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Preliminary considerations on food fortification monitoring in Malawi

Situation assessment and presentation of a database for food fortification monitoring

PROJECT HEALTHY CHILDREN

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1 Introductory remarks

Food fortification offers a cost effective strategy for managing micronutrient deficiencies in a country. A recent study[1] estimated that Malawi would lose US$446 million between 2006 and 2015 if micronutrient deficiencies such as stunting, nutritional anemia and iodine deficiency were not addressed, and the country would gain US$83 million in productivity in a single year if these deficiencies were reduced by 30% each. Staple food fortification, however, is only effective from a health and economic perspective if the fortified foods distributed contain adequate levels of vitamins and minerals in accordance with the currently prevailing dietary patterns of the population. As such, food fortification needs to be embedded in a country's holistic nutrition strategy. The responsibility for guaranteeing and monitoring the adequacy of the level of micronutrients in fortified food vehicles in Malawi is shared by a number of departments and organizations, including the Office of the President and Cabinet (OPC) Department of Nutrition, HIV and AIDS.

The OPC Department of Nutrition, HIV and AIDS asked Project Healthy Children (PHC) in spring 2010 to assist in the process of improving the country's food fortification efforts to address micronutrient malnutrition. As a first step in this partnership PHC in April 2010 conducted a fortification situation assessment, which reached the following conclusions:

- Vitamin A, iron and iodine deficiencies among children and women are widespread;
- Among various staple foods consumed, salt is the best fortification vehicle for iodine enrichment;
- Sugar and cooking oil are appropriate vehicles for vitamin A fortification given their regular consumption by the Malawi population; and
- There is the potential for maize and/or wheat flour to be fortified with iron, vitamin A and other minerals.

A successful food fortification strategy requires an adequate level of monitoring of fortified foods along the process chain, including border control of imported foods, industry control on the factory level and market place control on the trading centre level. Such a monitoring triangle should ensure that all sub-standard food vehicles brought into the food chain are tracked at the national level allowing for supervision and policy actions by the National Fortification Alliance (NFA).

As part of PHC's overall assistance, a standardized monitoring & evaluation (M&E) database has been designed that will allow for consistent monitoring of the adherence to food fortification standards over time and across many different parameters. Given that salt iodization has been obligatory in Malawi since 1998 and basic monitoring procedures are in place or being re-activated at border, industry and market-level, initial work has focused on evaluating the monitoring process for salt iodine levels. However, the current version of the database allows for vitamin A monitoring once standards and testing procedures are in place. Recommendations for immediate next steps should be considered in the context of the country's holistic food fortification strategy.

This report provides an analysis of the following topics:

[1] Sight and Life Magazine. "Positioning Nutrition at the Center of the Development Agenda: The Malawi Experience". 2010.

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PART 1: Overview of fortification stakeholders and assessment of iodized salt in Malawi

- Fortification stakeholder overview
- Current situation assessment on iodized salt in Malawi (border, industry, market place monitoring)
- Summary of key issues and recommendations to improve fortification, specifically iodized salt, in Malawi

PART 2: Introduction of an M&E database allowing for the monitoring of food fortification strategies

- Description of a M&E database for fortification monitoring and proposed process/guidelines from data sampling to report generation
- Sample report on iodized salt (historic data since 2009)

2 Fortification stakeholder overview

An effective food fortification strategy in Malawi relies on the collaboration and close cooperation of a number of governmental departments, as well as non-profit organizations with a mandate to assist in the process. The below table summarizes the stakeholders which are currently and should continue to be included in committees and task forces on food fortification:

Governmental unit	Department	Role / Responsibilities
Office of the President and Cabinet	Department of Nutrition, HIV and AIDS	▪ Supervision of national nutrition strategy including food fortification ▪ Overseeing National Nutrition Committee
Ministry of Trade	Ministry headquarters	▪ Overseeing NFA activities ▪ Monitoring of food fortification (market level) ▪ Issuance of import licenses
	Malawi Bureau of Standards	▪ Revision of standards ▪ Border inspection/sampling ▪ Laboratory testing ▪ Import compliance reports ▪ Industry inspection/sampling ▪ Law/standards enforcement
Ministry of Health	Environmental section	▪ Border inspection/sampling ▪ Market place inspection/sampling
	CHSU laboratory	▪ Laboratory testing
	Nutrition unit	▪ Legislative responsibilities (salt iodine requirements, vitamin A requirements)
Finance	Malawi Revenue Authority	▪ Clearing of imported fortified foods and fortificants (custom clearance) ▪ Data aggregation of salt imports ▪ Law/standards enforcement
Education	Chancellor College Bunda College	▪ Market place inspection/sampling (temporarily contracted by UNICEF)

	(agriculture)	▪ Laboratory testing (temporarily contracted by UNICEF) ▪ School feeding programs
Agriculture	Nutrition section	▪ Bio-agricultural fortification ○ High protein maize ○ Sweet potatoes ○ Soy beans ▪ Surveillance of nutrition programs

Non governmental entities and assisting consultants	Section/Individual	Role / Responsibilities
UNICEF[2]	Nutrition department	▪ General technical assistance to industry (sugar, oil, blended flours) ▪ Capacity building in laboratory testing and laboratory equipment ▪ Training of inspectors for monitoring fortified foods ▪ Provision of financial resources
Project Healthy Children (PHC)	Nathaniel Brooks	▪ Technical support and strategic guidance including strategy writing, drafting of legislation and standards, monitoring and advocacy
Irish Aid		▪ Support of sugar fortification and other activities
USAID		▪ Support of salt iodine fortification
UN Food & Agriculture (FAO)		▪ General support of food fortification activities
World Food Programme (WFP)		▪ Support of school feeding programs
World Vision International (WVI)		▪ Support of small scale maize flour fortification
Consumers Association of Malawi (CAMA)		▪ Social marketing of fortified foods and consumer education

3 Current situation of iodized salt in Malawi

Fortification of salt with iodine has been obligatory in Malawi since 1998. Given that the vast majority of salt consumed is imported from neighboring countries, border inspection is the key success factor for an effective monitoring strategy for the adherence to standards set by the Malawi Bureau of Standards (MBS) and Ministry of Health.

- Import standards are currently under revision with a target to decrease the currently prevailing standard of 80-100 ppm iodine content in imported salt to an average of 50 ppm

[2] Phillip Makhumula supporting UNICEF in their fortification efforts in Malawi.

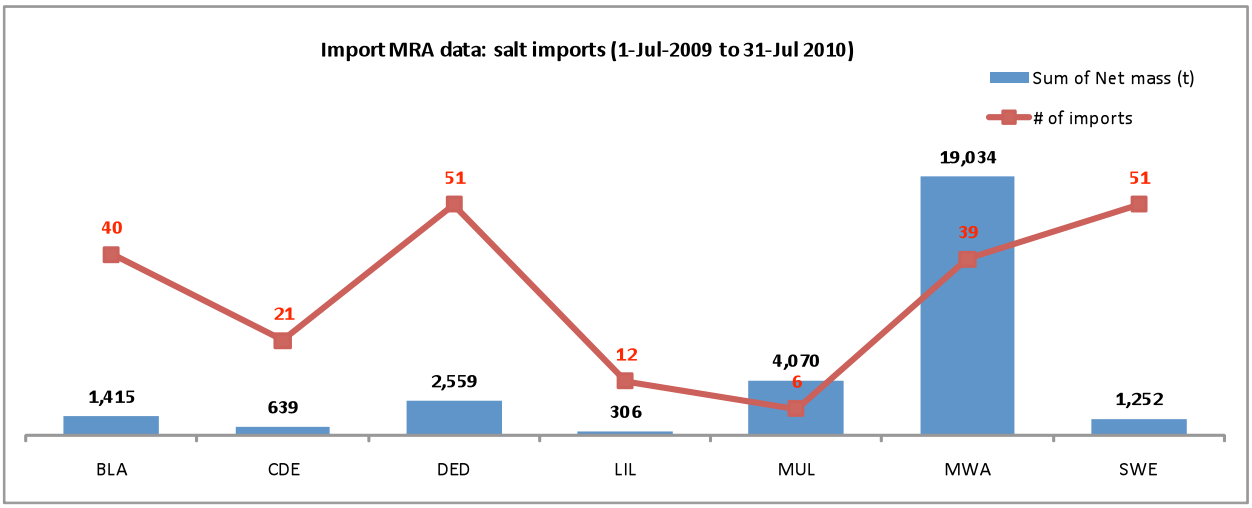
- Industry level standards for the purpose of factory testing are currently set at a minimum requirement of 50 ppm to account for some evaporation effect of iodine between the time of import and factory/wholesale storage
- Most current health standard recommendations propose a level of >25 ppm iodine at household/final consumption level[3]

3.1 Characteristics of salt imports between 1-Jul-2009 and 31-Jul-2010

In order to enhance understanding of salt import patterns in Malawi, a trend analysis was carried out on a dataset provided by the Malawi Revenue Authority (MRA) of all cleared salt imports for the period of 1-Jul-2009 to 31-Jul-2010. The analyzed data will allow for recommendations on an improved monitoring/inspection process and comparisons with data on salt imports tested by the MBS.

Figure 1 illustrates that (recorded) salt imports are heavily concentrated on a small number of customs stations / border entry points. Malawi has a total of 28 customs stations alongside its border zone, yet salt imports were only recorded on 7 different stations, with Mwanza accounting for 2/3 of total imports. Blantyre and Lilongwe are inland custom clearance stations enabling importers to bring salt into the country without immediate customs clearance at the point of entry. Total imports over the analyzed period amounted to 29,000 metric tons and 220 individual imports.

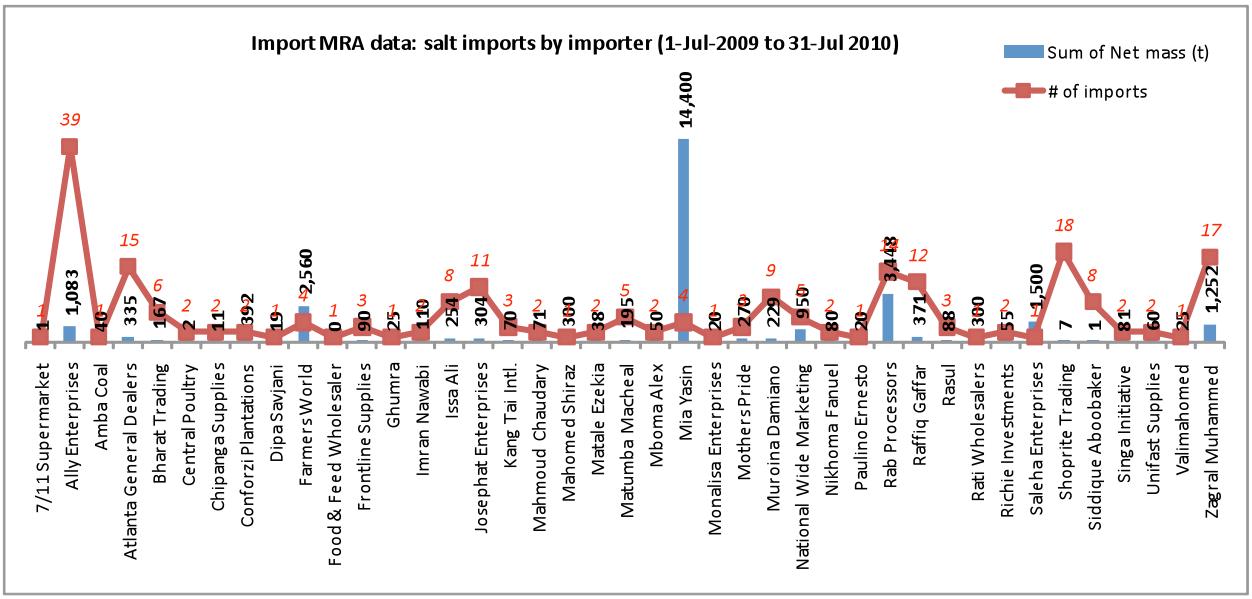
Figure 1



A total of 40 importers brought salt into Malawi in the past 13 months, some of whom are independent, contracted salt traders and some of who are importing directly on account of the national wholesaler (e.g. Mothers Pride, Bharat Trading, Farmers' World, etc.). As indicated in Figure 2 below, import sizes are relatively fragmented with the notable exception of Mr. Mia Yasin who accounted for 50% of total salt imports but only 4 different imports, all through the border of Mwanza coming from Botswana. Lack of fortification inspection on a particular day of such sizeable import would mean that more than 10% of Malawi's imported salt would not be tested for iodine.

