MINISTRY OF HEALTH

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FOOD FORTIFICATION PROGRAM

NATIONAL MONITORING REPORT

USAID FROM THE AMERICAN PEOPLE

A2Z Micronutrients Sight Innovation

AED Academy for Educational Development

Compiled with support from the A2Z/The USAID Micronutrient and Child Blindness Project

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PREFACE

Uganda has well documented the problem of micronutrient deficiencies. Information indicates that the major micronutrient deficiencies relate to a lack of sufficient intake of vitamin A, iron and iodine from the local diet. A number of strategies are being used in the country to control and manage the situation. Key strategies include annual vitamin A supplementation during child-days-plus for children and mothers, the fortification of salt with iodine, supplementation of adolescent girls with iron tables and fortification of staples foods. Mukwano Oil Industries and BIDCO Uganda Limited have been fortifying oil with vitamin A since 2004. To a lesser degree, Maganjo Grain Millers and Unga 2000 have also been fortifying maize with a multi-mix for a similar period of time. Sugar fortification is also being undertaken by Kendo Mills and plans are at an advance stage in Uganda to fortify wheat flour produced in the country with iron, zinc, vitamin A, and vitamins of the complex B. This will be done with support from the Global Alliance for Improved Nutrition (GAIN)

The overall objective of the Ministry of Health (MOH) is to manage the problem of micronutrient malnutrition within the population by increasing the intake of key nutrients through the provision of fortified foods, which are consumed as part of the local diet. It is therefore important that producers do add adequate amounts of the vitamins and minerals and that they use appropriate nutrient forms as provided for in the national standard. At present, standards for fortification are available in Uganda for maize flour, wheat flour, sugar, and oil and salt. The Uganda standards present levels of micronutrients that should be used for monitoring purposes during production and marketing. A summary of reference levels for key micronutrients in staple foods are presented in **Annex 1**.

In order to monitor the food fortification program, various monitoring activities are performed by different stakeholders so as to ensure that adequate fortification takes place at all times. In Uganda, the food control system is headed by the Health Inspectorate of the Ministry of Health (MOH) in collaboration with the Uganda National Bureau of Standards (UNBS), the Uganda Industrial Research Institute (UIRI) Laboratory, and the National Drug Authority (NDA), among other partners. Supervision of all fortification work in the country is coordinated by the National Working Group for Food Fortification (NWGFF) whose Secretariat is at the Ministry of Health.

Food control systems are only effective when the findings from various monitoring bodies are documented and reported on a regular basis. This is important for information, decision making for corrective action by key players where necessary. This report presents the information that has been compiled through three inspection rounds in Uganda since 2006 to determine the quality of the fortified foods in the market, during importation and at local fortifying plants. These reports are also meant to be used by industries to check their performance and implement remedial changes where necessary.

This report also provides findings from the third round of food control monitoring exercises conducted in Uganda between August and October 2008. It also contrasts these recent results with the findings from the monitoring work conducted for Round 1 between November 2006 and February 2007 as well as Round 2 which took place from July to October 2007.

INTRODUCTION

Food Control refers to activities aimed at monitoring the quality of fortified foods from the production level to retail stores. It comprises of *internal monitoring* performed by the industry during production and *external monitoring* performed by a regulatory body. External monitoring includes factory inspection, checking of the fortified foods at the importation sites, and commercial monitoring. Factory monitoring and auditing is carried out by officials from the Uganda National Bureau of Standards (UNBS). They are also responsible of inspecting imported products at ports of entry both on the Uganda border and at ports of entry within the country. Commercial monitoring is conducted by officials from the Ministry of Health at retails outlets throughout the country on a regular basis. Food Control does not include monitoring of quality at household level. The monitoring at household level will be conducted in the future as part of an integrated monitoring and evaluation system of micronutrient interventions.

It is expected that program managers in Uganda are going to use this information as one way to determine success of the National Food Fortification program and to implement any actions to improve its performance.

METHODOLOGY

This exercise was coordinated by the Ministry of Health with collaboration from the A2Z Project Office in Uganda. The food control system involved sampling of fortified salt at the importation sites of Busia and Malaba. The quality of oil was verified through inspection and auditing exercises conducted at the refineries. Two main producers of oil in the country namely Mukwano Industries of Kampala and BIDCO (U) Ltd in Jinja were paid visits by inspectors from UNBS. The quality of the fortified foods at retail market level was assessed by Ministry of Health Inspectors across the country and this included collecting samples for analysis.

Maize flour is currently fortified by Maganjo Industries in Kampala and Unga 2000 in Mbarara. UNBS personnel visited the two plants and collected samples in Rounds 1 and 2, but no maize flour samples were collected from the retail market

Although Uganda has not been fortifying wheat flour, samples were collected from retail outlets from across the country to determine the intrinsic level of iron. The purpose was to confirm typical levels of iron in flour sold in Uganda. The Uganda Standard for fortified wheat flour takes into account the intrinsic level of iron in wheat flour. Samples were sent to the UNBS laboratory for analysis and the analysis was done in collaboration with the Uganda Industrial Research Institute (UIRI) analytical laboratory.

All samples collected were tested qualitatively in the laboratory to determine the presence of key nutrients. The positive samples were then grouped according to their brand names and representative samples tested quantitatively.

The levels of micronutrients obtained were grouped into five categories based on the Uganda standard for each fortified food. The reference values for the five categories are presented in **Annex 1**. Average values of concentrations were computed for each brand tested and a weighted national average determined based on the number of samples tested at a national level for all the major brands. The relative availability of samples with specific concentration levels for each brand was also worked out and plotted. At a regional level, the availability of specific brands in the region was also determined and is presented in this report.

SALT

Salt consumed in Uganda is mostly imported from salt producers of Kenya. Very insignificant amounts are imported from other places. The most popular brands in the country are Kay Salt, SAFI, Crystallised Salt, Habari, Kape, Kensalt, Sunsalt and Kyoga. (see **Annex 2**). **Figure 1(a)** illustrates the main brands of salt in the different regions of Uganda. Kay and Safi brands were found in all regions.

