part of the group sessions, participants joined a group according to their background or profession: (1) production and distribution, (2) national food control systems and (3) standards and technical regulations. The ‘profession groups’ had to elect a chairman and secretary to prepare a report/presentation. The task of each working group was to make a brief overview on current status, drawbacks, strengths, weaknesses, improvements and challenges on flour fortification specifically in their field.

In the second part of the group sessions, participants were regrouped into ‘country groups’. Each country group was formed with participants from the first three working groups by profession. Every country had to summarize the findings from the profession groups specifically for their own country situation and then put together a review and plan for fortification. Each country was required to make a presentation on the plan of activities to be accomplished to make food fortification a reality. This was based on the status of the country in the implementation of food fortification and those priority activities that require urgent measures. The presentations focused on 3 elements of food fortification: (i) Food Control Systems, (ii) Standards and Technical Regulations, and (iii) Production and Distribution.

The review and plan followed the format below:

(i) Food Control Systems

Item	Status	What needs to be done	Time frame	Responsible authority
Personnel (food inspectors, nutritionists, lab (personnel)	Qualified personnel but inadequate	Further training in food fortification and recruitment	December 2015	

(ii) Standards and Technical Regulations

Item	Status	What needs to be done	Time frame	Responsible authority
Regulations	Iodised salt regulation available	Monitoring	On going	
Standards	Working drafts on oil, flour, sugar and maize meal	Finalization	December 2015	

(iii) Production and Distribution

ITEM	STATUS	WAT NEEDS TO BE DONE	TIME FRAME	RESPONSIBLE ORGANISATION
Technology	Diverse but outdated technology	Capacitation of industry	December 2015	Industry
Skills (fortification)	Gap existing	Training of trainers and cascading	ongoing	Industry

See the country reports [here](#), linked to the name of the country in the participants section.

Recommendations and Suggestions from the meeting

- There was some discussion on the **scale of fortification**. Most programmes focus on large scale fortification by big industrial mills which is an easy way to reach a large part of your population. However, some participants want mostly initiatives for small scale (hammer) mills in rural areas. However, one should keep into mind that a lot of people benefit from the large scale fortification programmes as in Africa in recent years as cities have become bigger and urbanisation is increasing. On the other hand, fortification programmes should also include efforts to support small scale fortification in the rural areas for which another approach and technology is needed. Small scale fortification is a challenge as it is more difficult to control the process and assure adequate fortification. So, this implies the need of training of local millers and workers on this topic.
- In some countries, the staple food is not wheat or maize, but **sorghum** (e.g. Botswana). Fortification of sorghum flour is possible and similar to the practices used in wheat or maize flour fortification. Also **cassava** flour is part of the diet in some countries. Cassava flour can also be fortified.
- William Kapfupi (National Foods, Zimbabwe) highlighted the importance using a suitable premix for fortification. By using a **premix**, and not the separate additives (minerals and vitamins) you are able to control the required addition of micronutrients. Otherwise, up to 7 different additives should be added in different concentrations, which is difficult. Premix suppliers provide support in producing the suitable premix: they ensure that you get a high quality premix.
- The major difference between commercial industry milling and a small local hammer mill is the **raw material quality control**. A big industrial mill has to perform extensive quality control on the raw material before acceptance. A small local mill, will mill the product which is provided by its clients without checking the quality. This may lead to fortification efforts being overruled by other harmful effects such as high mycotoxin levels.

- High quality fortification technology is required. Before purchasing this type of **equipment**, make sure you also check availability of spare parts and support in case of problems.
- On the level of **legislation**: try to keep legislation as short as possible and put conditions and terms in the regulations and standards which are to update. Also keep them updated!
- As every country tends to set its own standards this may limit the trade in cereal products among countries. It is recommended that regional organisations **harmonize the standards** on flour fortification.
- When company **inspections** are needed, first provide the inspectors with all the details and papers but keep it simple and structured (need for a well-established control system). Show them how you are doing the fortification in practice!
- Inspectors do not need to do extensive testing on the fortified flour, simply check the total amount of production and the amount of premix used in a certain period of time: this will indicate if the right amounts of micronutrients have been provided to the population.
- Industry faces a lot of inspections for different reasons. There is a lot of legislation that they have to comply to which is time consuming. Sometimes different inspections from the same ministry are performed for different regulations. The industry participants ask to combine these inspections in the future.
- IEC is a necessary part of every fortification program.
- Monitoring of the fortification program is necessary to redirect the program if goals are not reached. However, monitoring needs a lot of effort and funds from the government so support is needed. NGOs like GAIN and Smarter Futures provide tools to implement a monitoring system: FACT and FORTIMAS.

Post-test and Closing remarks

The final action of the training was to fill in the post-test questionnaires, which will be used to evaluate the learning effect of the training.

Finally, Ronald Afidra closed the training with words of thank to the organizers, Zimbabwean government, the facilitators, the invited speakers and all the participants for their help and participation in the training.

Ronald then invited Mrs Chigumira (Deputy Director Nutrition) to provide the closing remarks as the host of such a successful workshop. The Deputy Director thanked all who had come to experience the Zimbabwean hospitality while working at the same time. She hoped that the workshop has been very helpful to all who attended and enabled participants from different countries to share expertise and experience while at the same time making friends. She also indicated that the review and plans that the delegates made for their countries can be fine-tuned in consultation with stakeholders when they go back to their countries so that the goal of eradicating micronutrient deficiencies can be realized within the region. She bade all participants a farewell and wished them a safe travel to their countries and homes and that they find their families in good health. A special dedication was made for colleagues from Burundi in light of an attempted coup and the political instability in their country.