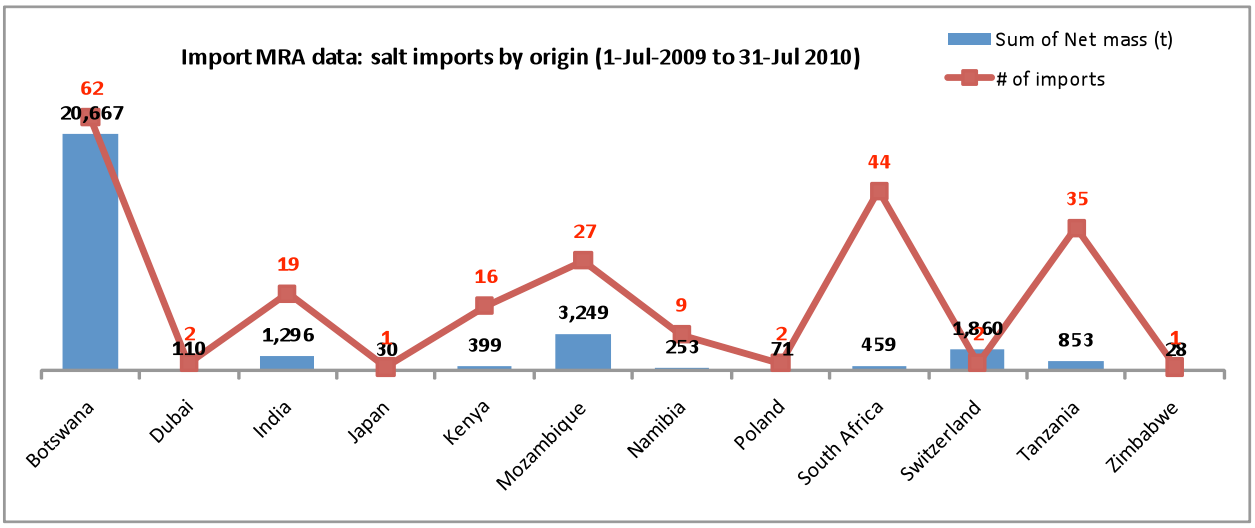
[3] P. Makhumula, R. Afidra, O. Dary. "Quality of fortified foods in Uganda". 2008.

Figure 2



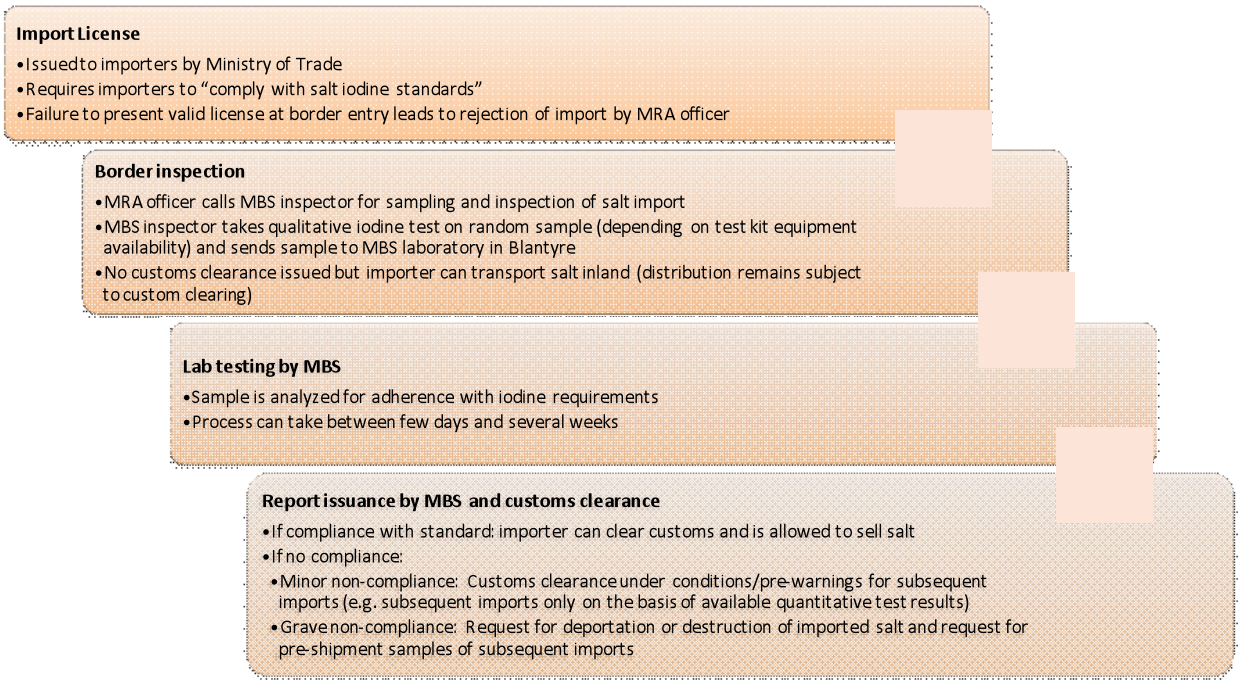
Mirroring the concentration by importer, the majority of salt imported during this period entered from Botswana (mainly through Dedza and Mwanza), followed by imports from Mozambique (mainly through Mulanje and Chiponde). Salt imports with Swiss origin are in fact imported from Botswana as well.

Figure 3



3.2 Analysis of current border inspection process

The graphic below illustrates the current process for salt import clearance.



- **Inspection on border stations <u>with</u> presence of MBS officers:** Currently, MBS inspection officers are only constantly present at 4 border stations – Dedze, Mwanza, Mulanje and Songwe. Together, these 4 border stations account for c. 90% of total (recorded) salt imports into Malawi. This number could be even higher given c. 5% of salt imports are cleared inland in Blantyre and Lilongwe but enter the country most likely through one of the 4 main border stations for salt imports where they should be sampled by MBS inspectors. There is currently no MBS inspector based in Chiponde (639t salt imports; 21 individual imports in the past 13 months – all from Mozambique).
- **Inspection on border stations <u>without</u> presence of MBS officers** officially falls under the responsibility of Port Health Inspectors (PHI) (based directly on border station) or Health Surveillance Assistants (HSA) who are present at or near all remaining border stations (24 in total). When no MBS inspector is available, MRA officers are currently supposed to call the PHI/HSA for salt inspection. PHIs/HSAs are normally equipped with quick test kits (although there is evidence that these are often outdated or not available) for qualitative testing. Some samples are sent to CHSU (Ministry of Health laboratory) for further testing. The main issue is that the MRA cannot issue customs clearance for salt imports on the basis of an inspection by a PHI/HSA, as a formal report by the MBS is required. As such, PHIs/HSAs currently do not serve an effective role within the border inspection process. In reality, therefore, MRA officers either reject salt imports on border stations other than the 4 main entry points, allow for the importation and subsequent clearance without formal laboratory inspection, or call an MBS inspector to the relevant border which can take a few days and delay the import process.

3.2.1 Congruence of recorded data between MRA and MBS

According to both MBS and MRA sources, all salt imports are subject to salt iodine inspection by an MBS inspector since the MRA cannot issue customs clearance on salt imports without a positive laboratory report (see annex for an example of an MBS laboratory report). In practice, however, it was noticed by

comparing recorded data from MRA and MBS sources, that the respective data samples on salt imports are not congruent.

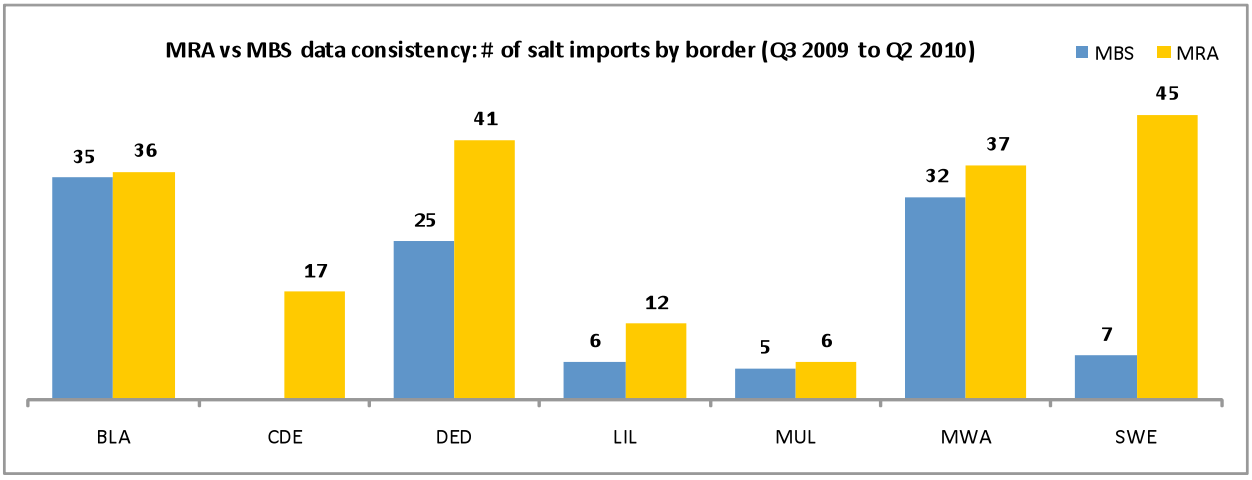
Figure 4 illustrates that the MRA recorded 194 salt imports in the 12 months between Jul-2009 and Jul-2010, while the MBS laboratory received (or recorded) only 110 samples over the same time period.

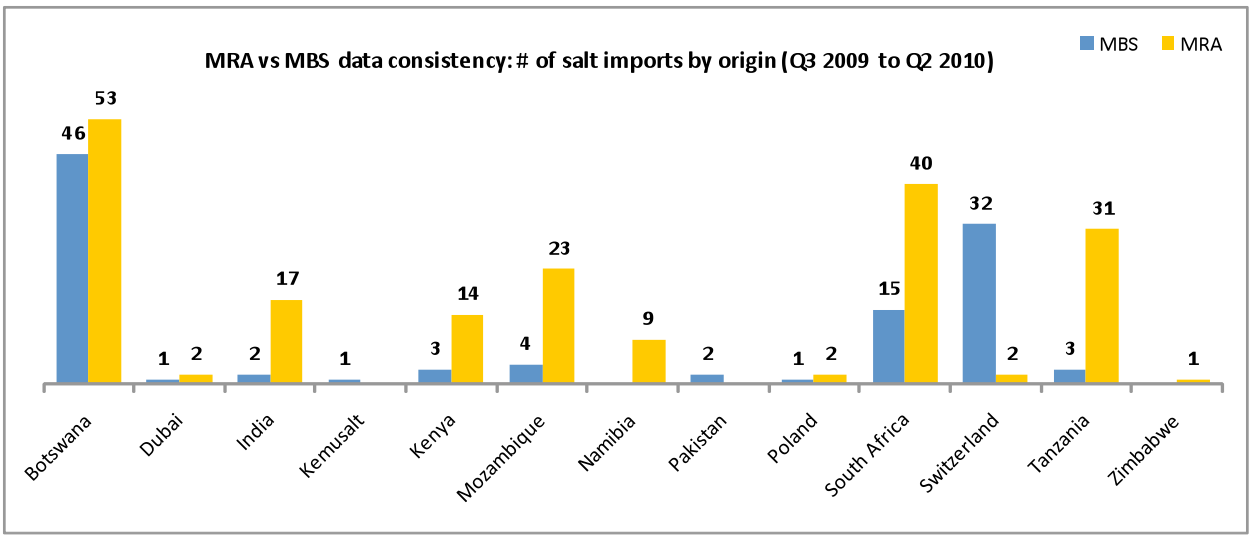
- Data inconsistency appears to be focused on the following borders: Dedza, Songwe and Chiponde. As mentioned before Dedza and Songwe are permanent bases for MBS inspectors while the lack of MBS reports from Chiponde is not surprising given there is no inspector based on this border station.
- Imports from Botswana are generally well documented by MBS while imports from the following countries are often not checked for their salt iodine content:
  - Tanzania: imported through Songwe
  - South Africa: imported through Blantyre, Dedza, Lilongwe and Mwanza (many small imports)
  - Mozambique: imported mainly through Chiponde and Mulanje
  - Kenya: imported through Songwe
  - India: imported mainly through Blantyre
- Imports from Tanzania, South Africa and Mozambique which *are* recorded by the MBS are also often associated with lower than average iodine content (see Figure 13 of the M&E report), giving rise to the assumption that *unrecorded* imports from these countries are likely sub-quality as well.