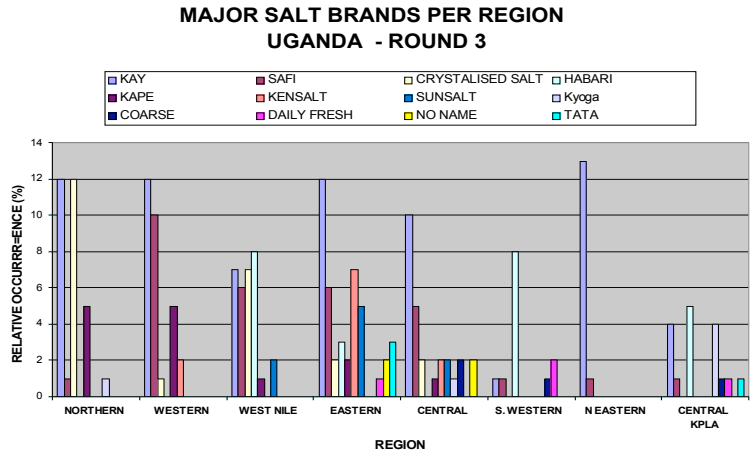


Figure 1 (a): Distribution of salt brands in Uganda - Round 3 - 2008

Table 1 summarizes the quality of salt at market level for all three rounds; it is shown here that the average concentration of iodine in the salt was between 50 and 60 mg/kg which is within the regulatory levels in the country; 30-80 mg/kg. It should be noted that only Kensalt, in the second round, and Tata brand samples, in the second and third rounds, had concentration below the minimum of 30 mg/kg.

Table 1: Concentration of iodine in salt marketed in Uganda

SALT BRAND	ROUND 1 (mg/kg)	ROUND 2 (mg/kg)	ROUND 3 (mg/kg)
Habari		77	51
Kape	60	65	57
Kensalt		20	59
Kay	60	56	52
Kyoga	42	64	56
Safi	54	69	56
Sansalt		69	56
Tata		27	26

In Round 3, the inspectors collected 237 salt samples of which all were tested qualitatively for the presence of iodine using a the rapid test kit, and about a third (77 samples) were tested quantitatively from 8 major brands. It is shown in **Figure 1 (b)** that the latest national average for iodine in salt is 53 mg/kg. There was a slightly decrease in average values for all popular brands in comparison to Round 2 but all levels were within the accepted levels as required by the Uganda national standard. Results of Rounds 1, 2 and 3 are presented in Figures 1(c), 1(d) and 1(e) respectively.

During the Round 2 of monitoring, 115 samples were collected from across the country of which 27 samples were tested quantitative, whereas in Round 1, a total of 30 samples were collected of which 6 brands were tested quantitatively.

In general, the quality of salt in Uganda is very good in terms of iodine content with the most popular brands containing iodine levels between 50 and 60 mg/kg. If this situation is maintained, and constantly enforced, Uganda is going to keep iodine deficiency under control.

