



GOVERNMENT OF UGANDA

Capacity Needs Assessment for Food Processors of Maize and Wheat Flours, Salt, and Edible Oils and Fats



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Acronyms

CIMS	Certification Information Management System
COMESA	Common Market for Eastern and Southern Africa
CNA	capacity needs assessment
DRC	the Democratic Republic of Congo
FACT	Fortification Assessment Coverage Tool
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practices
GOU	Government of Uganda
KII	key informant interviews
MAAIF	Ministry of Agriculture, Animal Industries, and Fisheries
MAD	minimum acceptable diet
MOFPED	Ministry of Finance, Planning, and Economic Development
MOH	Ministry of Health
MOLGSD	Ministry of Labour, Gender, and Social Development
MTs	metric ton
MTIC	Ministry of Trade Industries and Cooperatives
NWGFF	National Working Group on Food Fortification
NDA	National Drug Authority
PPE	personal protective equipment
PSFU	Private Sector Foundation Uganda
QC/QA	quality control and quality assurance
SOPs	standard operating procedures
UDHS	Uganda Demographic and Health Survey
UIRI	Uganda Industrial Research Institute
UMA	Uganda Manufacturers Association
UNBS	Uganda National Bureau of Standards
URA	Uganda Revenue Authority
USAID	United States Agency for International Development
VAT	value-added tax

Definition of Terms

Food fortification: The deliberate addition of key vitamins and minerals such as iron, folic acid, iodine, vitamin A, and zinc to staple foods to improve the nutritional content and address nutritional gaps in a population

Food vehicle: The foodstuff that is selected to carry added micronutrients maize flour, wheat flour, salt, and edible oils and fats

Fortification equipment: Machinery used to add vitamins and minerals at the factory

Fortificants/premix: The compound that contains the specified micronutrient intended to be added to a food vehicle

Fortifiable: Any food that is not made at home and is assumed to be industrially processed

Capacity needs: Gaps of knowledge, skills, strengths, and technology among food processors that have become barriers to their meeting food fortification standards and regulations

Capacity needs assessment: A process of evaluating existing gaps among food processors and determining recommended actions

Acknowledgements

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Special thanks also for the members of the National Working Group on Food Fortification (NWGFF) for their active participation and input during the capacity needs assessment.

Executive Summary

Micronutrient deficiencies, also known as hidden hunger, remains a public health concern in Uganda, particularly for children under 5 years and women of reproductive age. The Uganda Demographic Survey 2016 rated anaemia at 53 percent; and anaemia at 32 percent among women of reproductive age (15–49 years) and 33 percent for adolescent girls (15–19 years). The uptake of interventions, such as vitamin A supplementation, that contribute to normal vision, immune system, reproduction, growth and fetal development was at 62 percent for children 6–59 months of age. For children 6–23 months of age, only 15 percent had access to a minimum acceptable diet (MAD), and only 40 percent of those who did have access to a MAD consumed iron-rich food. Only 34 percent of school children consumed school meals in schools.

In response to this challenge, the Government of Uganda (GOU), through the Ministry of Health (MOH), adopted industrial food fortification as one of the high-impact and cost-effective interventions that contribute to the reduction of micronutrient deficiencies. Uganda implements the 1997 Universal Salt Iodization legislation, voluntary food fortification of wheat, maize, sugar, and edible oils/fats before 2005, the food and drugs (food fortification) regulation 2005 which supported voluntary fortification of wheat, maize, and edible oils/fats, and the 2011 mandatory food and drugs (food fortification) (amendment) regulation that supports industrial food fortification across four food vehicles: maize and wheat flours, salt, and edible oils, and fats. Despite the GOU's pragmatic decision to introduce mandatory food fortification, compliance with national standards and the regulation, as well as scale-up of fortified food production, remains a challenge for food processors of the four food vehicles, with the maize flour processing sector being the least compliant.¹

USAID Advancing Nutrition in support to the Ministry of Trade Industries and Cooperatives (MTIC) and MOH conducted a capacity needs assessment in May and June 2022 that sought to identify the capacity needs of maize and wheat flours, salt, and edible oils, and fats processors; tailor technical support to scale up production of fortified foods; and document best practices, opportunities, lessons, and recommendations to improve processors' compliance with national food fortification standards. The assessment employed a desk review and discussion with the food processors for both qualitative and quantitative data. While stakeholder discussions were guided by an understanding of the qualitative information that needed to be collected, a formal survey methodology was not employed. Fifty-eight food processors participated in the assessment, with six industries processing more than one food vehicle. These include: one producing both edible oils and maize flour, two producing edible oils and wheat flour, and three producing both maize and wheat flour. Table I below shows the number of industries that participated in the CNA per food vehicle.

The capacity needs assessment found variations between installed and actual production capacity per day for all food vehicles, (see detail in Table I) which reflects gaps affecting optimal production especially for maize flour and edible oils which have thresholds for fortification. These capacity gaps include;

- The high cost of production as a result of limited access to and high cost of fortificants/premix
- High utility costs particularly for electricity
- Limited technical capacity including skilled personnel for internal product testing.