It should be noted, however, that MBS data includes a number of imports from Switzerland, which is not the case according to MRA records.

Given the shortcomings revealed with regards to data consistency between MRA and MBS, it is recommended that the below analysis should be repeated in a year's time once some of the proposed actions for an improvement of the border inspection process have been realized. Import data can be obtained by the MRA in Blantyre with Mr. Vallete (+265 8888 77 252) being the right point of contact.

Figure 4





3.3 Analysis of current industry level inspection process

Factory level inspection for adherence of wholesalers and supermarket chains with salt iodine requirements is currently the responsibility of the MBS. Inspections have happened on a relatively regular basis since 2009. A total of 22 samples have been collected from the following companies: Bharat Trading, Chimalira Enterprise, Eco Products, Fadamz Rice Mill, Rab Processors, Rice Milling, Tambala Food Products, and Agora. It appears, however, that there is currently no routine/countrywide schedule of factory inspections in place. The results of historic inspections are discussed within the sample M&E report.

3.4 Analysis of current market-place level inspection process

Market-place inspections have historically been done by a combination of Ministry of Trade representatives and district health officers, but lacked a structured approach and adequate data aggregation. UNICEF recently contracted Chancellor College for a full market level inspection of salt iodine levels as well as vitamin A levels in cooking oil and maize flour samples. Representatives from Chancellor College are currently collecting salt samples across the entire country – covering approximately 20 trading centers in each of Malawi's 28 districts. Following the initial sample collection, samples of the same brand and trading center will be tested in aggregate. First results should be made available in October 2010 and should then be included in the M&E database as described in this report.

Subsequent to this initial round of market place testing, further inspection rounds should be initiated on a regular basis, at least annually. Representatives of Chancellor College are already training health officers in every district for the purpose of handing over this process to the Ministry of Health, which is currently adding capacity in its CHSU laboratory to enable increased testing capabilities (iodine and vitamin A).

4 Summary of key issues identified

- **Lack of collaboration and cooperation of MRA, MBS and Ministry of Health for border inspection**

MRA currently does not rely on test results issued by the Ministry of Health / CHSU for the purpose of customs clearing. As such, there appears to be a lack of communication between the MRA and Health Surveillance Assistants on border stations where no MBS inspector is present. MBS and health officers work in parallel rather than combining their efforts in providing inspection services to all of Malawi's border stations, resulting in inconsistent data and increased risk of import leakage along the border zone.

- **Uncertainty on availability and execution of standard custom procedures for salt imports**
  It is unclear how custom clearing of salt is dealt with at various border stations. While standards may be in place, execution of such procedures does not appear consistent. Sometimes importers have to wait until lab results are issued while on other occasions inland transport is allowed on the basis of qualitative testing only. It was indicated that custom clearance can only be obtained on the basis of a copy of an MBS laboratory report testifying compliance of the imported salt with related standards. However, such reports are often issued only months after the actual import, which makes it probable that clearance is also granted without a ready MBS lab report. This by itself may not be a huge issue (as retrospective actions can be taken against importers for further imports), but proves lack of universal and transparent custom procedures.

- **Lack of standard equipment at border stations**
  Some MRA officers, MBS inspectors and Health Surveillance Assistants are equipped with rapid test kits for qualitative iodate testing. While equipment is not always available and often too old to ensure reliable results, it is unclear which purpose rapid test kits should serve under the current inspection process given that MRA border officials issue custom clearance purely on the basis of quantitative test results. It is recommended that qualitative test results are used for immediate rejection of attempted imports of non-iodized salt in the future.

- **Lack of clear rules regarding enforcement of non-compliance with salt iodine requirements**
  It appears that negative laboratory results are dealt with in an inconsistent manner with regards to enforcement actions against non-compliant importers. While this may not necessarily result in unsatisfactory execution of the standards, it might be more effective to increase transparency and issue clear guidance on how to deal with non-compliant results.

- **Current standards for iodine levels are to narrow and not in accordance with general recommendations**
  Current standards are based on consumption patterns from 2001, however standards are currently under revision by both MBS and Ministry of Health. The current iodine import requirement of 80-100 ppm may be both too narrow of a range and too high in absolute terms leading to many non-compliant testing reports, which are effectively not enforceable.

- **Governance structure on food fortification strategy is dispersed and lacks transparency and clear accountabilities**

There are currently a number of different committees, sub-committees and task forces in place that exist on paper but are effectively not operating. Overlap of tasks and individuals among the various committees is likely high and meetings happen irregularly.

5 Summary of preliminary recommendations

The following recommendations should be considered a first proposal for immediate next steps towards an improved monitoring structure for food fortification in Malawi. Although this report focuses work on iodized salt, selected perspectives are offered on vitamin A fortification as well.

The predominant area of concern is the lack of cooperation between MRA, Ministry of Health and MBS for salt import inspections, as well as the overall lack of standardized procedures in place from data sampling to enforcement of standards and data aggregation for further analyses and monitoring.

The flow charts illustrated below outline the chain of events and associated responsibilities along the border inspection process which can be used as an implementation guideline:

Figure 5: Process steps salt import inspection - on the border

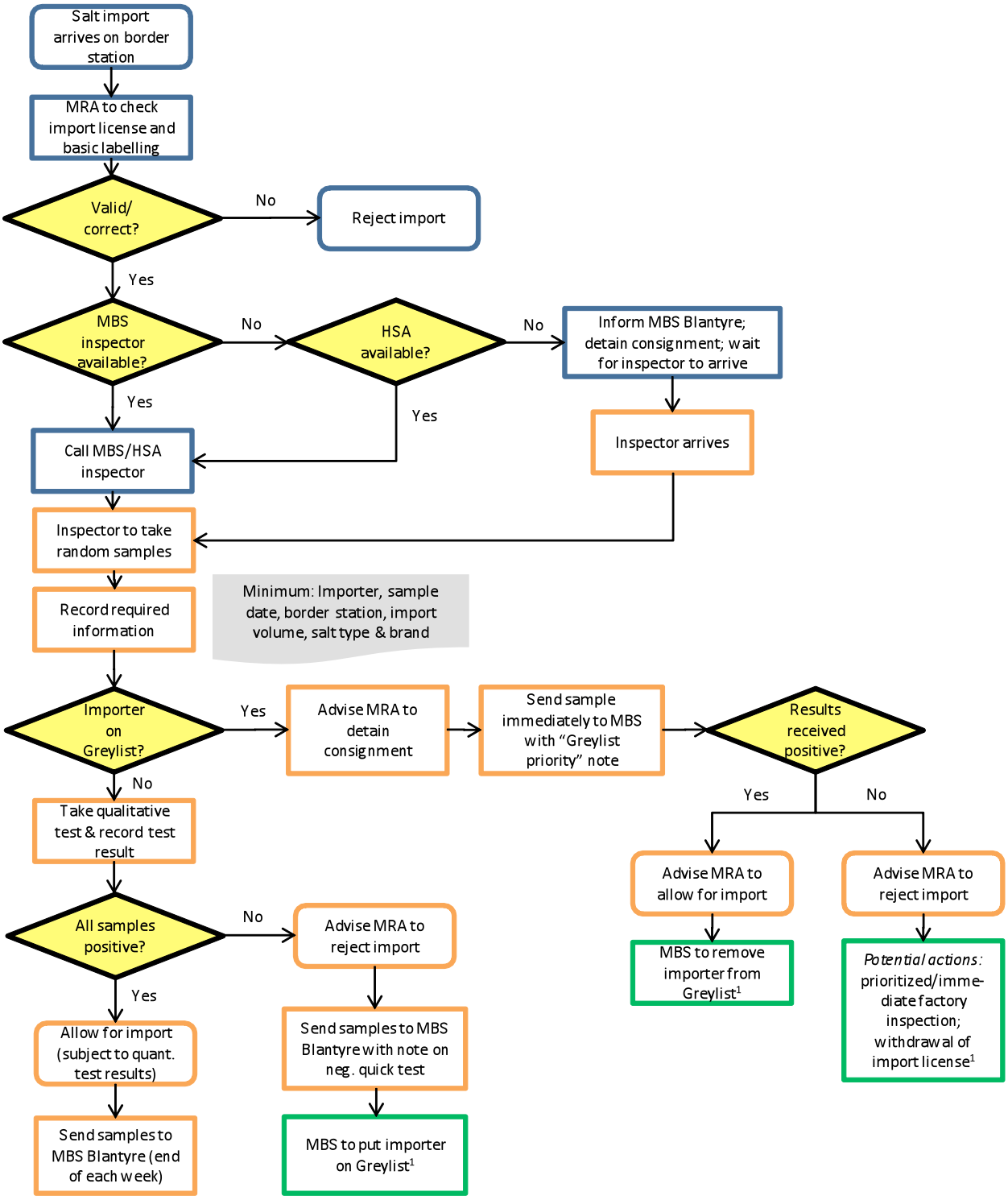
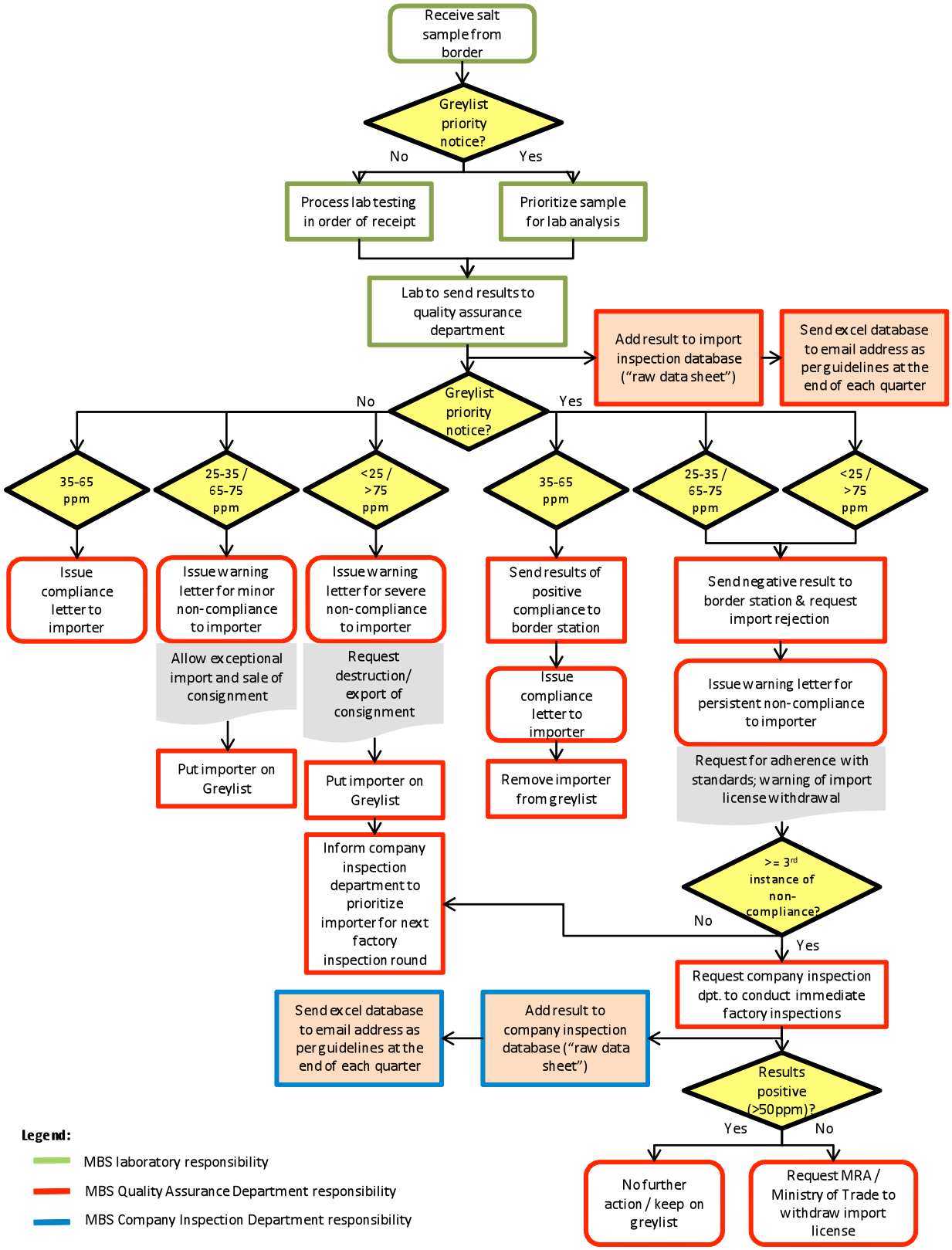


Figure 6: Process steps salt import inspection – MBS laboratory level / standards enforcement[4]



[4] Iodine cut-off values triggering standards enforcement are based on a target average iodine content of imported salt of 50 ppm (as currently proposed in the revision process).