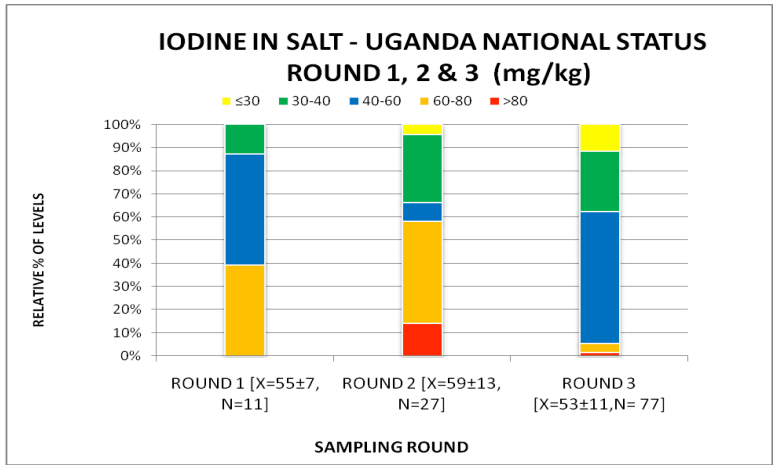


Figure 1(b): National Trend; Iodine levels in salt for period 2007-2008

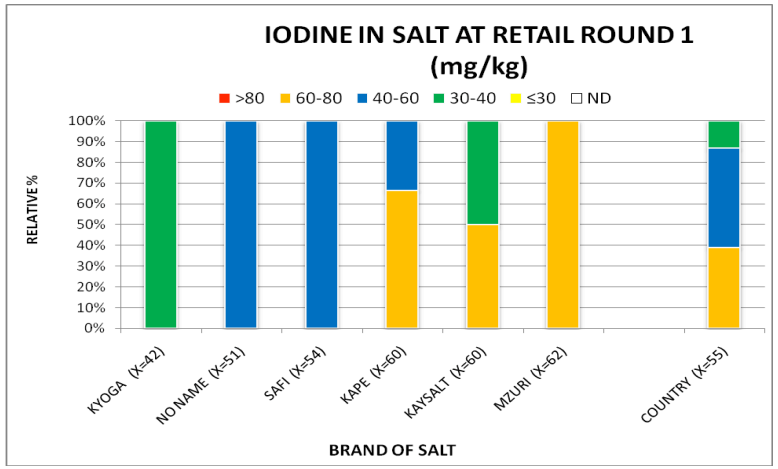


Figure 1(c): Iodine levels in salt for Uganda - Round 1 - 2007

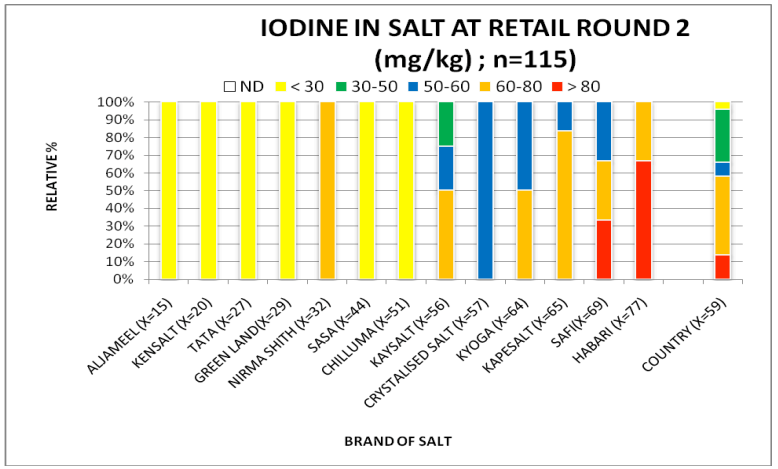


Figure 1(d): Iodine levels in salt for Uganda - Round 2 – 2007

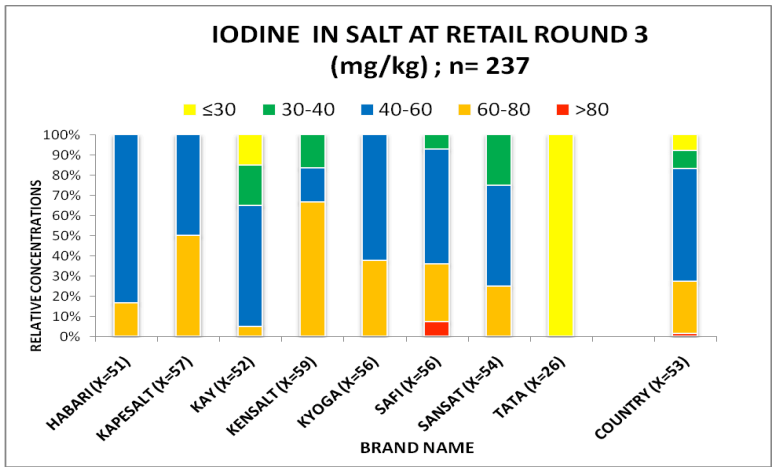


Figure 1 (e): Iodine levels in salt for Uganda - Round 3 – 2008

OIL

Oil fortification started in Uganda in 2004 and since then Mukwano Oil industries and BIDCO Uganda Ltd have been distributing cooking oil and fat fortified with vitamin A. These two companies supply 80-85% of the fortified oils and fats consumed in Uganda.

During Round three, 209 samples were collected from across the country with Ufuta and Mukwano brands being at the top of the list. A large number of samples were collected from bulk dispensers from five regions specifically in the North, East, West Nile, West and Central regions. Another group of 16 brands of oil were collected from some of the regions and this includes one brand from USA. There are a number of imported non-fortified brands found on the market especially from South Africa, Kenya and Tanzania (see **Figure 2(a)**).

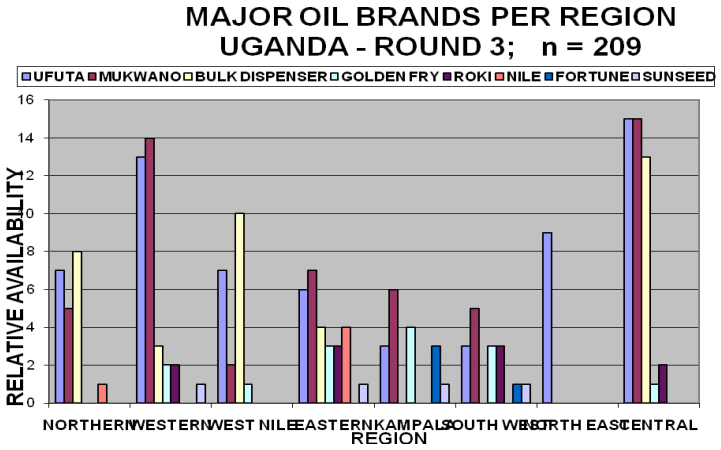


Figure 2(a): Distribution of cooking oil brands in Uganda - Round 3 - 2008

The allowable levels of vitamin A in oil during marketing are summarized in the reference levels in **Annex 1**. Since 2003, the acceptable tolerable lower limit during production was 15 mg/kg but now, according to the latest standard revised in 2006 (US511:2006), producers are required to add 35 mg/kg retinyl palmitate with a minimum of 25mg/kg and a maximum of 45 mg/kg. When inspectors visit the production unit they are expected to find all samples falling within that range. At retail, the permissible range for single samples has the minimum is 20 mg/kg and the maximum of 45 mg/kg. The standard for fats is the same as that applied to oil. The trend in vitamin A levels in oil on the market, as obtained during the three rounds, is summarized in **Table 2**.

Table 2: Concentration of vitamin A in major oil brands marketed in Uganda

OIL BRAND	ROUND 1 (mg/kg)	ROUND 2 (mg/kg)	ROUND 3 (mg/kg)
Golden Fry	-	17	25
Mukwano	32	26	34
Ufuta	27	24	30

Figure 2(b) shows that the number of samples tested has increased gradually and the latest average concentration at the market is 31 mg/kg. This performance is welcome news and demonstrates compliance of the standards by the main oil producers. The average for Mukwano oil is 34 mg/kg whereas the other major brand of Ufuta is 30 mg/kg. These levels should be compared to the permitted range of 20-45 mg/kg.

It should be pointed out here that there were a number of major brands that are found to contain no vitamin A in some of the samples collected from the across the country. These are represented as ND (Not Detected) in the **Figures 2(d)** and **2(e)**.