¹ Fortification Assessment: Coverage and Tool, FACT Survey 2015

Table 1. Variations between installed and actual production capacity

Type of food processor	Number of Processors	Range of actual production capacity in MTs	Average installed production capacity in (MTs)	Average actual production capacity in MTs
Maize flour	32	10- 180	44 MTs	37 MTs
Wheat flour	14	20- 600	264 MTs	181 MTs
Salt	2	09- 150	310 MTs	80 MTs
Edible oils	7	06- 600	242 MTs	138 MTs
Edible oils and fats	3	130- 1000	613 MTs	577 MTs

Additionally, the assessment as seen in Table 1 above, found that:

- 57 percent (33/58) of processors of all food vehicles were fortifying
- 9 percent (3/32) of maize flour processors produced fortified products
- with 100 percent (14/14) wheat flour fortifying
- 100 percent (2/2) of salt processors produced fortified salt only
- 70 percent (7/10) of edible oils and fats processors were producing only edible oils
- 100 percent (3/3) of processors were producing both edible oils and fats

The capacity needs identified were categorized in four main broad areas:

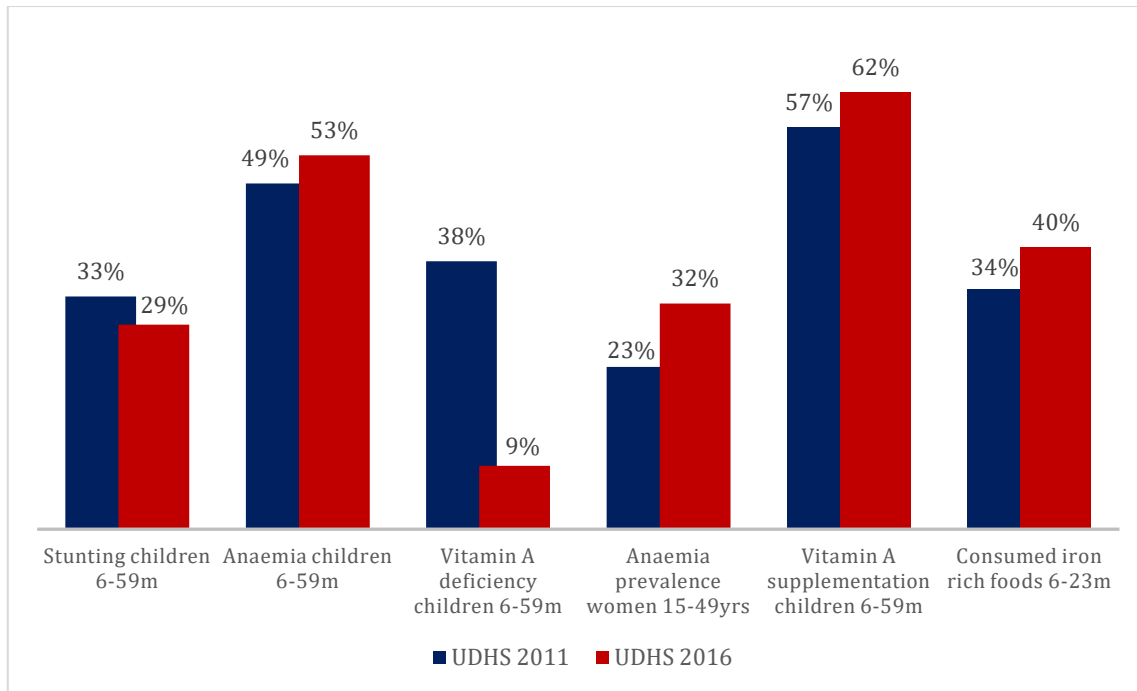
1. **Organizational/institutional capacity:** Needs included access to capacity to invest in advanced technology that supports food fortification; incentives, including tax exemptions and waivers on inputs like imported fortificants and equipment; and reduction in the high electricity tariffs, sample testing costs, and certification costs by regulatory agencies.
2. **Enabling environment:** Needs included strengthening multi-sectoral engagements for effective coordination of key partners; reviewing the regulation for inclusiveness of all producers; simplifying and translating the standards in local languages, targeting uneducated private sector stakeholders; accessibility to laboratories for sample testing across regions; and increasing demand creation efforts on the benefits of food industries producing fortified food, and increasing awareness of consumers on the benefits of consuming fortified foods, in scenarios where both fortified and unfortified foods exist.
3. **Technical capacity:** Findings showed the need for training and information sharing: 93 percent (54/58) of processors did not have optimal knowledge on all areas across the food fortification process flow; 48 percent (28/58) of processors highlighted the need for orientation on current food fortification standards and the regulation. Respondents emphasized the need for the MOH to routinely share information on new developments in food fortification with stakeholders. Detailed capacity needs for each food vehicle in table 4 below.
4. **Capacity by program area and food vehicle:** Capacity needs were further identified for each set of Program areas; production; standards and the food fortification regulation; quality control and quality assurance; fortificants/premixes; occupational health safety; and sales and marketing as well as for each of the four food vehicles.

1.0 Introduction

1.1 Micronutrient Status in Uganda

Micronutrient deficiencies remain a public health concern in Uganda. The Uganda Demographic and Health Surveys (UDHSs) from 2011 and 2016 indicated micronutrient status as shown in Figure 1 below.

Figure 1: Micronutrient status of children under 5 years and women of reproductive age in Uganda



Between 2011 and 2016 there was an uptick in anaemia levels among children 6-59 months and women of reproductive age.

Further review of the UDHS report indicates a higher (33 percent) prevalence of anaemia among adolescent girls 15–19 years. In addition, consumption of iron rich-foods by children 6–23 months was low, and only 15 percent had access to a minimum acceptable diet (MAD). Anaemia prevalence among adolescent girls 15–19 years was 32 percent and 33 percent, respectively. The 2016 UDHS indicated relatively high levels of anaemia in men 15–49 years—16 percent, 26 percent among adolescent boys 15–19 years.

The Government of Uganda (GOU) has long adopted high-impact interventions to address micronutrient deficiencies, including dietary diversification; food fortification; maternal, infant, young child, and adolescent nutrition programs; and scaling up of health, food security, and nutrition programs.