- **Improve cooperation between MBS, MRA and Ministry of Health for border inspection**
  - MBS and Ministry of Health have to agree on allocation of responsibility for all 28 border stations (i.e. each border station should be formally designated to fall either under MBS or Ministry of Health responsibility for inspection purposes).
  - MRA officers should be formally required to notify responsible inspector (MBS or PHI/HSA) of each salt import.
  - Clear guidance should be issued to MBS inspectors with respect to data documentation/labeling to ensure congruence of records with MRA records.
  - MBS inspectors and PHIs/HSAs should include the volume of each salt import as part of their documentation and this information should be recorded by the laboratories and subsequently in the M&E database to allow for improved analyses.
  - The analysis comparing MBS and MRA records of salt imports should be repeated once other proposed actions have been realized.

- **Simplification / standardization of border inspection process *(please refer to flow charts above for further details)***
  - Border inspectors (MBS or PHI/HSA) should have the right to advise MRA to allow/reject inland transport on the basis of a sample qualitative test result.
  - Further discussions are proposed with the MRA with respect to custom clearance and whether it is practical to allow this only on the basis of a positive lab result.
  - Right to distribution and sale of imported salt should remain subject to positive laboratory test result (although in practice monitoring and enforcement of such rule might pose a challenge).
  - All random samples (collected by MBS inspectors and PHIs/HSAs) should be sent to MBS laboratory in Blantyre for further analysis and report issuance (to permit right to distribution or issue penalizing actions).

- **Train MRA officers at borders without presence of MBS inspectors in qualitative iodine testing and random sampling**
  - The process proposed in the current flowcharts dictates MRA officers to 'inform MBS Blantyre, detain the consignment and wait for the arrival of an MBS inspector' in case no PHI/HSA is readily available for testing and sampling of salt imports at the border.
  - While this might be an effective solution to ensure a tight surveillance net, it may prove impractical.
  - It is therefore recommended that MRA inspectors at these particular border stations are themselves equipped with iodine test kits and sample forms to avoid potentially long waiting times for salt importers. In such cases, the MRA officers could conduct the qualitative test and random sampling him/herself and subsequently allow or reject the import on the basis of the test results. Samples would have to be properly labeled and sent to MBS Blantyre.
  - Such engagement of MRA officers would, however, require adequate training of MRA staff in qualitative iodine testing, sampling and labeling procedures.

- **Standardize actions and notifications to non-compliant importers *(please refer to flow charts above for further details)***
  - It is recommended that the NFA defines the relevant and adequate iodine cut-off points that trigger enforcement actions by border inspectors, laboratories and the MRA. The below defined cut-off ranges are based on a target average iodine content of 50 ppm at the import level, which is the target value currently proposed in the revision process.
  - Allowed range for salt imports: 35-65ppm
  - Warning of importer for minor non-compliance (e.g. iodine level 25-35ppm, or 65-75ppm):
    - Allow for distribution of consignment.
    - Put importer on grey list to allow for prioritized further testing (e.g. truck has to wait on border until quantitative test is available for subsequent imports).
    - Import rejection in case of further non-compliance.
  - Severe non-compliance (e.g. iodine level < 25ppm, or > 75ppm):
    - Request for destruction/export of imported consignment.
    - Grey list: prioritize further testing (further imports subject to quantitative test only).
    - Prioritize importer for subsequent industry inspections.
  - Consistently severe non-compliance (failure to respond to demanded actions by MBS):
    - Put importer on black list: temporary withdrawal of import license.
  - Consistent updating and publishing of "Greylist" status:
    - The MBS will be responsible for keeping the greylist (list of importers with historic track record of non-compliance with salt iodine requirements) up to date.
    - The current status of the greylist should be sent to the following individuals at the end of each week via email: MBS border inspectors; PHIs/HSAs; and all 28 MRA border stations.

- **Ensure timely delivery of qualitative test kits to border inspectors**
  - Provision of test kits to all border inspectors should be the responsibility of Ministry of Health.

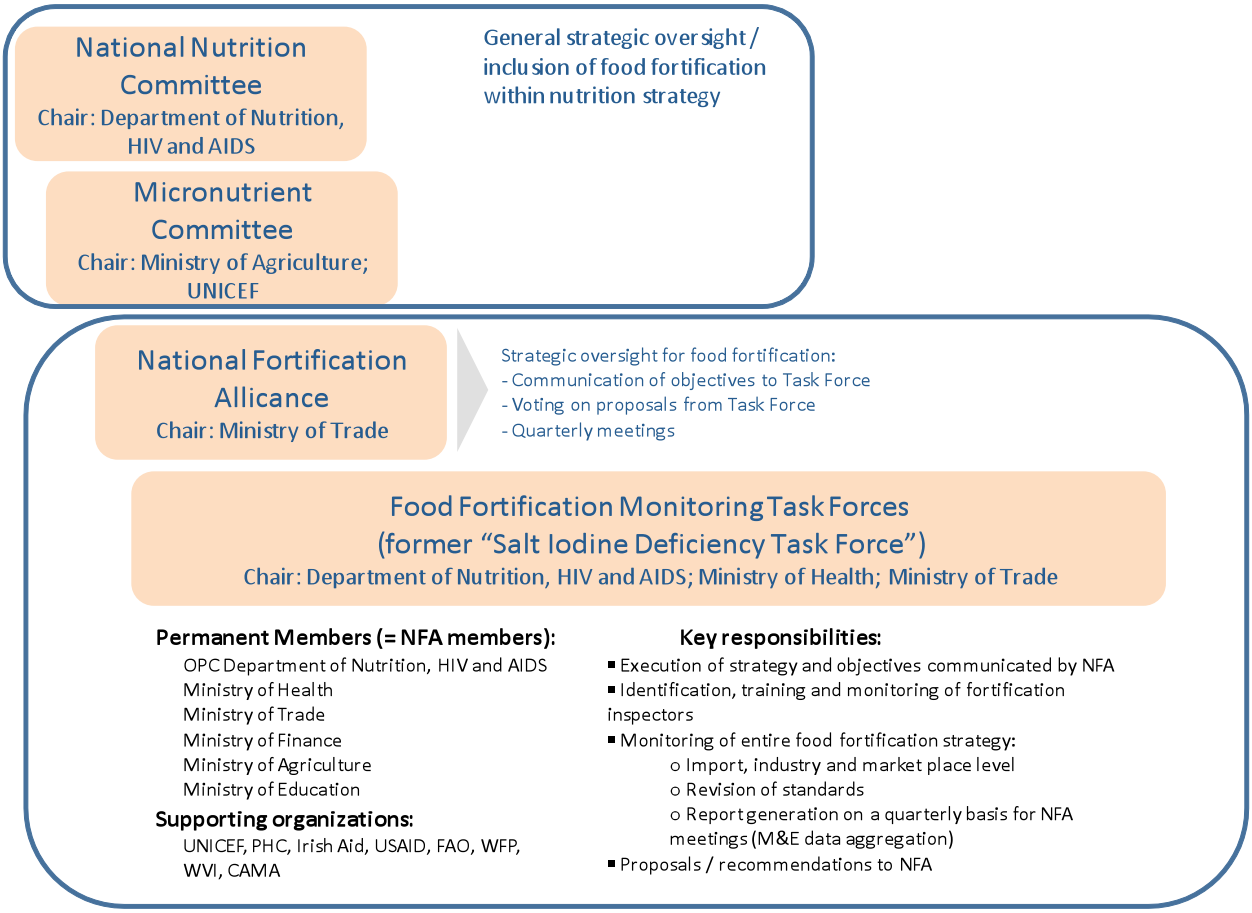
- **Simplification of committee and task force governance on food fortification**

  Future governance on food fortification should be structured according to the below illustration. In particular, it is recommended that the current 'Salt Iodine Deficiency Task Force' be elevated to a new 'Food Fortification Monitoring Task Force', which would be composed of members from all relevant stakeholders and subsume execution of strategic objectives for food fortification (iodine, vitamin A, iron) in addition to eventual oversight around bio-fortification and school feeding programs.

  Key success factors for the functioning of such a task force include:

  i) Identification of the appropriate individuals by the various departments;
  ii) Training of the individuals on the monitoring of food fortification; and
  iii) Transparency on job description and deliverables (formalization of guidelines, objectives and accountabilities issued by the NFA).

In order to facilitate parallel work-streams within the task force, the group should be free to form further sub-task forces composed of members from its internal resources based on the specific need/objective.



6 Presentation of an M&E database for food fortification monitoring

As part of initial work to improve food fortification monitoring standards, an M&E database was created to allow the easy aggregation and evaluation of laboratory results. Data aggregation will be possible across various staple foods and inspection levels (import, industry and market place). As of now, the database is designed to capture the following data sets:

- Salt iodine: import, industry, market place (see Figure 7, Figure 8, Figure 9 below)
- Vitamin A fortification: sugar, cooking oil, maize flour (see Figure 10 below)

On the basis of the raw data summarized in the tables below, a number of illustrative charts are created automatically, which allow for an analysis of salt iodine/vitamin A levels across a number categories and parameters. In addition, reports can be generated for any preferred combination of the parameters mentioned:

- Import data: analysis over time, by customs station, by importer, by staple food brand & salt type
- Industry data: analysis over time, by company, by salt type
- Market place data: analysis over time, by district, by staple food brand & salt type

Date	IIR Code	Point of entry / Customs Station Co	Importer	Salt Type	Salt Brand (=Origin)	Result	Category	Month	Quarter	LTM?
7-Apr-10	IIR/10/111	MWA	Chicco General Dealers	Coarse	Botswana	81.33	75-99.9	April 2010	Q2 2010	1
16-Mar-10	IIR/10/071	DED	Chipiku Stores	Fine	Switzerland	82.20	75-99.9	March 2010	Q1 2010	1
28-Mar-10	IIR/10/094	DED	Chipiku Stores	Coarse	Switzerland	82.28	75-99.9	March 2010	Q1 2010	1
1-Mar-10	IIR/10/057	DED	Kalaria Wholesalers	Coarse	Switzerland	85.20	75-99.9	March 2010	Q1 2010	1
28-Dec-09	IIR/09/35	MWA	Rab Processors	Coarse	Botswana	99.20	75-99.9	December 2009	Q4 2009	1
5-Feb-10	IIR/10/06	DED	Rab Processors	Coarse	Switzerland	96.52	75-99.9	February 2010	Q1 2010	1
16-Apr-10	IIR/10/109	MWA	Rab Processors	Coarse	Switzerland	86.40	75-99.9	April 2010	Q2 2010	1
18-Dec-09	IIR/09/307	MWA	Rice Milling	Fine	Botswana	134.00	>=100	December 2009	Q4 2009	1
8-Apr-10	IIR/10/095	MWA	Rice Milling	Fine	Switzerland	92.90	75-99.9	April 2010	Q2 2010	1