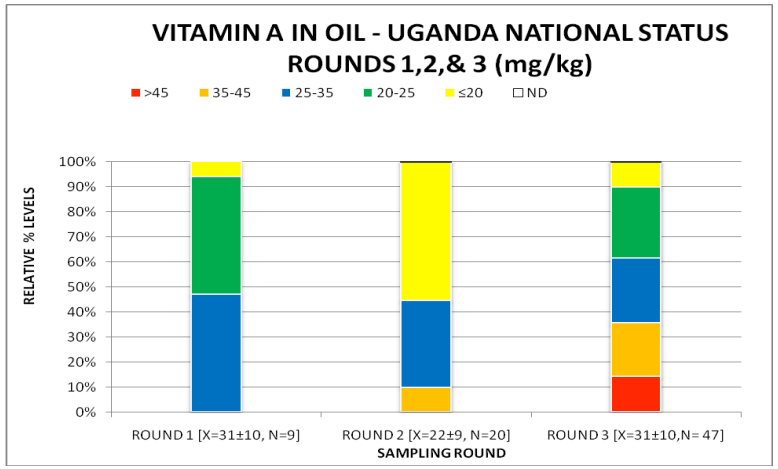


Figure 2(b): National situation in Uganda in terms of vitamin A levels in oil for period 2007-2008

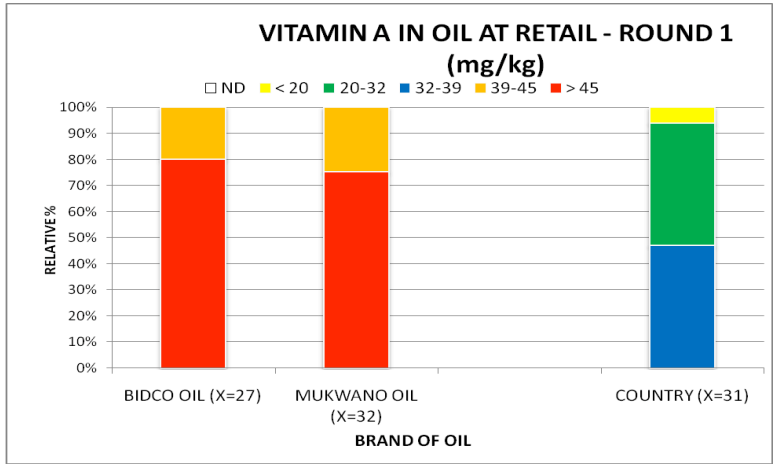


Figure 2(c) Vitamin A in oil from Uganda-Round 1- 2007

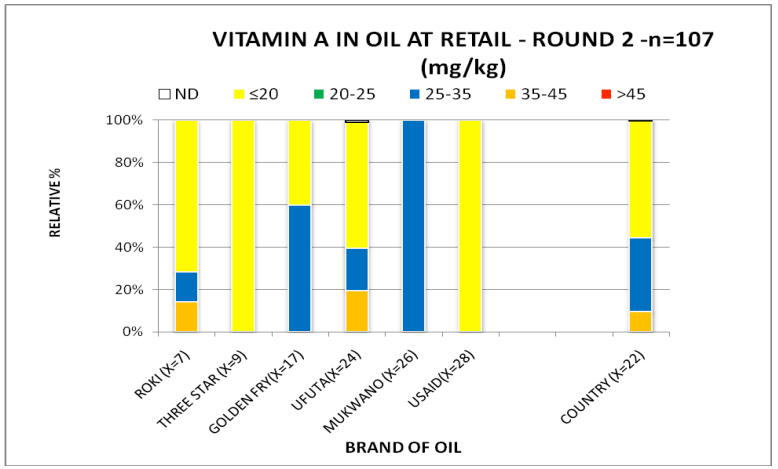


Figure 2(d) Vitamin A levels in oil for Uganda-Round 2- 2007

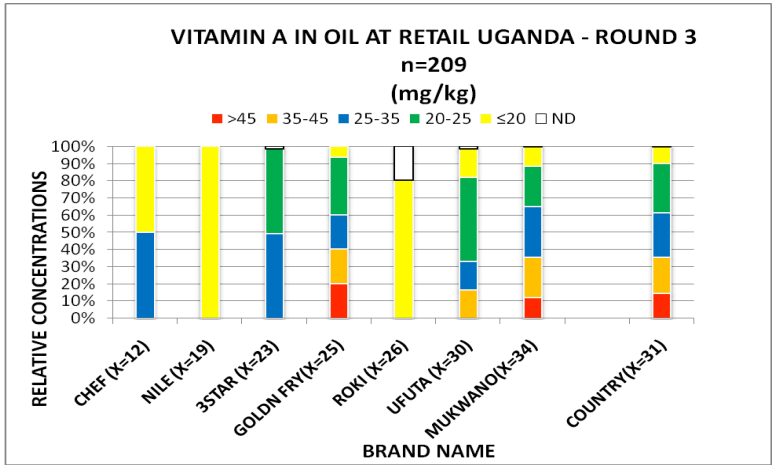


Figure 2(e) Vitamin A in oil from Uganda- Round 3- 2008

WHEAT FLOUR AND MAIZE FLOUR

Considering the imminent introduction of fortified wheat flour in Uganda, wheat flour samples were collected from the retail outlets to provide officers with the opportunity to practice sampling and handling of wheat flour samples and to determine the key brands on the market as well as the intrinsic level of iron. This was for the purpose of validating assumed natural levels of iron in wheat flour upon which the Uganda standard for fortified wheat flour is based.

The average level of iron in the wheat flour for the third round was found to be 17 mg/kg for refined flour and 25 mg/kg for whole wheat flour. An addition of 40mg/kg iron would therefore yield flour samples with an average minimum of 57mg/kg for refined flour and this would fall within the expected level of 55-95mg/kg at production, according to the Uganda standard.

Figure 3(a) shows the popular brands distributed across the country. It is seen there that *Azam* is widely distributed across the country followed by *Drum* and then *EXE*. The average concentrations of iron for each of the brands are shown in parenthesis in **Figure 3(b)**.