1.2 Implementation of the Food Fortification Program

The MOH adopted industrial food fortification as one of its high-impact and cost-effective interventions to reduce micronutrient deficiencies. The GOU started implementation of Universal Salt Iodization in 1997, passing legislation to ensure that only iodized salt was used for human consumption, voluntary food fortification of wheat, maize, sugar, and edible oils/fats before 2005, the food and drugs (food fortification) regulation 2005 supported voluntary fortification of wheat, maize, and edible oils/fats. To increase production of fortified foods, the MOH issued the Food and Drugs (Food Fortification) (Amendment) Regulations, 2011, and implementation began in 2013, which made fortification mandatory for other food vehicles in addition to salt. This regulation applies to industrial

mills with a daily production capacity of 10 MTs for edible cooking oils and fats and 20 MTs for maize flour, as well as all mills producing wheat flour. The regulation also requires fortification of all imported maize flour, wheat flour, and edible oils and fats². Standards for mandatory food fortification was reviewed in 2012 for Salt, wheat flour, edible oil/fats, maize flour, and sugar, with a further review of the wheat, edible oil/fats, and maize flour standards harmonized with the ECSA regional standards in 2019.

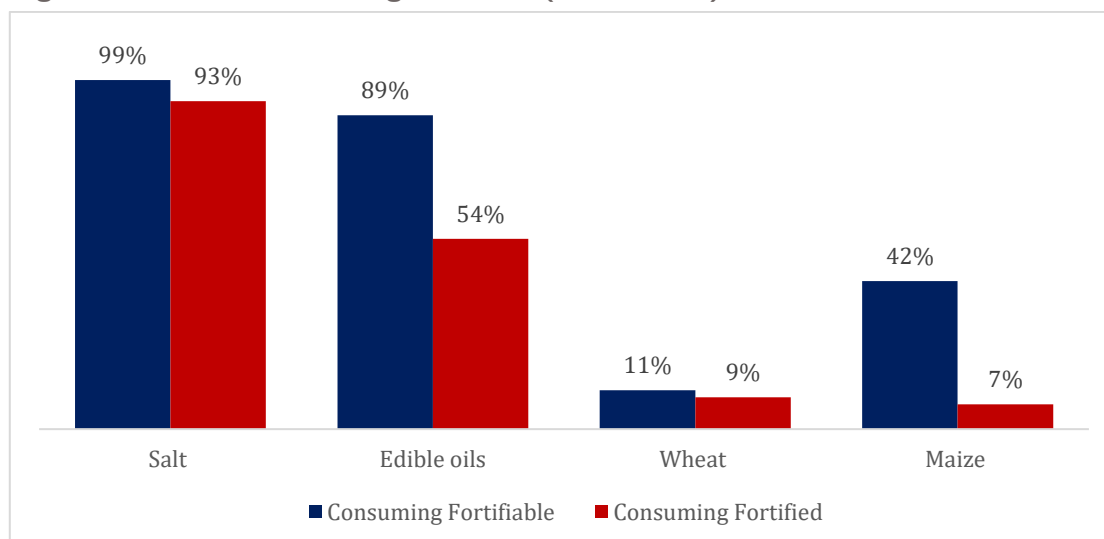
The country has made considerable progress in implementing the food fortification program, and the public sector has made efforts to enforce the regulation and ensure compliance in the private sector. The MOH has led coordination of food fortification efforts, with MTIC integrating food fortification as a key strategy to promote value addition within the Grain Trade Policy. Further, the Uganda National Bureau of Standards (UNBS) has integrated food fortification into the mandatory certification scheme for food products as part of national efforts to institutionalize and sustain food fortification.

The Fortification Assessment Coverage Tool (FACT)³ survey reported household consumption of fortified foods at:

- 54 percent consume fortified oils, of the 89 percent who consumed fortifiable oil
- 9 percent consume fortified wheat flour, of the 11 percent who consumed fortifiable wheat flour
- 7 percent consume fortified maize flour, of the 42 percent who consumed fortifiable maize flour
- 93 percent consume fortified salt, of the 99 percent who consumed fortifiable salt (Figure 2 below).

The survey also showed disparities between urban and rural areas in fortified food consumption, with 70 percent of urban households consuming fortified edible oil compared to 51 percent in rural areas; 20 percent compared to 6 percent for wheat flour; and 9 percent compared to 6 percent for maize flour.

Figure 2: Household coverage of foods (FACT 2015)



² MOH 2011. The Food and Drugs (Food Fortification) (Amendment) Regulations, 2011 <http://ugandanlawyer.com/wp-content/uploads/2019/03/Food-and-drugs-food-fortification-regulations-2011.pdf>

³ Food sample that was subjected to laboratory testing and met the nutrient cut-off defined in the national standards: FACT Survey 2015

The survey indicated that the production of fortified maize flour remains low across the country, largely because the maize sector is dominated by micro- and small-scale millers operating below the threshold for mandatory fortification. This is evidenced in reports such as the 2018 USAID Strengthening Partnerships, Results, and Innovations in Nutrition Globally report on mapping of maize millers⁴, indicating that 46 percent of maize millers operate at one to five MTs per day.

1.3 Justification of the Capacity Needs Assessment Exercise

Despite the GOU's pragmatic decision to introduce mandatory food fortification, compliance with national standards and guidelines remains a challenge across the four food vehicles, with the maize flour processing sector being the least compliant.⁵

The challenges of fortifying industries vary across food vehicles, while others are cross-cutting. Challenges include:

- Limited financing to meet recurrent costs on premix purchase
- Significant capital requirements for acquisition of fortification equipment
- Prohibitive taxes on imported fortificants (18 percent value-added tax (VAT) and 6 percent withholding tax)
- Lack of skilled personnel
- High charges on product testing and certification
- Limited access to fortificant/premix suppliers, resulting in high costs of fortificants/premix through which generates supply monopoly with a resultant effect on prices.

These challenges prompted the need to conduct a capacity needs assessment (CNA) among food processors of the four food vehicles.