Figure 7: Salt import monitoring data

Sample Dat	Company name	Salt Type	Result	Category	Month	Quarter	LTM?
1-Apr-10	Bharat Trading	Fine	84.00	75-99.9	April 2010	Q2 2010	1
22-Jul-10	Chimalira Enterprise	Fine	86.70	75-99.9	July 2010	Q3 2010	1
12-Dec-09	Eco Products	Fine	63.45	50-74.9	December 2009	Q4 2009	1
1-Mar-10	Eco Products	Fine	116.19	>=100	March 2010	Q1 2010	1
18-Feb-10	Fadamz Rice Mill	Coarse	98.32	75-99.9	February 2010	Q1 2010	1
18-Feb-10	Fadamz Rice Mill	Fine	84.44	75-99.9	February 2010	Q1 2010	1
18-Feb-10	Rab Processors	Coarse	73.29	50-74.9	February 2010	Q1 2010	1

Figure 8: Salt industry monitoring

Date	District	Trading Centre	Salt Type	Salt Brand (=Origin)	Result	Category	Month	Quarter	LTM?
20-Jul-09	Blantyre	Centre 1	Fine	Switzerland	20.00	5-24.9	July 2009	Q3 2009	0
25-Jul-09	Zomba	Centre 1	Coarse	Mozambique (SeaFresh)	51.00	50-74.9	July 2009	Q3 2009	0
30-Jul-09	Mangochi	Centre 1	Fine	Botswana	23.00	5-24.9	July 2009	Q3 2009	0
4-Aug-09	Phalombe	Centre 1	Coarse	Kenya	118.00	>=100	August 2009	Q3 2009	0
9-Aug-09	Mulanje	Centre 1	Fine	Ghana	97.00	75-99.9	August 2009	Q3 2009	0
14-Aug-09	Thyolo	Centre 1	Coarse	Switzerland	38.00	25-49.9	August 2009	Q3 2009	0
19-Aug-09	Mwanza	Centre 1	Fine	Kemusalt	57.00	50-74.9	August 2009	Q3 2009	0
24-Aug-09	Neno	Centre 1	Coarse	Switzerland	15.00	5-24.9	August 2009	Q3 2009	0

Figure 9: Salt market place monitoring (currently dummy data)

Date	District	Trading Centr	Product	Brand	Result	Category	Month	Quarter	LTM?
20-Jul-09	Blantyre	Centre 1	Cooking oil	Kazinga	25.00	25-34.9	July 2009	Q3 2009	0
25-Jul-09	Zomba	Centre 1	Maize flour	Brand 4	2.50	1-4.9	July 2009	Q3 2009	0
30-Jul-09	Mangochi	Centre 1	Sugar	Illovo	7.00	5-14.9	July 2009	Q3 2009	0
4-Aug-09	Phalombe	Centre 1	Cooking oil	Kukoma	45.00	>=35	August 2009	Q3 2009	0
9-Aug-09	Mulanje	Centre 1	Maize flour	Brand 5	3.70	1-4.9	August 2009	Q3 2009	0
14-Aug-09	Thyolo	Centre 1	Sugar	Illovo	18.00	15-24.9	August 2009	Q3 2009	0
19-Aug-09	Mwanza	Centre 1	Cooking oil	Kazinga	33.00	25-34.9	August 2009	Q3 2009	0

Figure 10: Vitamin A market place monitoring (currently dummy data)

6.1 Guideline for database management / ownership of the database

An individual within the Department of Nutrition, HIV and AIDS (to be assisted and trained initially by PHC) should be appointed to manage the database on a regular basis. This responsibility would include the following tasks:

- Collaboration with and training of the various laboratories: the database manager will identify one individual within each laboratory generating test results (currently these are MBS and Chancellor College / CHSU) and assign him/her to input test results into a "raw data sheet" to be sent back to the database manager on a quarterly basis. Training by the database manager with the help of PHC will be required for the laboratory individuals (basic guidelines are included in the excel file to be sent to the laboratories).
- Data aggregation: the data sheets received from the various laboratories will then be cut and paste into the main database to allow comprehensive analysis.
- Quarterly report generation: the database manager will be responsible for generating a quarterly report summarizing the key findings of the data received over the time period analyzed, to be sent to the Food Fortification Monitoring Task Force and National Fortification Alliance. Relevant charts are mostly generated automatically, but should be augmented by a descriptive analysis (summary of remarks, key findings, and recommendations for further actions).

ANNEX 3: Manual for the management of the M&E database illustrates the proposed process in more detail.

6.2 Illustrative example of food fortification M&E report

In order to test the practicality and effectiveness of the M&E database, historic laboratory results have been collected from MBS to inform a draft report analyzing the derived results. This report should serve as a model for future quarterly reports, and allow a first evaluation of adherence to salt iodine requirements in Malawi.

The M&E report contains the following elements:

- Salt import inspections: Analysis of salt iodine levels since 2009 (data source: MBS)
- Company inspections: Analysis of salt iodine levels since 2009 (data source: MBS)
- Market place inspections: Analysis of salt iodine levels (dummy data – Chancellor College to provide laboratory results in October/November)

The following report discusses salt iodine levels in Malawi relative to the currently allowed range of 80-100ppm at the import level. Once this range is lowered to reflect a target average requirement of 50 ppm (as currently proposed in the revision process), the charts presented in the report should be updated to reflect the revised standards (i.e. change iodine ranges and respective coloring of ranges shown in the charts).

Due to the current lack of test results on vitamin A levels in sugar, cooking oil and maize flour, the report does not include a separate section on vitamin A monitoring. However, the database has been designed to include these results once they become available. The M&E report for vitamin A fortification would follow the same composition as the report presented below.

6.2.1 Key summary remarks

- **Average iodine content of recorded salt imports has remained at acceptable levels throughout 2009 and the first half of 2010 (i.e. above 80 ppm):**
    - Mulanje is the only border station with documented low iodine content (69ppm)

- 2/3 of all salt is imported from Botswana with a good track record in iodine content (typically above 80ppm).
- Imports from Mozambique (only to some extent), Pakistan, South Africa and Tanzania have lower than average iodine levels.
- A number of individual small-scale salt traders continue to import sub-quality salt.

- **However, while average iodine levels have been acceptable, there exists notable variation of iodine content within individual salt imports:**
  - Only 29% of individual imports (or 55 out of 188 recorded imports over the analyzed time period) were within the allowed range of 80-100ppm (according to the current Malawi standard).
  - 35% of imports had an iodine content of lower than 80ppm.
  - 36% of imports had an iodine content of higher than 100ppm.
- **Industry inspections have resulted in an overall satisfactory salt iodine content of above 80ppm:**
  - The exception was an average iodine content of 50ppm at Agora factories tested in Sep-2009.
  - Only 22 individual samples across 8 salt wholesalers have been collected since 2009.
- **Market-place inspection results will only become available in late Sep-/early Oct-2010**

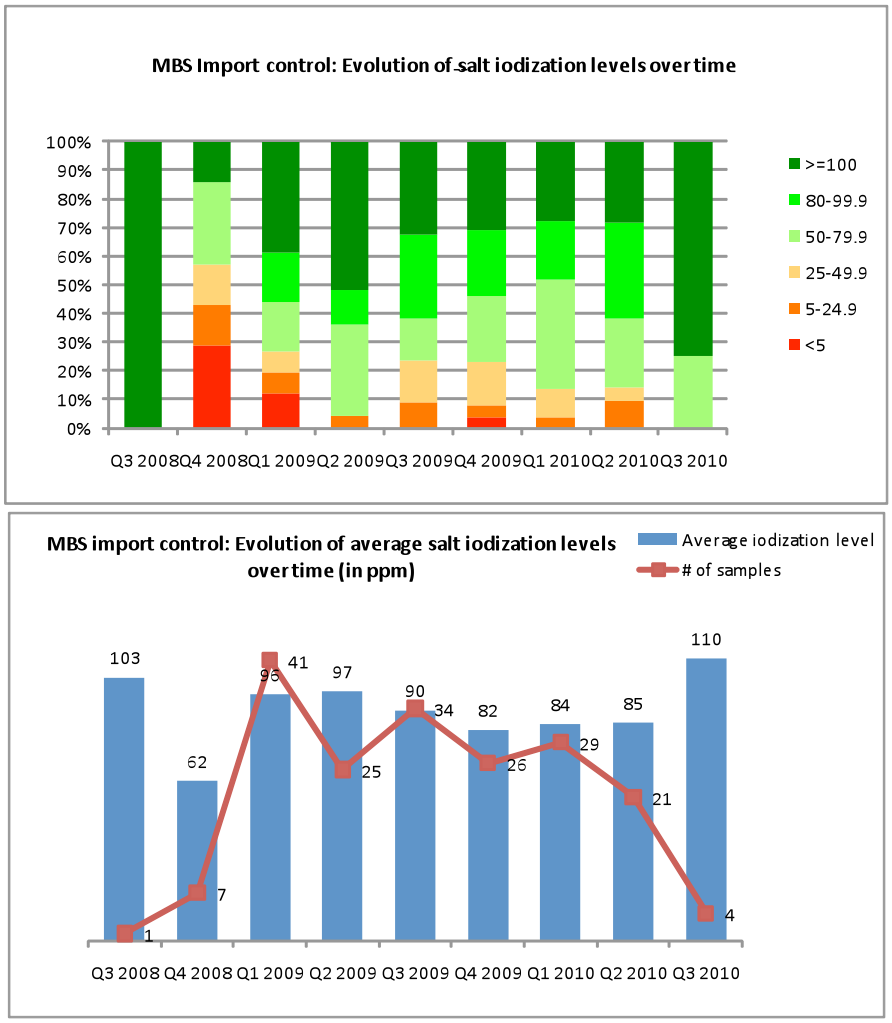
6.2.2 Import control: Analysis of salt iodine levels since 2009

Analysis over time

It should be reiterated that while the data presented includes all salt iodine test results recorded by MBS since 2009 (an incomplete data sample for the year 2008 was received, which is not representative), the total number of samples is significantly lower than the number of imports recorded by the MRA. In addition to such evident inspection leakage, salt might be imported/smuggled without knowledge of the MRA. As such, the data analyzed does not capture the entire amount of salt imports into Malawi.

An analysis of imported salt since 2009 reveals that 80-90% of imports generally have iodine levels > 50ppm, and 50-60% show a level higher than 80ppm (Figure 11). No particular trend over time can be readily discerned. If anything, salt iodine levels seem to have increased slightly in recent quarters. Q3 2010 is not yet representative given the low number of samples analyzed.