The assessment of maize flour for iron yielded positive results. Five maize flour samples were collected from Maganjo Millers by UNBS inspectors and the average iron content was 42.3mg/kg. This level satisfies the requirements in the standard as described in **Annex 1**. All the samples fell within the allowed range.

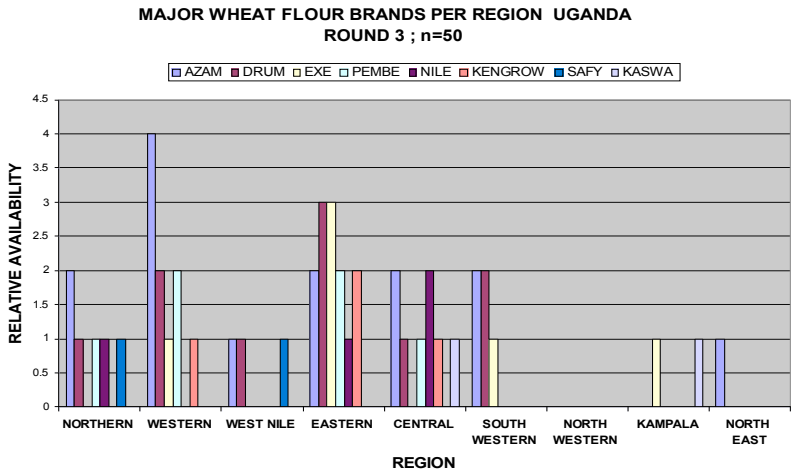


Figure 3(a): Distribution of wheat flour brands in Uganda - Round 3 - 2008

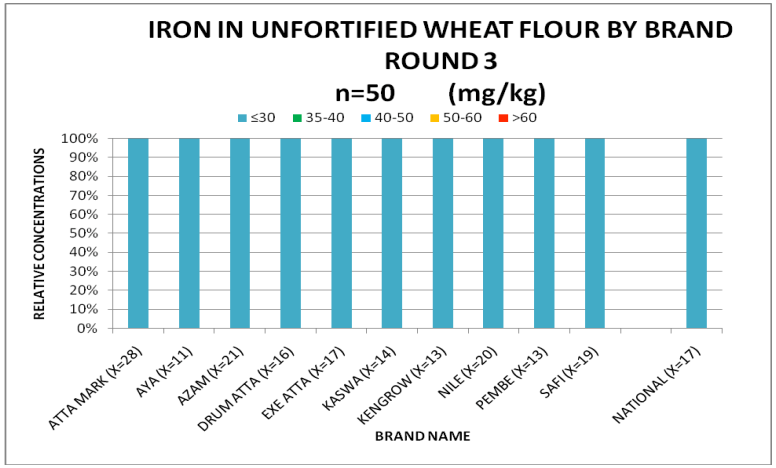


Figure 3(b) Iron levels in wheat flour from Uganda- Round 3

FACTORY AND IMPORT INSPECTION

Inspectors from UNBS participated in the monitoring by conducting inspection at importation sites for salt and making factory inspection visits to oil industries. Inspectors from UNBS sampled salt imported through the Busia and Malaaba border posts. Fortified oil distributed in Uganda is mainly produced by Mukwano Industries and BIDCO Uganda Limited in Jinja. Inspectors conducted auditing and inspection rounds at the two oil factories and collected samples for testing at the UNBS laboratory

SALT

The levels of iodine in salt remained within the acceptable levels although in round 2, the average was relatively higher. The results show that there is little difference between the levels at importation and at household. This would suggest that if salt is imported with the right levels, consumers would be ensured of using salt adequately fortified with iodine.

OIL

The addition level of vitamin A in oil in Uganda has changed since Round 2 to a target of 35mg/kg. During round 1 and round 2 the addition was 20mg/kg which would explain the low levels for round 2. Results for round 1 are based on a small number of samples and not very representative of the national situation as in round 2 and 3. Again, if the oil is adequately fortified, the consumers will obtain adequately fortified oil since the differences at the factory and retail is relatively insignificant.

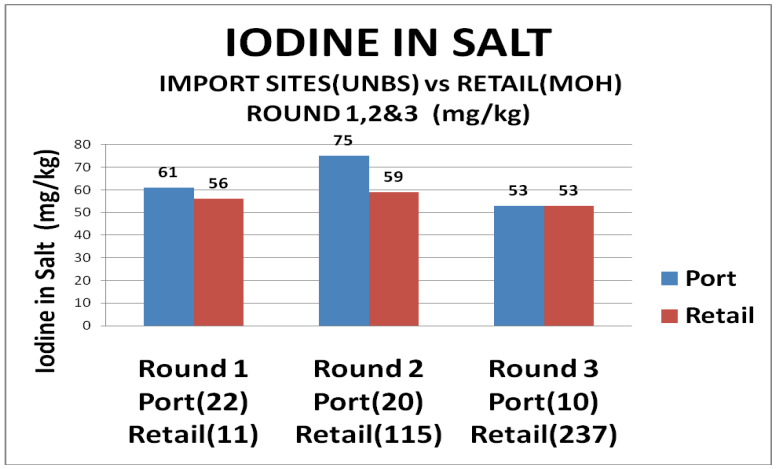


Figure 3: Average Iodine levels in salt at importation sites and on the market.