1.4 Purpose of the Exercise

The purpose was to conduct a CNA with two objectives:

- To identify the capacity needs of maize flour, wheat flour, salt, and edible oils and fats processors for tailored technical support to scale-up production of fortified foods
- To document best practices, challenges, opportunities, lessons, and recommendations to improve food processors' compliance with national food fortification standards

Additionally, capacity needs, best practices, opportunities, lessons, and recommendations would be tailored to specific program areas production; standards and regulations; quality control and quality assurance; fortification technologies; fortificants/premix; occupational health safety; and sales and marketing as well as to each food vehicle.

1.5 Significance of the CNA's Outcomes

This assessment's findings provide a snapshot of the unique capacity needs, challenges, opportunities, and best practices of the fortified food processing industries, and recommend actions for stakeholders (including the public and the private sector, civil society, and implementing partners) to scale up production of fortified foods and improve food processors' compliance with national fortification standards. Although the assessment considered all four food vehicles, maize flour was emphasized given this sector's unique challenges.

⁴ SPRING. 2017. Uganda: Mapping of Maize Millers. A Road Map to Scaling Up Maize Flour Fortification. Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING).

⁵ Fortification Assessment: Coverage and Tool, FACT Survey 2015

2.0 Methodology

2.1 Assessment Design

The assessment employed qualitative and quantitative methods of primary data collection, as well as review of secondary data, including literature review, key informant interviews (KIIs), and use of an observation checklist with food processors. The quantitative and qualitative data was triangulated for complementarity and to provide a complete and comprehensive understanding of findings.

2.2 Development of Tools

USAID Advancing Nutrition in collaboration with the MTIC and MOH jointly developed and validated the assessment tools with technical representatives of key institutions on the National Working Group on Food Fortification (NWGFF) committee through a consultative workshop. The tools (Annex 10) were structured to respond to the two objectives.

2.3 Industry Selection

Food processors selected met one of two criteria: they were certified and fortifying or certified but not fortifying. The information that informed this selection came from the UNBS Certification Information Management System (CIMS)⁶ and review of related reports. USAID Advancing Nutrition also worked with millers' associations, Private Sector Foundation Uganda (PSFU) and the USAID Feed the Future Inclusive Agricultural Markets (IAM) Activity to identify and map out food processors that met the selection criterion across Uganda's four regions: Central, Eastern, Western, and Northern. Additionally, snowball sampling was used to identify and select food processors, especially those not certified.

Following these consultations, 69 industries were selected across the four regions. Of these, 63 participated in the assessment, while six were inaccessible. Six of the 63 food processors assessed were processing more than one food vehicle, and were counted per food vehicle. See [Annex 6](#) for details.

2.4 Data Collection

USAID Advancing Nutrition in collaboration with NWGFF members collected data from the 63 food processors in May and June 2022. These NWGFF members included the Uganda Industrial Research Institute (IIRI), Uganda Manufacturers Association (UMA), the MOH, the MTIC, millers' associations, and local industry experts across the four regions. The individual members' selection was based on their experience and understanding of the internal industrial processes, as well as experience collecting KIIs to ensure data quality. USAID Advancing Nutrition and MTIC co-facilitated the training of the field data collection teams on the data collection tools.

2.5 Data Analysis

Following data collection, USAID Advancing Nutrition entered data into a Microsoft Excel template and cleaned it using frequency distributions of the variables to identify outliers and missing variables.

Quantitative findings related to production capacity, knowledge of respective standards, fortification technologies, product type, certification status, barriers to fortification, quality control processes, and access to premix were triangulated to ensure the findings' validity across all assessment areas and to identify emerging themes. The analysis used descriptive statistics to generate frequency tables, proportions, and cross-tabulations of key variables.

Qualitative data was transcribed into Excel to provide quick abstraction of the emerging themes. Both quantitative and qualitative analysis were relevant to the two objectives and the identified program areas. CNA findings were disaggregated by food vehicle.

⁶ <https://unbs.go.ug/e-services/certified-products/>

2.6 Consent to Participate in the Exercise

Each respondent completed a consent form before data collection that introduced the exercise, described the purpose and benefit, explained confidentiality, and obtained consent for participation in the exercise.

3.0 Findings of the Capacity Needs Assessment

Overall, the analysis focused on identifying capacity needs that would strengthen efforts of the food processors to help increase production of fortified foods and increase compliance with food fortification regulations and standards.

The findings are organized into three main thematic areas:

1. **General information on food processors:** This includes participation of food processors in the CNA across the four regions, food vehicles produced by region, production capacity, and fortification status.
2. **Capacity needs of food processors:** This responds to the first objective. Capacity needs are organized into four areas: the first three (a, b, and c) are emerging capacity areas/themes from the exercise, which are further categorized based on emerging sub-themes; and the last one (d) is emerging capacity needs by program area:
3. **Organizational/institutional capacity:** This includes the need to build institutional capacities and improve access to grants, incentives, affordable inputs (fortificants/premixes), and technology).
4. **Enabling environment:** This includes the need to strengthen NWGFF coordination efforts; develop and/or review policy frameworks and tools; strengthen demand creation efforts to scale up production of fortified foods in the private sector; and increase consumption of the fortified foods.
5. **Technical capacity:** Needs focused mainly on access to food fortification knowledge and information sharing between public- and private-sector institutions and within private-sector institutions and the industries across all food vehicles.
6. **Capacity needs by program areas and food vehicle:** Capacity needs were further assessed by program area—production; standards and the food fortification regulation; quality control and quality assurance; fortificants/premixes; occupational health safety; and sales and marketing and by food vehicle.
7. **Best practices, challenges, opportunities, lessons, and recommendations:** In line with the second objective, the assessment documented information on the best practices, challenges, opportunities, lessons, and recommendations for each of the four food vehicles and by emerging themes across program areas, which was complementary information to the identified capacity needs.