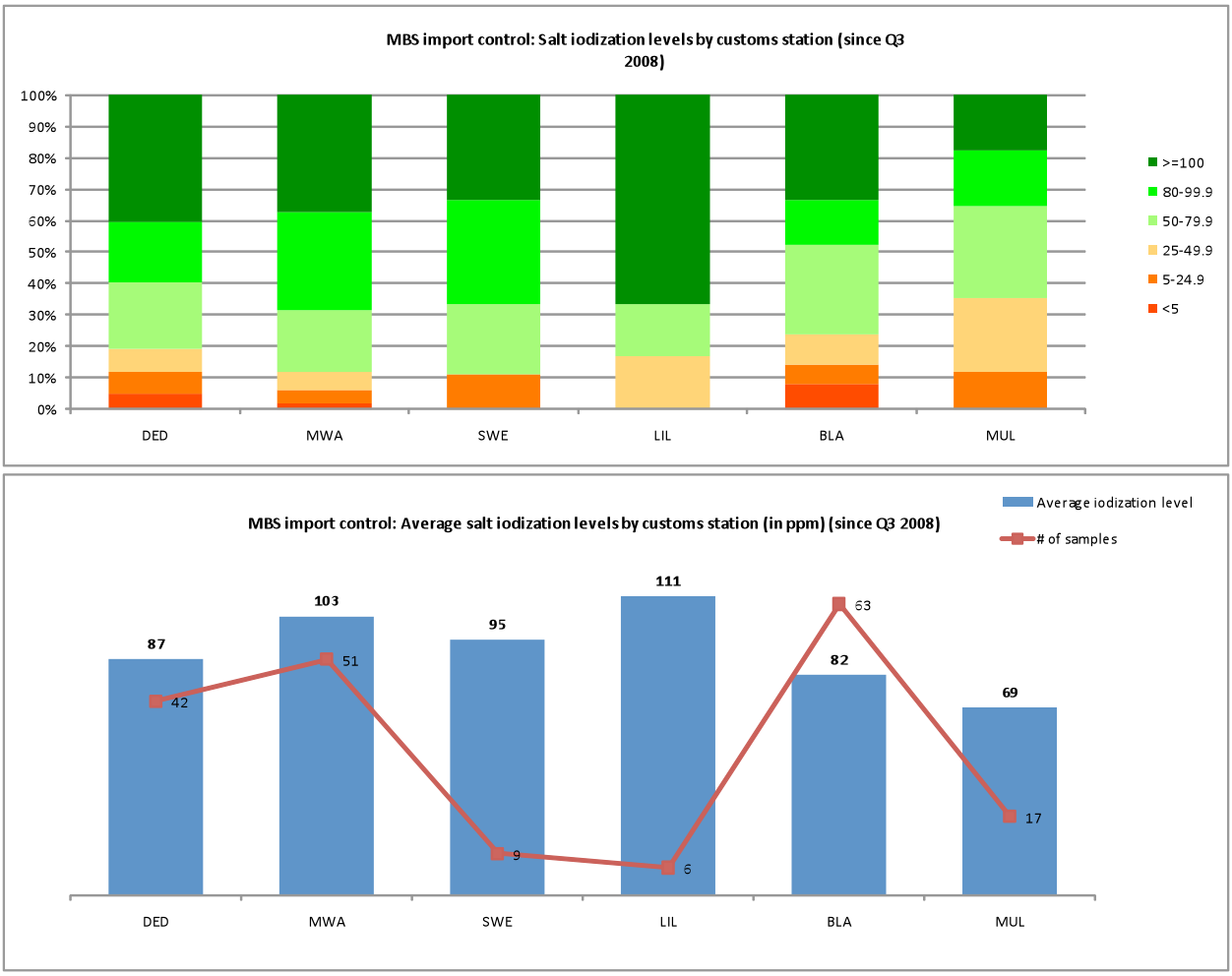
Figure 11



Analysis by border station/entry point

Unsurprisingly, imports have only been recorded on border stations with permanent presence by an MBS inspector, as well as the two inland custom clearing stations, Lilongwe and Blantyre. No particular border station seems to lag severely behind the others with regards to iodine content of salt imports. The only exception is Mulanje, with an average imported iodine content of 69ppm (35% of individual imports <50 ppm), which is primarily a result of the concentration of salt imports coming from Mozambique which has historically been the source with the poorest adherence to iodine requirements.

Figure 12



Analysis by salt brand and salt type

The key focus here is on evaluating Botsalt, given that 2/3 of all salt is imported from Botswana. Salt with Swiss origin is, in fact, imported from Botswana as well. The average iodine content from Botswana is 94ppm, which lies within the recommended range of the current Malawi standard. 39% of individual imports from Botswana had a salt iodine content of below 80ppm and 22% of imports adhered to the current standard of 80-100ppm.

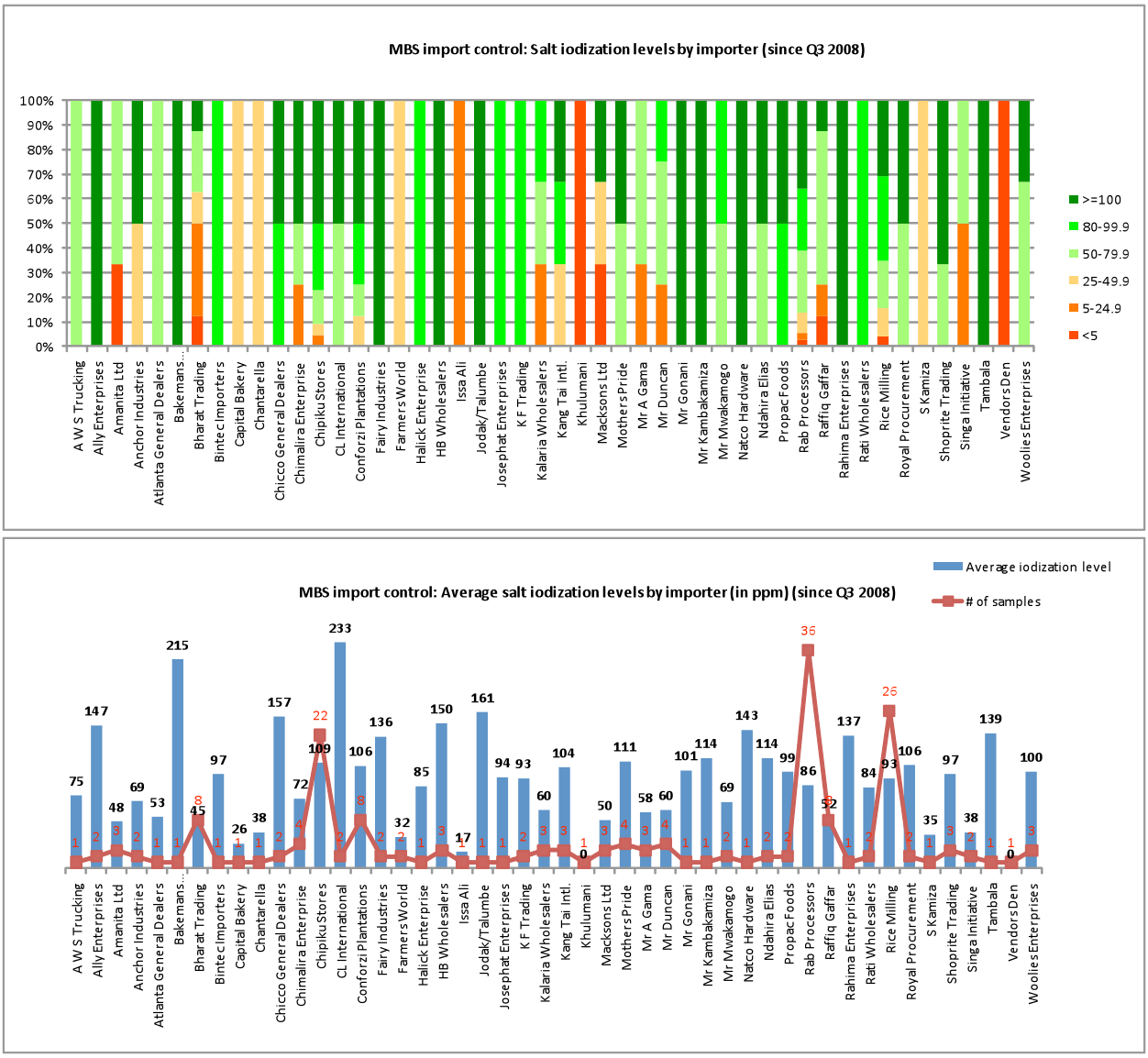
Notable problem areas seem to exist with salt imported from Mozambique (30% of imports < 50ppm), Pakistan (average of 62ppm, but only 3 recorded imports), South Africa (average of 51ppm for fine salt; 41% of all imports < 50ppm), and Tanzania (average of 35ppm for coarse salt, mainly through the "uncontrolled" border of Chiponde; only 4 recorded imports).

Figure 13

Analysis by individual importers

There exists significant variation in iodine content of imported salt among individual importers with a relatively large number of small-scale traders importing sub-quality salt. The more notable negative examples include Bharat Trading (average of 45ppm; 50% of imports < 50ppm), Farmers' World (average of 32ppm; only 2 imports), and Raffiq Gaffar (52ppm; 25% of imports < 50ppm). Mia Yasin does not show up in the MBS data sample as an individual importer.

Figure 14



6.2.3 Industry control: Analysis of salt iodine levels

MBS has conducted a total of 22 inspections of salt wholesalers since 2009. The average iodine content measured in these inspections has consistently been within or above an acceptable range of 60-80ppm. The only exception was a round of inspections at Agora in September 2009, which revealed an average iodine content of 50ppm across a total of 5 random samples.

Figure 15

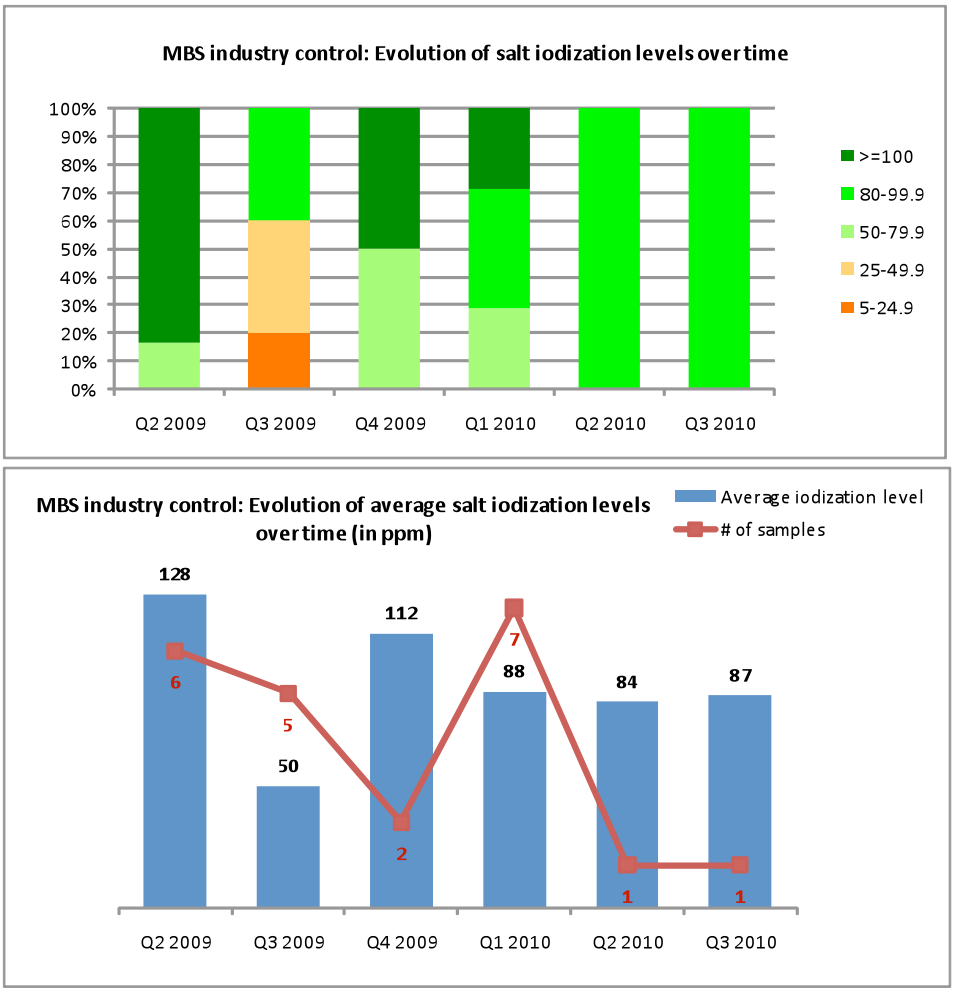
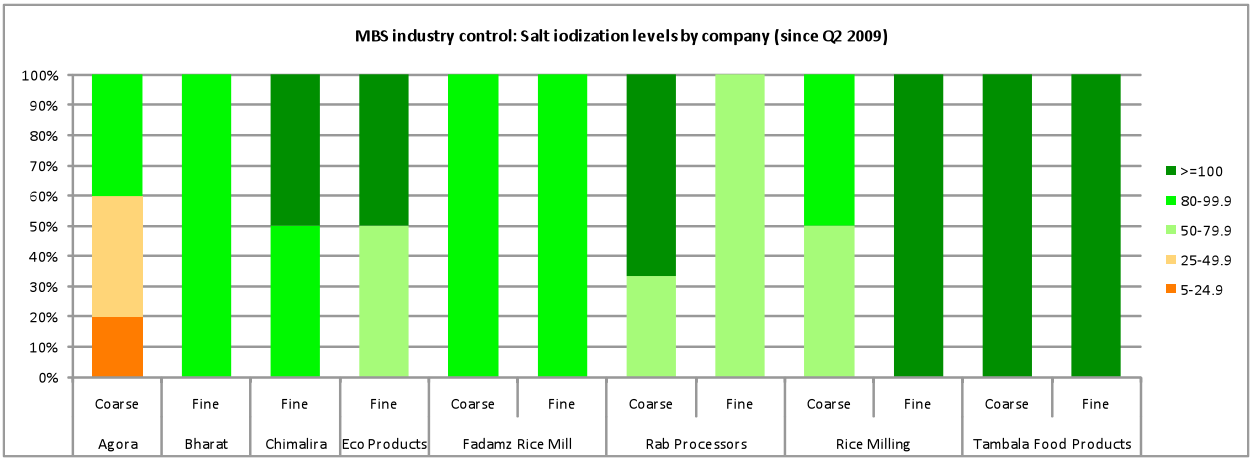
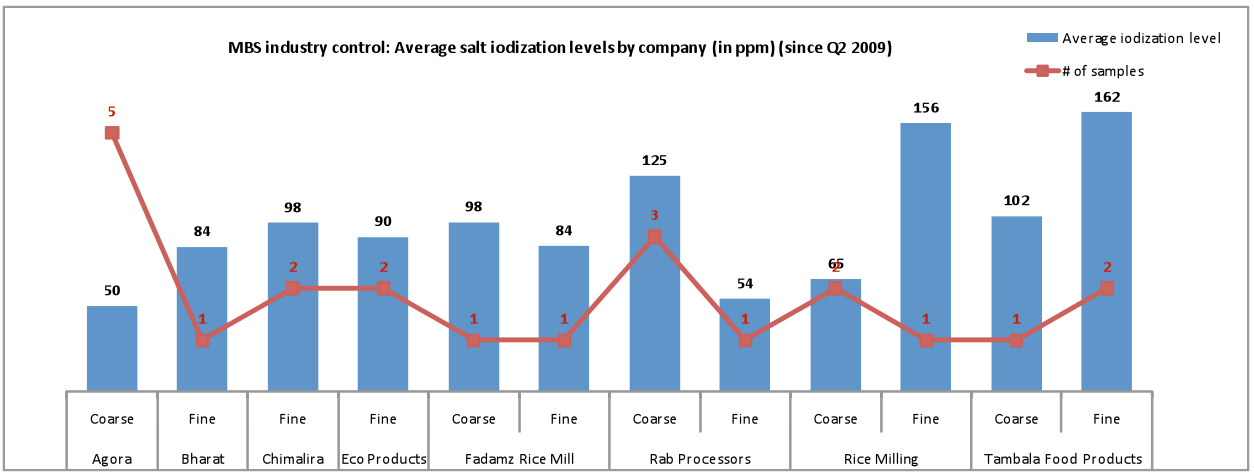