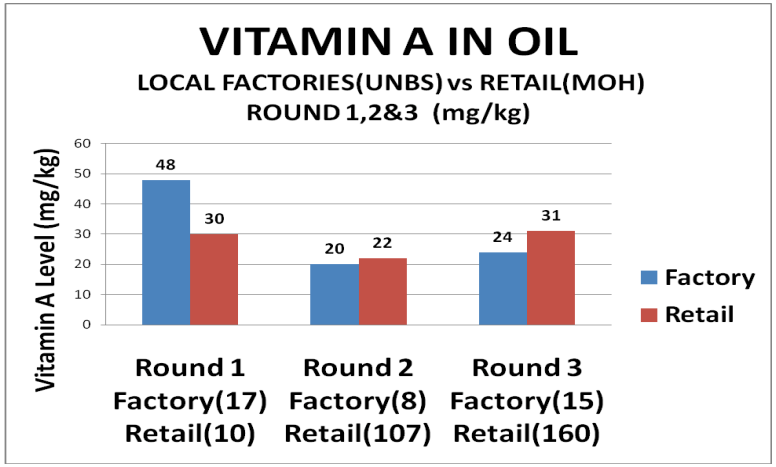


Figure 4: Average vitamin A levels in oil at local factories and on the market

CONCLUSION & RECOMMENDATIONS

The quality of salt in Uganda in terms of iodine content is very good. During these three assessments conducted between November 2006 and October 2008 it has shown that the average national concentration of iodine falls between 53 and 59 mg/kg. This is in line with the Uganda standard that stipulates that single salt samples should contain between 30 and 80 mg/kg during marketing. The country has 7 major brands of salt with Kay and Safi appearing to be the widely distributed. The concentration of iodine in the two brands was found to be 52 mg/kg and 56 mg/kg for the last assessment, Round 3. It should also be noted that the country has some salt brands on the market that have low iodine content according to the national standard. The information gathered showed that Tata, Al Jameel, and Greenland brands contained iodine levels below 30 mg/kg which is the minimum according to the standard.

In a similar manner, the oil fortified in Uganda by BIDCO and Mukwano continues to be of good quality and satisfying the requirements of the national standard. During the assessment the average level of vitamin A at a national level was between 22 mg/kg and 31 mg/kg. The standard in Uganda requires that individual samples of oil contain between 20mg/kg and 45 mg/kg. The two major brands of Mukwano and BIDCO (Ufuta) were shown to have an average of 34 mg/kg and 30 mg/kg. The third most important brand was Golden Fry and it had a national average of 25 mg/kg vitamin A in oil. The unfortified and refined wheat flour distributed in the country contains on average 17 mg/kg iron. The major brands that are distributed widely across the country are Drum, Azam, EXE and Pembe. This intrinsic level is adequate to ensure that the fortified wheat flour samples contain adequate amounts of iron when fortified according to the Uganda standard. It is expected that during production the samples should contain 40-60 mg/kg iron which can be achieved when the iron content in unfortified flour is increased by 40 mg/kg.

The fortified maize flour sampled at Maganjo industries by UNBS inspectors were all found to contain adequate iron levels according to specification.

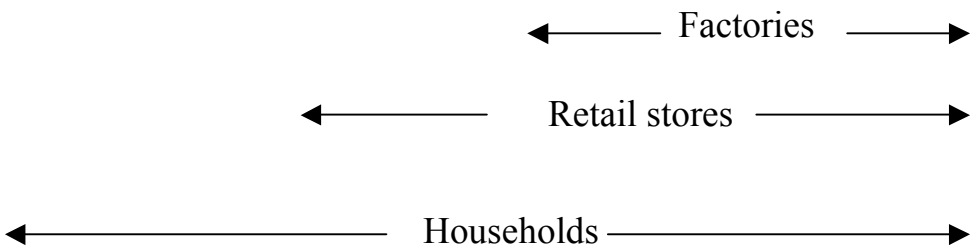
It is recommended here that the inspection of the fortified foods should continue with a strong emphasis on the brands that are not meeting the criteria. This is in terms of salt samples and oil samples. The inspectors at port of entry need to monitor closely the importation of suspect brands as discussed in this report.

It should be noted that of the all salt and cooking oil tested qualitatively in Round 3, more than 96% of the samples tested positive for the presence of the added micronutrients.

ANNEX 1

CUT OFF POINTS FOR NUTRIENT CONTENT IN FORTIFIED FOODS[1]

FOOD	REQUIREMENT AT HOUSEHOLD[2] LEVEL	BELOW MINIMUM AT RETAIL	ALLOWED RANGE			ABOVE MAXIMUM
			Low	Medium	High	
Iodine in Salt (mg/kg)	≥25	≤30	30 - 40	50 - 60	60 - 80	>80
Vitamin A in Oil (mg/kg)	≥15	≤20	20 - 25	25 - 35	35 - 45	>45
Iron Wheat Flour (mg/kg)	≥30	≤35	35 - 40	40 - 50	50 - 60	>60
Iron Maize Flour (mg/kg)	≥25	≤30	30 - 35	30 - 35	40 - 50	>50



[1] Based on the latest Uganda National fortification standards for the specified foods
[2]Takes into account losses incurred between the market level and household and is based on the minimum at retail level

ANNEX 2(a)

DISTRIBUTION OF BRANDS OF IODISED SALT IN UGANDA

BRANDS	REGIONS – (SALT ROUND 3)									TOTALS
	NORTHERN	WESTERN	WEST NILE	EASTERN	CENTRAL KPLA	S. WESTERN	N EASTERN	CENTRAL 1	CENTRAL 2	
KAY	12	12	7	12	10	1	13	4		71
SAFI	1	10	6	6	5	1	1	1		31
CRYSTALISED SALT	12	1	7	2	2					24
HABARI			8	3		8		5		24
KAPE	5	5	1	2	1					14
KENSALT		2		7	2					11
SUNSALT			2	5	2					9
Kyoga	1				1			4		6
COARSE					2	1		1		4
DAILY FRESH				1		2		1		4
NO NAME				2	2					4
TATA				3				1		4
AL DOUHA	1		1					1		3
MALINDI				3						3
NATURE FRESH								3		3

ANNEX 2(b)