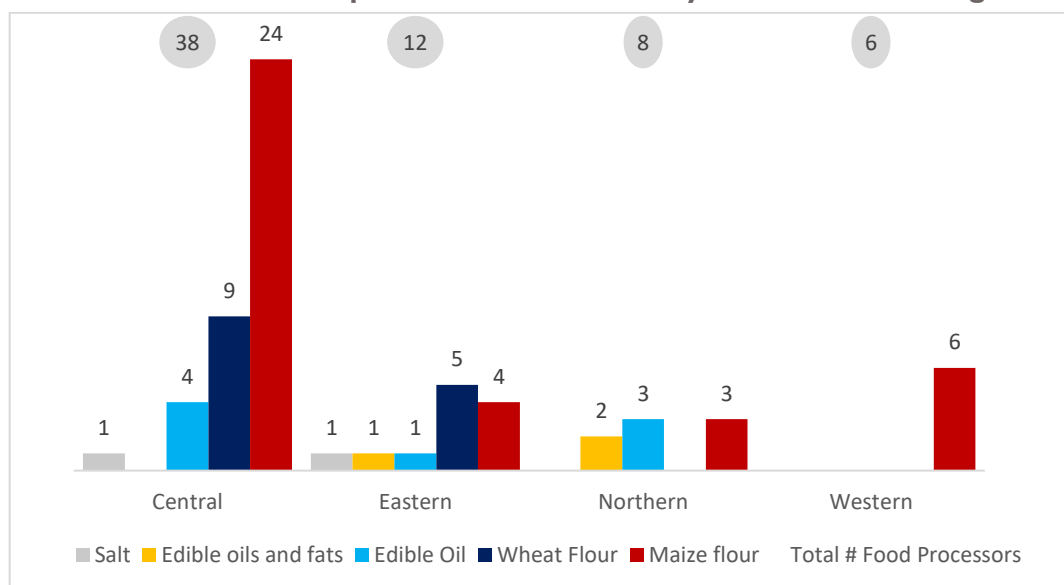
3.1. General Information on Food Processors

3.1.1 Participation and distribution of processors in the CNA by food vehicle and region

Figure 3 on the next page shows the distribution of the 63 food processors by region and by food vehicle. Distribution by food vehicle reflects:

- 37 maize flour processors (three were not operational at the time of the assessment due to maize grain scarcity, and two were at the installation phase but were interviewed)
- 14 wheat flour processors
- Seven processors producing edible oils
- Three processors producing both edible oils and fats
- Two salt processors

Figure 3: Distribution of food processors in the CNA by food vehicle and region



3.1.2 Production Capacity and Fortification Status of Food Processors

The exercise assessed food processors' production capacity (installed and actual) to document information on capacity to fortify. In addition, data was collected on food processors' fortification status.

3.1.2.1 Production Capacity (Installed and Actual)

The findings indicated that all food processors assessed had an average installed and actual capacity above the recommended thresholds for mandatory food fortification, as seen in [Figure 4](#) below. Specifically:

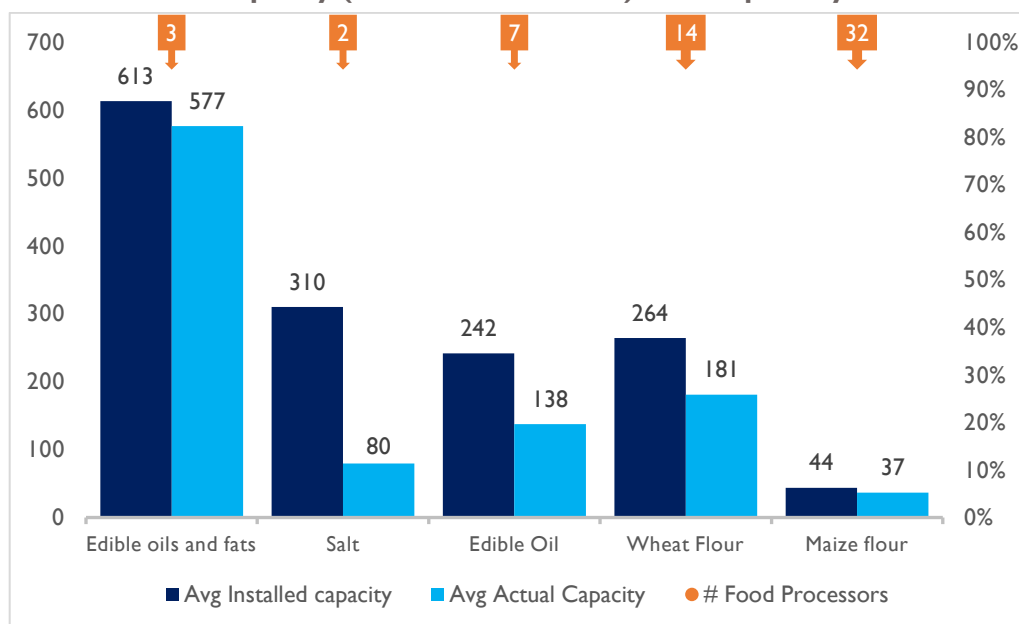
- Maize flour processors had an average installed capacity of 44 MTs per day and average actual production capacity of 37 MTs per day, which is above the mandatory threshold of 20 MTs for maize flour fortification.
- Wheat flour processors had an average installed capacity of 264 MTs per day versus 181 MTs actual capacity.
- The two local Salt producers had an average installed capacity of 310 MTs per day versus 80 MTs actual capacity.
- Those producing only edible oil had an average installed capacity of 242 MTs per day versus 138 MTs actual capacity, which is above the recommended threshold of 10 MTs for fortification.
- Producers of both edible oils and fats had an average installed capacity of 613 MTs per day versus 577 MTs actual capacity.