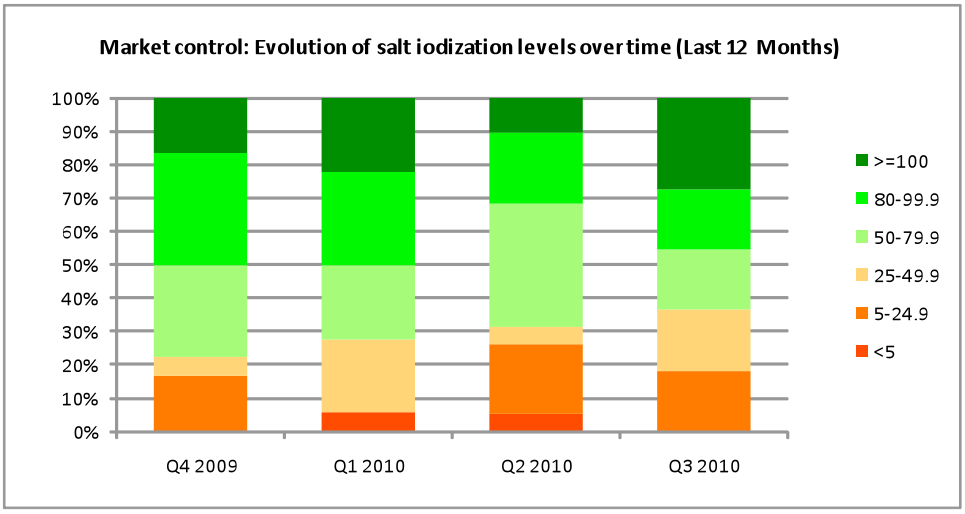
Figure 16





6.2.4 Market place control: Analysis of salt iodine levels (currently DUMMY data - for illustration purposes only)

Figure 17



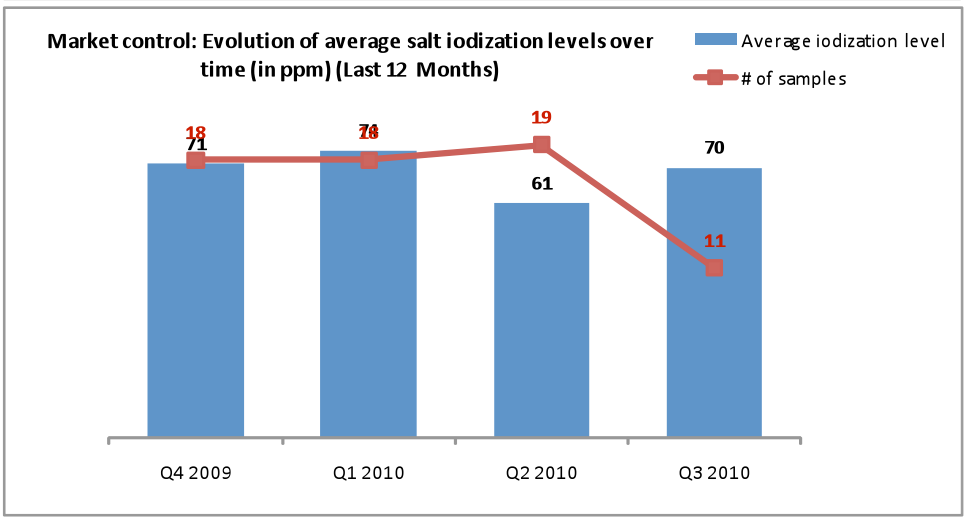
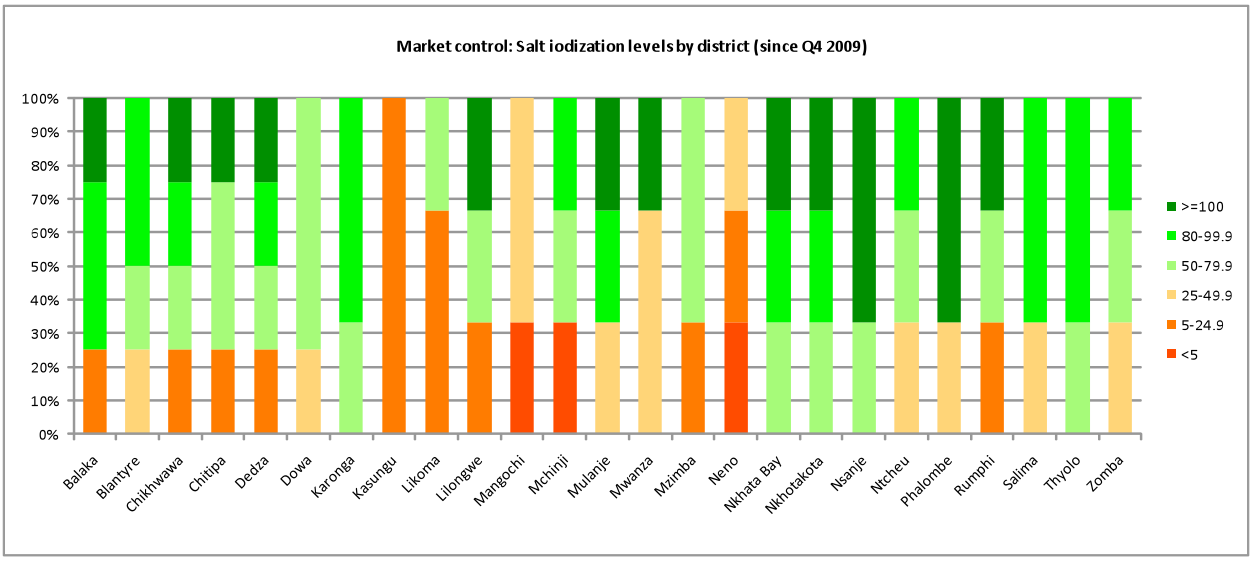


Figure 18


Market control: Salt iodization levels by district (since Q4 2009)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
>=100
80-99.9
50-79.9
25-49.9
5-24.9
<5
Balaka
Blantyre
Chikhwawa
Chitipa
Dedza
Dowa
Karonga
Kasungu
Likoma
Lilongwe
Mangochi
Mchinji
Mulanje
Mwanza
Mzimba
Neno
Nkhata Bay
Nkhotakota
Nsanje
Ntcheu
Phalombe
Rumphi
Salima
Thyolo
Zomba

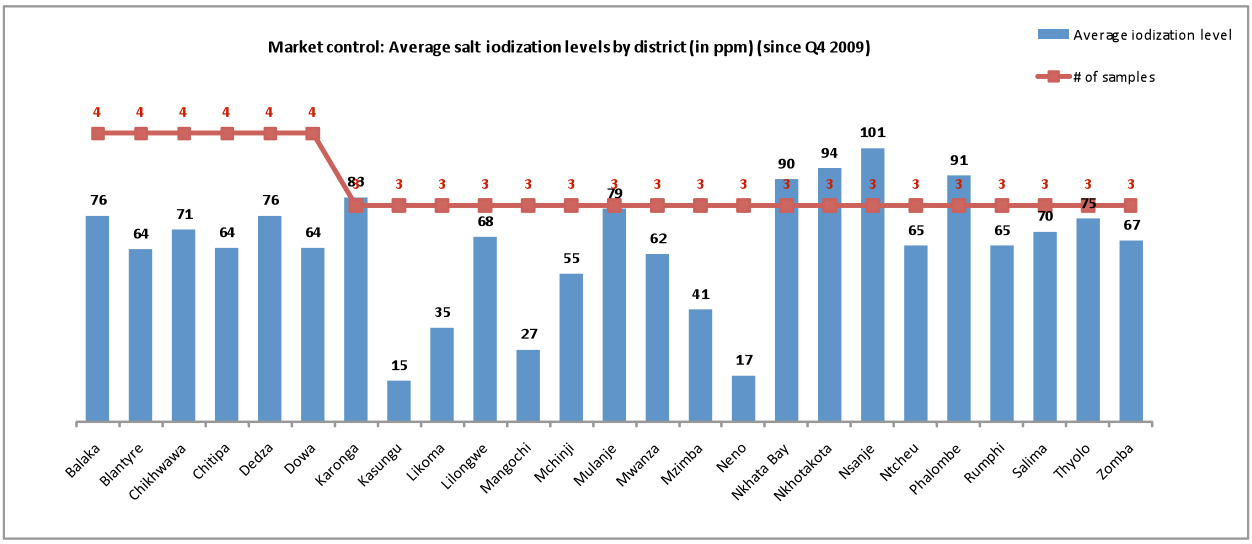
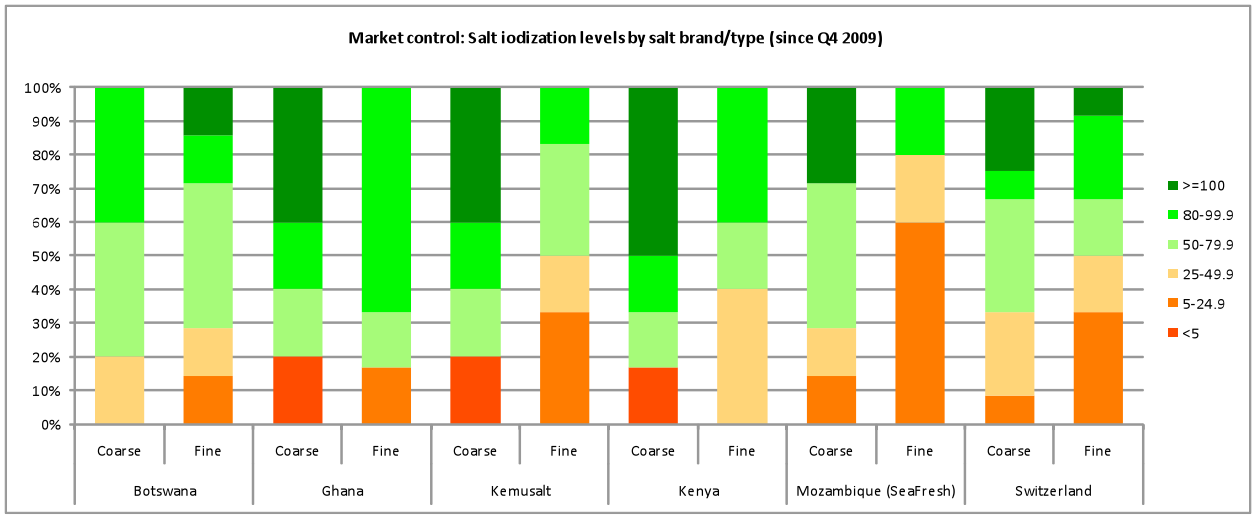
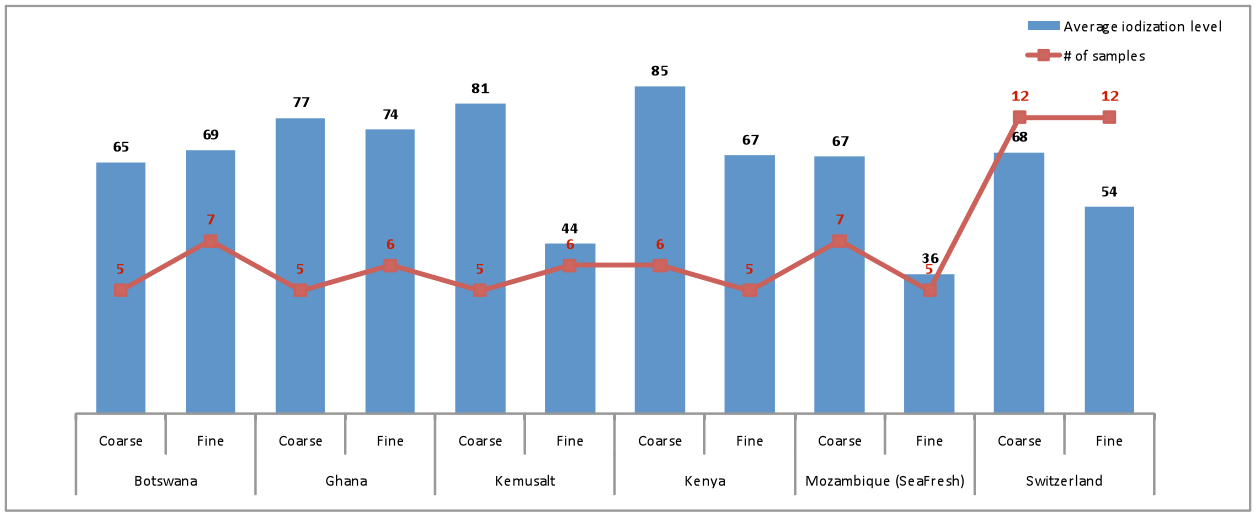