BRANDS	REGIONS – (SALT ROUND 3)									TOTALS
	NORTHERN	WESTERN	WEST NILE	EASTERN	CENTRAL KPLA	SOUTHWESTERN	NORTH EASTERN	CENTRAL 1	CENTRAL 2	
	CONTINUED SALT TABLE…									
AJINI MOTO								2		2
CEREBOS								2		2
CHILUMA					2					2
LO SALT						1		1		2
RAMDEV								2		2
SASA				1				1		2
I-SHAKTI						1				1
AMERICAN GARDEN						1				1
GOOD PRICE								1		1
ISCHLE			1							1
MAZA						1				1
NEZO								1		1
RITEBRAND								1		1
BAD ISCHLE			1							1
MILTOP				2						2
TOTAL SAMPLES	32	30	34	49	29	17	14	32	0	237

ANNEX 3

DISTRIBUTION OF BRANDS OF FORTIFIED OIL IN UGANDA

BRANDS	REGIONS									TOTALS
	NORTHERN	WESTERN	WEST NILE	EASTERN	CENTRAL KAMPALA	SOUTH WESTERN	NORTH EASTERN	CENTRAL 1	CENTRAL 2	
UFUTA*	7	13	7	6	3	3	9	15		**63**
MUKWANO**	5	14	2	7	6	5		15		**54**
BULK DISPENSER	**8**	**3**	**10**	**4**				**13**		**38**
GOLDEN FRY*		2	1	3	4	3		1		**14**
ROKI**		2		3		3		2		**10**
NILE	1			4						**5**
FORTUNE*					**3**	**1**				**4**
SUNSEED**		1		1	1	1				**4**
3 STAR			**2**					**1**		**3**
CHEF					**2**	**1**				**3**
BAT UFUTA*						**2**				**2**
CRYSTAL			**1**			**1**				**2**
ELIANTO*					**1**					**1**
LUGLIO					1					**1**
NIKKY AFRICANA					1					**1**
NOOR PURE					1					**1**
RAFI				1						**1**
RITEBRAND					1					**1**
USA					1					**1**
TOTAL SAMPLES	**21**	**35**	**23**	**29**	**25**	**20**	**9**	**47**		**209**

* Brands produced by BIDCO

** Brands produced by Mukwano Industries

ANNEX 4

DISTRIBUTION OF BRANDS OF WHEAT FLOUR IN UGANDA

BRANDS	REGIONS									TOTALS
	NORTHERN	WESTERN	WEST NILE	EASTERN	CENTRAL KPLA	SOUTH WESTERN	NORTH WESTERN	CENTRAL 1	CENTRAL 2	
AZAM	2	4	1	2	2	2			1	14
DRUM	1	2	1	3	1	2				10
EXE		1		3		1		1		6
PEMBE	1	2		2	1					6
NILE	1			1	2					4
KENGROW		1		2	1					4
SAFY	1		1							2
KASWA					1			1		2
ATTA MARK								1		1
AYA								1		1
Totals =	**6**	**10**	**3**	**13**	**8**	**5**	**0**	**4**	**1**	**50**