The marked variation between installed and actual production capacities especially for maize flour and edible oils, which have thresholds for food fortification reflects the capacity gaps that affect optimal production. These capacity gaps include:

- The high cost of production as a result of the limited access to and high costs of fortificants/premix
- High utility costs, such as for electricity
- Limited technical capacity, including limited skilled personnel for internal product testing

Analysis of capacity needs in section 3.3 below provides a detailed justification for these production capacity differences.

Figure 4. Production Capacity (Installed and Actual) in MTs per day



3.1.3 Fortification Status by Food Vehicle

The findings in Table 2 (below) show that only 19 percent (6/32) of maize producers were fortifying all maize produced; 9 percent (3/32) produced both fortified and unfortified maize flour; and the majority—72 percent (23/32)—were not fortifying. All 100 percent (3/3) processors of both edible oils and fats were fortifying, as were producers of salt and wheat flour. For industries processing edible oils, 71 percent (5/7) were fortifying; the two industries that were not fortifying produce virgin sunflower oil, which is not fortifiable, meaning 80 percent (8/10) of all fortifiable oil were fortifying at the time of the assessment. In summary, only maize flour has not fully embraced fortification in Uganda.

Table 2: Food Fortification Status by Food Vehicle

Fortification status	Edible oils	Edible oils and fats	Maize flour	Salt	Wheat flour	Total
Fortified and unfortified	0	0	3	0	0	3
Fortified	5	3	6	2	14	30
Unfortified	2	0	23	0	0	25
Total	7	3	32	2	14	58

3.1.4 Food Fortification Status and Production Capacity by Food Vehicle

A further analysis of the fortification status and production capacity for each food fortification indicated that: 1) maize flour fortification has an average daily amount of fortified flour produced by the six maize processors fortifying was more than twice as much (60 MTs) as that produced by the 23 processors not fortifying (23 MTs), which presents an opportunity to up-scale food fortification through targeted capacity needs support such as tax exemption on fortification inputs, 2) two processors of edible oils and fats were not fortifying each with installed and actual capacity of 7 MT 3) while all salt were fortified by the two salt industries, and all the 14 wheat processors fortified, as seen in Table 3 below. Annex 9, provides details of fortification status by brand, and production capacity.

Table 3: Food Processors by Fortification Status and Production Capacity

Food Vehicle	Item	Fortified and unfortified	Only Fortified	Only Unfortified	Out of production*	Total
Maize flour	Number of processors	3	6	23	5	37
	Average actual capacity	29	60	23	0	31
	Average installed capacity	31	76	36	5	44
Edible oils and fats	Number of processors	0	8	2	0	10
	Average actual capacity	0	309	7	0	254
	Average installed capacity	0	458	7	0	376
Salt	Number of processors	0	2	0	0	2
	Average actual capacity	0	310	0	0	310
	Average installed capacity	0	80	0	0	80
Wheat Flour	Number of processors	0	14	0	0	14
	Average actual capacity	0	181	0	0	181
	Average installed capacity	0	264	0	0	264

* Out of production due to grain scarcity or awaiting machinery installation

3.2 Capacity Needs of Food Processors

The CNA's main objective was to identify the capacity needs of selected food processors critical to strengthening private-sector capacity to adopt and scale up production of fortified foods, and ensure compliance with food fortification regulations and standards.

Text box 1 summarizes capacity needs across the four food vehicles. Specific capacity needs by food vehicle is detailed in **Table 4** in Section 3.2.4, and capacity needs by each food industry and food vehicle is detailed in **Annex 7** and **Annex 8**.

Findings are presented under three broad capacity areas and the emerging themes, which include organizational/institutional, the enabling environment, and technical capacity, as described in Section 3.0 above.

3.2.1 Organisational/Institutional Capacity

Access to capital

Food fortification is associated with start-up and recurrent costs, which were highlighted as being prohibitive. Twenty-five percent (5/20) of food processors with locally fabricated hammer mills who intend to invest in advanced equipment/technology that support food fortification expressed the need for linkages to financial grants, opportunities to facilitate cost recovery, and increased business capital.

Incentives to reduce food fortification costs

Tax exemptions, waivers on fortification inputs (fortificant/premix and equipment), and reduction in electricity tariffs by the Uganda Revenue Authority were highlighted as incentives that would attract industries to fortify. Relatedly, subsidizing the cost of external sample testing and renewal of

Box 1. Summary of the Capacity Needs

- Training of food processors on: food fortification application/processes; standards and regulations; internal testing
- Increase access to efficient food testing services and reduce sample testing fees.
- Increase access to affordable modern/advanced technology, fortificant/premix
- Increase linkage and access to regional markets.
- Linkage to capital grants to invest in food fortification
- Advocate and attract local manufacture of fortificants/premix
- Provide food processors with standard operating procedures on food fortification.
- Support industries to access post-harvest handling services for quality and safety of raw materials e.g. maize grain
- Waive off all tax on fortificants/premix and imported inputs e.g. equipment
- Provide subsidies on power/energy to reduce operation costs
- Fast-track fortificant/premix verification
- Update standards for inclusiveness of all small and medium producers.

certification to UNBS, as well as stabilization of electricity production to curb high maintenance costs resulting from frequent fluctuations in electricity supply, would act as incentives by reducing business operational costs.

Increased access to quality and affordable fortificants/premix and fortification technology

Respondents emphasized the need for the National Drug Authority (NDA) to increase and ease access to quality and affordable fortificant/premix sources. They also emphasized the MOH, MTIC, and private sector supporting local manufacturing to reduce the high costs of importing fortificant/premix, as well as supporting locally fabricated equipment. Additionally, respondents highly recommended distributing a verification list for fortificant/premix suppliers.

Relatedly, food processors expressed the need to harmonize fortificants' dosage rates and advocated for suppliers to package premix in smaller, more convenient quantities through the NDA's coordination.