Market control: Average salt iodization levels by district (in ppm) (since Q4 2009)
Average iodization level
# of samples
4 4 4 4 4 4
76 64 71 64 76 64 83 15 35 68 27 55 79 62 41 17 90 94 101 65 91 65 70 75 67
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Balaka
Blantyre
Chikhwawa
Chitipa
Dedza
Dowa
Karonga
Kasungu
Likoma
Lilongwe
Mangochi
Mchinji
Mulanje
Mwanza
Mzimba
Neno
Nkhata Bay
Nkhotakota
Nsanje
Ntcheu
Phalombe
Rumphi
Salima
Thyolo
Zomba

Figure 19


Market control: Salt iodization levels by salt brand/type (since Q4 2009)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
>=100
80-99.9
50-79.9
25-49.9
5-24.9
<5
Coarse
Fine
Botswana
Ghana
Kemusalt
Kenya
Mozambique (SeaFresh)
Switzerland


Average iodization level
# of samples
65
69
77
74
81
44
85
67
67
36
68
54
5
7
5
6
5
6
6
5
7
5
12
12
Coarse
Fine
Botswana
Ghana
Kemusalt
Kenya
Mozambique (SeaFresh)
Switzerland

7 ANNEX 1: Sample MBS report for minor incompliance

BS/QAD/58/10 2010-05-11

The Managing Director

[Company] P.O. Box 198

Dear Sir/Madam

RE: IMPORT QUALITY MONITORING REPORT NR IQR/10/169 ON COARSE SALT UNDER COMMERCIAL INVOICE NR 1268 FROM BOTSWANA

We refer to the above consignment, which was inspected and sampled from in March 2010 under imports inspection request nr IIR/10/082.

Please, find below laboratory test results on the tests conducted on the sample in accordance with MS 188- *Mandatory Malawi Standard on salt specification.*

SL NR	TEST DONE	RESULTS	MS 188 SPECIFICATION	REMARKS
1.	Colour	White	White	Pass
2.	Moisture	1.88	5.0 max	Pass
3.	Water insoluble matter, %	0.16	1.0 max	Pass
4.	Chloride (Nacl) & m/m	97.00	96.0 min	Pass
5.	Calcium, Ca, water soluble %	0	0.5 max	Pass
6.	Magnesium, Mg, water soluble % mm	0	0.5 max	Pass
	Sulphate, SO_4, % m/m			
7.	Alkalinity (Na_2C0_3) % m/m	0.161	0.5 max	Pass
8.	Iodine (KIO_3)	0.97	1.0 max	Pass
9.	Cadmium (Cd)	116.19	80 – 100	Fail
10.	Copper (Cu)	0.01	0.5 max	Pass
11.	Iron (Fe)	0.00	2.0 max	Pass
12.	Lead (Pb)	0.00	5.0 max	Pass
13.		0.00	2.0 max	Pass

The above results show that your sample failed on the above-mentioned parameter for which we ask you to notify your supplier for redress, as the Malawi Bureau of Standards will not allow such non-complying consignments into the country.

We however allow you to distribute, see and use this consignment only and that any subsequent failing consignment will not be allowed into the country.

Yours faithfully

8 ANNEX 2: Sample MBS report for severe incompliance

BS/QAD/58/10 2010-03-25

The Managing Director

[Company] P.O. Box 51044

Dear Sir/Madam

RE: IMPORT QUALITY MONITORING REPORT NR IQR/10/119 ON FINE SALT UNDER COMMERCIAL INVOICE NR 1622/2010 FROM SWITZERLAND AND REJECTION OF ITS FURTHER IMPORTATION DUE TO NON-COMPLIANCE

We refer to the above consignment, which was inspected and sampled in February, 2010 under imports inspection request nr IIR/10/052.

Please, find below laboratory test results on the tests conducted on the sample in accordance with MS - 188 *Mandatory Malawi Standard on salt specification.*

SL NR	TEST DONE	RESULTS	MS 188 SPECIFICATION	REMARKS
1.	Colour	White	White	Pass
2.	Moisture, % m/m	0.19	5.0 max	Pass
3.	Water insoluble matter % m/m	0.23	1.0 max	Pass
4.	Chloride content as (NaCl) , % m/m	97.14	96.0 min	Pass
5.	Calcium (as Ca) water soluble, % m/m	0	0.5 max	Pass
6.	Magnesium (as Mg) water soluble, % m/m	0.09	0.5 max	Pass
7.	Sulphate as (SO_4) % m/m	0.74	0.5 max	Fail
8.	Alkalinity (as Na_2CO_3)	0.98	1.0 max	Pass
9.	Iodine (as KIO_3) ppm min (port of entry iodisation salt plant & prepacking)	57.5	80 – 100	Fail
10.	Cadmium (as Cd)	0	50.0 max	Pass
11.	Copper (as Cu)	0	2.0 max	Pass
12.	Iron (as Fe)	0	5.0 max	Pass
13.	Lead (as Pb)	0	2.0 max	Pass
14.	Tin (as Sn)	1.9	100.0 max	Pass

The above results show that your sample failed on the above-mentioned parameters for which we ask you to notify your supplier for redress, as the Bureau will not allow such non-complying consignments into the country.

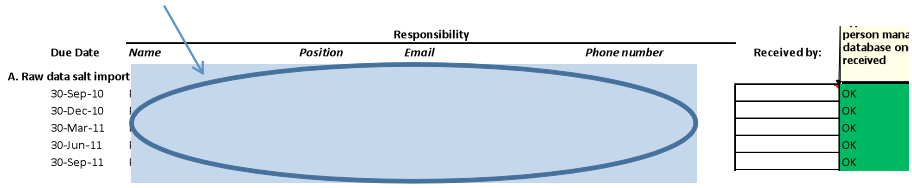
We therefore reject further importation of this non-complying salt and we demand preshipment testing of the product to verify redress of the non-compliance prior to any consideration.

9 ANNEX 3: Manual for the management of the M&E database

Step 1

Identify responsible individuals within relevant laboratories

Add details of individual into worksheet "status of received data" as per below example



		Responsibility					
	Due Date	*Name*	*Position*	*Email*	*Phone number*	Received by:	person mana database on received
A. Raw data salt import							
	30-Sep-10						OK
	30-Dec-10						OK
	30-Mar-11						OK
	30-Jun-11						OK
	30-Sep-11						OK

The relevant laboratories for data aggregation are:

Data	Laboratory	Individual identified
Salt iodine: import	MBS	Patrician Kondowe (details in worksheet)
Salt iodine: industry	MBS	Not yet identified
Salt iodine: market (current round)	Chancellor College	Dr. Samson Sajidu (details in worksheet)
Salt iodine: market (future)	CHSU	Not yet identified
Vitamin A: import	TBD	Not yet identified
Vitamin A: industry	TBD	Not yet identified
Vitamin A: market (current round)	Chancellor College	Dr. Samson Sajidu (details in worksheet)
Vitamin A: market (future)	CHSU	Not yet identified

Step 2

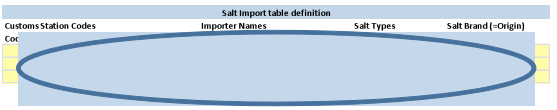
Send excel file with "guidelines", "status", "inputs" and "raw data" worksheets to identified individuals

Laboratories may require training for operating the data base. Basic guidelines are included in the related sheets but may have to be further explained

Step 3

Receive data files from all labs at the end of each quarter and copy paste data into the main database

Inputs



Salt import table definition

Customs Station Codes	Importer Names	Salt Types	Salt Brand (=Origin)

First, copy-paste yellow shaded cell content into the related cells of the "Inputs" sheet of the main database

Salt import quality monitoring - raw data

Date	IIR Code	Point of entry / Customs Station Co	Importer	Salt Type	Salt Brand (=Origin)	Result
7-Apr-10	IIR/10/111	MWA	Chicco General Dealers	Coarse	Botswana	81.33
16-Mar-10	IIR/10/071	DED	Chipiku Stores	Fine	Switzerland	82.20
28-Mar-10	IIR/10/094	DED	Chipiku Stores	Coarse	Switzerland	82.28
1-Mar-10	IIR/10/057	DED	Kalaria Wholesalers	Coarse	Switzerland	85.20

Second, copy-paste yellow shaded cell content into the related cells of the related "Raw data" sheet of the main database

Step 4

Generate quarterly report and send it to the Food Fortification Task Force and the National Fortification Alliance

-Update charts and Pivot tables: click on one of the pivot tables, then go to "options" in the pivot table menu and select "refresh all"

- Change time period settings for charts according to preference (last 12 months, last quarter, etc.) and the example below:

Click on first arrow and select "1" to display only data of the last 12 months; "All" selection will display all available data in the chart

LTM?	(All)
Quarter	(Multiple Items)

Click on second arrow and select only the most recent quarter of the list if you want to display only data of the past quarter in the chart, otherwise select all quarters of the list

Count of Category	Column Labels						
Row Labels	<5	5-24.9	25-49.9	50-74.9	75-99.9	>=100	Grand Total
Botswana	**2**	**5**	**8**	**13**	**25**	**35**	**88**
Fine	--	2	6	6	13	8	35
Coarse	2	3	2	7	12	26	52
Other/NA	--	--	--	--	--	1	1
Dubai	--	--	--	--	--	**2**	**2**
Fine	--	--	--	--	--	2	2

- Copy all charts into the report and add written commentary and remarks

- Send the report to the Food Fortification Task Force and the National Fortification Alliance