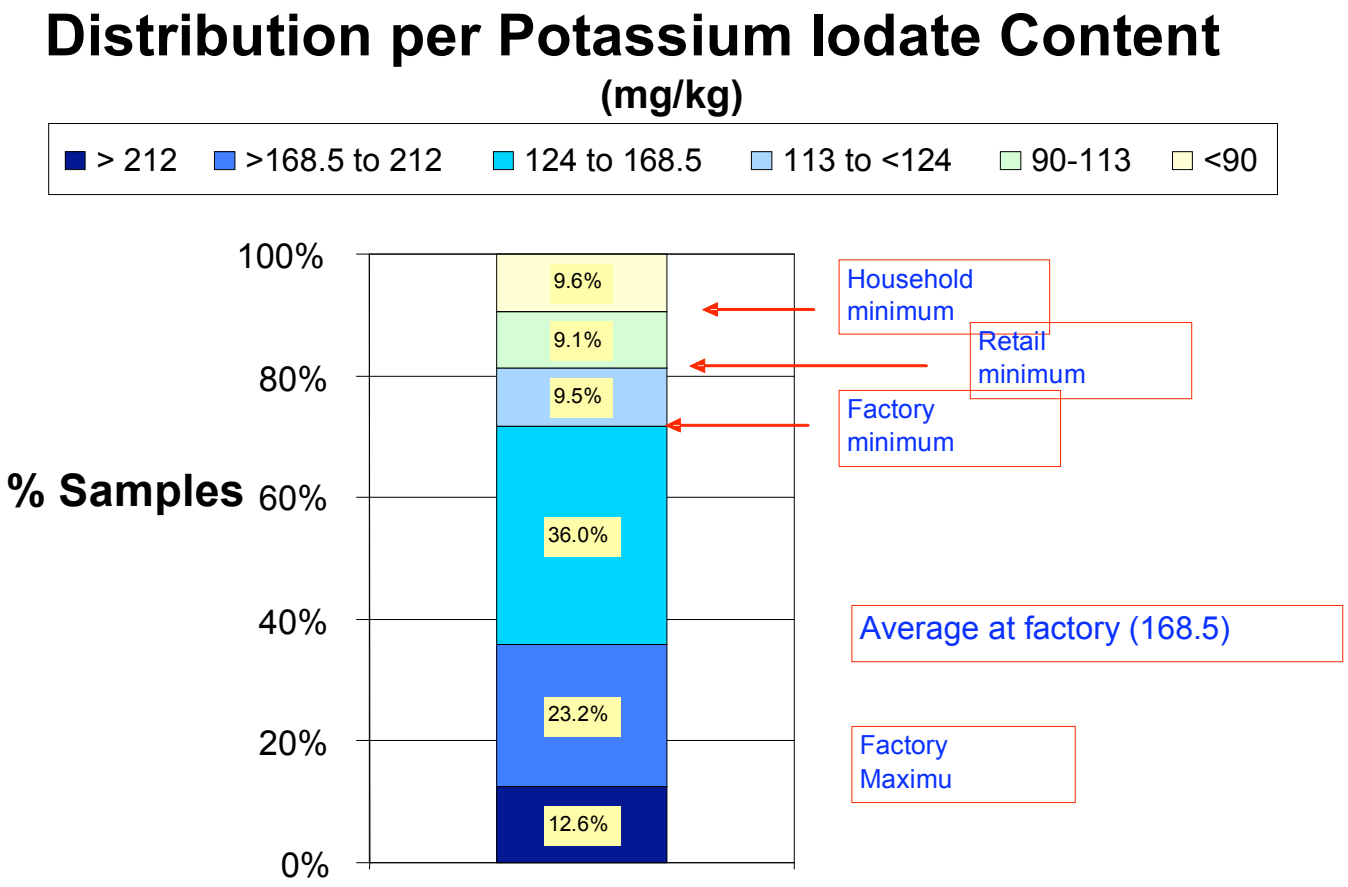
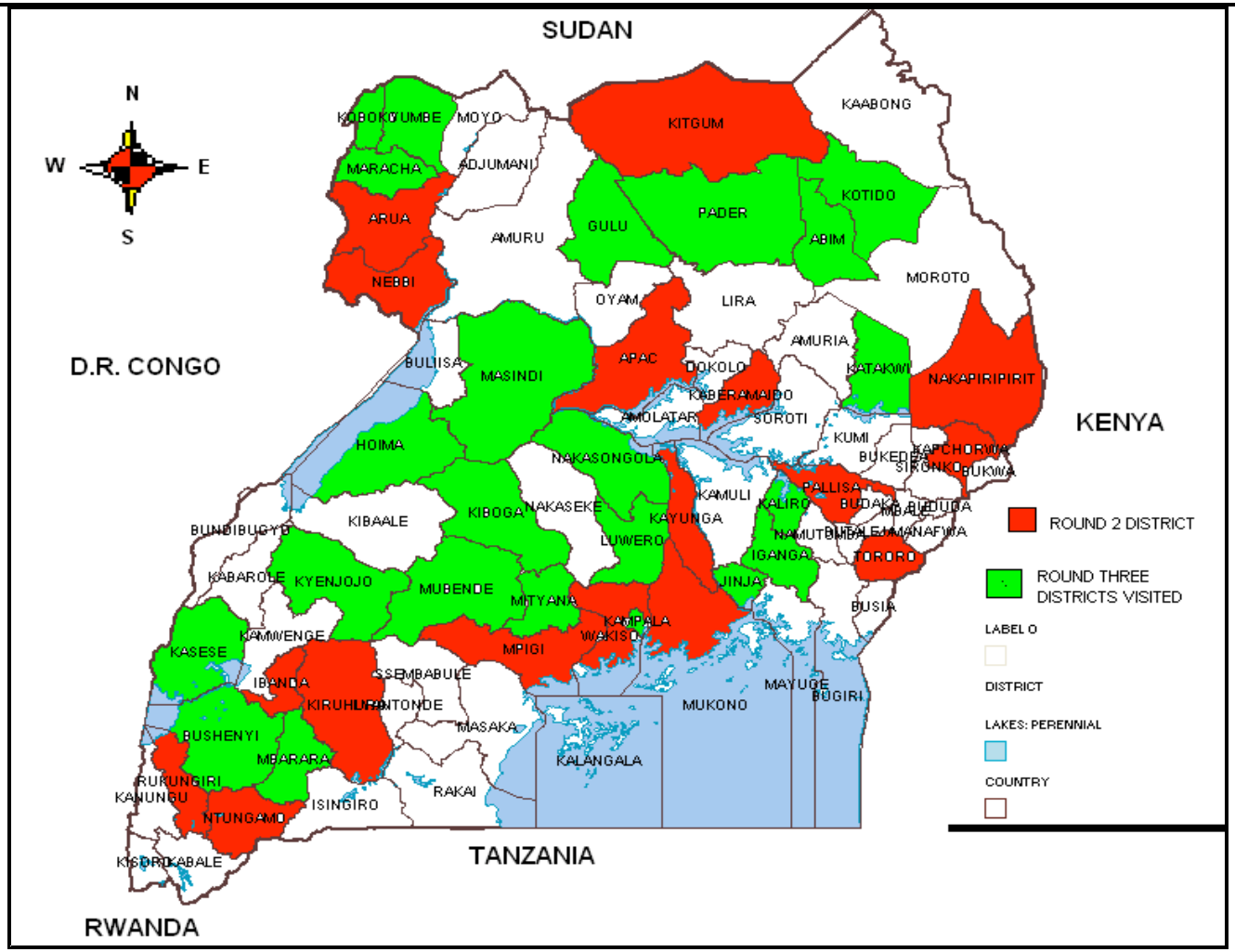


Figure 5: A Model graph for presenting level of iodine at national level, based on target addition of 168.5mg/kg

MAP OF UGANDA



MAIN MESSAGES

- Food fortification offers a cost effective strategy for managing micronutrients deficiencies in a country. This strategy is only effective when the fortified foods distributed contain adequate levels of vitamins and minerals according to the national standard.

- The work of ensuring that the fortified food vehicles contain adequate nutrients is part of the overall national program for ensuring food quality and safety. Therefore, this activity is a component of the overall national food fortification activities. This work involves a number of institutions that work in the area of food quality and monitoring and it has to be conducted in a consistent manner that is sustainable within the financial means of the country.

- Accessibility to adequately fortified foods in national fortification programs should ensure that major micronutrient deficiencies are managed. The fortification of oil, salt and flour in Uganda will help in addressing the problems of micronutrient deficiencies in wide sectors of the population.

- The quality of fortified salt in Uganda continues to satisfy the requirements of the national standard in terms of iodine levels. However there exist some brands that contain low levels of iodine and these need to be monitored closely.

- The quality of fortified oil shows that the major industries have adjusted to the recent increase in added vitamin A to take into account low consumption levels in the country. The increase is reflected in the levels of all major brands where the average is currently at 30 mg/kg.