3.2.2 Enabling Environment Capacity

Strengthened coordination

Given the food fortification program's multi-sectoral nature, respondents emphasized the need to strengthen multi-sectoral coordination and regular information sharing on new developments and capacity strengthening opportunities, especially through committees like the NWGFF and private sector platforms like associations that could be leveraged at the national and sub-national levels.

Review of the food fortification regulation and simplification and translation of standards

Respondents emphasized the need for the MOH to review, enforce, and monitor the food fortification regulation and specifically to review for maize flour and edible oils and fat industries. Thresholds of production for adopting fortification should be examined as the actual ones for small oil and maize flour factories are too low for introducing efficient and sustainable fortification programs. However, regulatory bodies like UNBS contend, based on observations and experience through the product certification program that small-scale food processors have a long way to go to adapt to and meet the recommended general manufacturing practices and other quality requirements, making universal fortification untenable, especially for maize flour.

In addition, maize, wheat, edible oils and fats, and salt processors requested that UNBS simplify, translate, and disseminate the food fortification standards, although majority was from the maize flour processors who are dominated by semi-skilled personnel. See details in Annex 5. Food processors also asked for support in developing standard operating procedures (SOPs) to guide implementation, especially information on food fortification beyond the Good Manufacturing Practices (GMPs), quality control, and quality assurance.

Accessibility to sample testing laboratories

Respondents emphasized the urgent need to establish regional and/or sentinel laboratories for testing of fortified samples. These would need to be streamlined through existing government and private-sector structures—for example, by using recognized laboratories, such as UIRI. This is anticipated to reduce turnaround time for feedback from UNBS and other regulators on the results. In addition, respondents emphasized NDA testing of fortificants/premix for regulatory monitoring to ensure conformity.

Demand creation on the benefits of fortified food production and consumption

Limited investments have been made in demand creation for both producers and consumers of fortified food, which is a significant factor in the low production and household consumption of fortified foods, as seen in section 1.2. Indeed, 48% (28/58) of food processors highlighted the need to create consumer demand/awareness of fortified foods as an incentive for increased production (Annex 7). Relatedly, the assessment highlighted the need for the NWGFF, the MOH, and private-sector associations to champion efforts to sensitize food producers on the value proposition of

producing fortified foods and sensitize consumers to increase demand for and consumption of fortified foods.

3.2.3 Technical Capacity

Access to skills and knowledge is essential for food processors to perform the necessary tasks and meet mandates in the food fortification program. The CNA highlighted the need for training, skills development, and sensitization in different areas for effective implementation.

Knowledge on food fortification standards/regulation and training on the application/processes

Only 7 percent (4/58) of food processors exhibited optimal knowledge on all areas of the food fortification process flow, these included 3 for edible oils and fats, and 1 wheat flour processor. The majority 93 percent (54/58) of food processors in all the four food vehicles exhibited knowledge gaps.

Notably, 34 percent of respondents (20/58) highlighted the need for orientation on current food fortification standards and the regulation. Although, majority 88 percent (28/32) of maize millers were aware of the common standards (labelling, code of practice, and milled maize (corn) products), only 28 percent (9/32) knew about fortification standards and were fortifying at the time of the assessment.

In addition, the 33 percent (19/58) of respondents indicated the need for training on the theoretical and practical food fortification application, along with the process flow, with emphasis on preparation for attainment of UNBS product certification, calibration/dosing, GMPs, Good Hygiene Practices (GHPs), and internal quality control processes.

Information on required inputs for food fortification

Sixty-three percent (20/32) of maize millers and 75 percent (3/4) of edible oils producers had an information gap on how to access quality and affordable technologies appropriate for food fortification, including dosers, as well as the procurement processes for fortificant/premixes. The 75 percent of edible oils producers also lacked installed fortification equipment.

["...we don't know how and where to get the required dosers, as well as the fortificants" ... A maize processor who is not fortifying]"

In addition, 65 percent (13/20) of maize flour processors highlighted their lack of knowledge and information on how to access and use fortificants/premix in food processing, including the absence of technical personnel to coordinate the fortification processes.

3.2.4. Capacity Needs by Food Vehicle

Food processors were to share key capacity needs under each program area, which are shown in Table 4 below. The capacity needs presented are based on the most common needs mentioned by the food processor by program area and by food vehicle. Under production, 45 percent (26/58) indicated the need for incentives, including tax waivers on fortificants, as well as technology; and 43 percent (25/58) highlighted the need to create demand for fortified products as a motivation for industries to fortify. In addition, 34 percent (20/58) needed training on QC and assurance, (33/58) in production with emphasis on fortification processes, 48 percent (28/58) sensitization on food fortification regulation and standards (19 maize, 5, wheat, 3 edible oils, and 1 salt). From the results in table 4, it is worth noting that maize flour processors had capacity needs across all program areas with 75 percent (24/32) of maize flour processors expressing the need for training/mentorship on production. See Annex 8, for additional information on capacity needs by food vehicle.

Table 4: Capacity needs of food processors by food vehicle and program areas

Program areas	Capacity Need	Edible oils/fats	Maize flour	Salt	Wheat flour
Occupational Health and Safety	Provide incentives	1	9	1	6
	Sensitisation		1		
	Training	7	19		6
Premixes	Local supply of premix	1	1		
	Premix verification	1	1		
	Provide incentives	1	3	1	7
	Training	2	2		2
Production	Access to affordable quality premix		6		1
	Capital grants	2	9		
	Demand creation	1	8		1
	Local supply of premix	1	1		1
	Power costs		9	1	3
	Premix verification		2		1
	Provide incentives	6	10	2	8
	Sensitisation		2		1
Training	4	24		5	
QC and Assurance	Access to affordable quality premix		2		1
	Provide incentives	2	2		
	Quick turnaround from UNBS	1	5		
	Sensitisation		2		
	Testing capacity	1	4		5
	Training	3	14	1	2
Sales and Marketing	Access to regional markets	3	9	1	2
	Capital grants		2		
	Demand creation	1	12		2
	Provide incentives	1	6		3
	Training	1	2		3
Standards and Regulations	Access to affordable quality premix	1	3		2
	Access to premix & machinery	1	5		1
	Local supply of premix	1	2		1
	Provide incentives	1	9		4
	Quick turnaround from UNBS	3	3		1
	Sensitisation	3	19	1	5

Note: Total respondents = 58 (maize = 32, wheat = 14, edible oils and fats = 10, and salt = 2)

4.0 Best practices, Challenges, Opportunities, Lessons, and Recommendations

The CNA's second objective was to capture best practices, challenges, opportunities, lessons, and recommendations for consideration by key sector players to scale up production of fortified foods and food processors' compliance with the national standards and regulation.

4.1 Best Practices

The CNA sought to identify best practices that food processors employ across the process flow to conform to standards. Emerging best practices are covered below for different program areas. [Text Box 2](#) shows a summary of best practices, and a detailed list of best practices by food vehicle is in [Annex I](#).

Production

Availability and use of manuals and guidelines with SOPs on GMPs were observed among food processors. (Adoption of GMPs is essential for food processing industries to prevent critical hazards that cannot be eliminated through quality control procedures on finished products).

This, coupled with the use of UNBS standards, guides food processors on key quality parameters, such as moisture content, aflatoxin levels, and micronutrient addition rates for compliance.

For maize flour processors in particular, grain cleaning and dehulling during production were identified as good practices to ensure safety and overall acceptability of the product.

Wheat and maize millers that use automated and continuous machinery and systems accentuated their use to improve efficiency during production. The automated and continuous processing is found to be efficient in dosing, and calibration is set once per batch.

Quality Control and Quality Assurance

Recruitment of staff based on education level and related training (e.g., in nutrition science and food processing technology), experience, and technical skills at the industry level ensured that QC/QA departments sourced the right personnel. This in combination with other practices, such as adherence to GMPs, was reported to contribute to product compliance and conformity to national standards.

The assessment also established that most food processors had functional internal QC/QA systems in place, with 24 percent (14/58) with proper documentation, 69 percent (40/58) with existing in-process quality control, 91 percent (53/58) with proper raw material reception, and 64 percent (37/58) conducting general and final product testing for nutrient compliance within the standards requirements.

Premix Dosing and Calibration of Equipment

Food processors considered the use of automated dosers, coupled with routine calibration of fortification equipment, as promoting process efficiency. In addition, they considered internal monitoring of in-process unit operations, including dosage rates, a best practice.

Box 2. Summary of Best Practices

- Recruitment of personnel in quality control and production, is based on education background, experience & technical skills.
- Routine calibration of dosers and documentation of SOPs.
- Safety and precautionary measures in premix handling
- Stock planning of premix based on production capacity and market projections
- Cleaning and testing of raw materials at reception
- Training on Quality Assurance Principles
- Routine submission of samples to External laboratories

Fortificant/Premix Procurement and Handling

More than 85 percent (29/33) of food processors that were fortifying exhibited best practices in premix procurement and handling stock planning, and ordering premix based on international specifications and relevant national standards.

Occupational Health and Safety

All (58/58) food processors were observed to own and use personal protective equipment; 62 percent (36/58) had fire extinguishers and hazard precaution warning posts. Additionally, the presence of workplace hygiene measures was considered a best practice and prerequisite for industrial operations. However, medical examination that is considered a requirement for medical insurance for staff, as well as the presence of first aid kits and a safety policy, were uncommon occupational safety measures in the food processors.

4.2 Challenges

The CNA also identified challenges hindering food processors' conformity with food fortification regulations and standards. These have been categorized under two major areas based on emerging themes: the high cost of production, and QC/QA challenges. [Text Box 3](#) lists a summary of the challenges, and a detailed list of challenges by food vehicle is in [Annex 2](#).

4.2.1 Challenges of the High Cost of Production

The high cost of production resulted from the following challenges:

Limited access to and high cost of fortificants/premix

Fortifying industries highlighted the limited access to fortificants/premix as a major challenge. For those not fortifying, recurring costs due to importation of fortificants were also indicated as a demotivating factor to adopt food fortification.

The high costs of fortificants/premix were attributed to premix having to be imported, since Uganda has no manufacturer in the country.

Limited technical capacity

Respondents highlighted limited knowledge on food fortification standards and the regulation, especially among those not fortifying. About 41 percent (24/58) indicated limited technical capacity and inadequate knowledge of application of food fortification processes, including the operation of dosers and calibration. Relatedly, 41 percent (24/58) of food processors stated that high staff turnover and limited technical skills to operate and repair the advanced machinery affects consistent production and conformity to standards.

The high initial cost of machinery was emphasised as a factor in the high cost of production, deterring food processors from fortifying.

High Cost of Electricity

Fifty-two percent (30/58) of industries mentioned the high cost of electricity tariffs as a recurring challenge. In addition, unstable electricity and load shedding/power cuts often affect equipment functioning and result in mechanical/equipment breakdowns.

Box 3. Summary of Challenges/Barriers

- Limited knowledge on regulations and standards on fortification.
- Limited technical skills on fortification processes like calibration
- Limited access to good quality premix and fortification equipment
- High production costs (i.e. on raw materials, electricity and recurrent premix costs.
- Limited testing capacity of fortificants and fortified foods
- Long turnaround time which curtails trade
- High costs on certification and testing of fortified foods specifically private laboratories
- Low consumer awareness and demand for fortified foods
- High taxation on imports
- Price war between salt processors and importers
- Lack of capacity to verify premix quality

These factors contribute to the high cost of operations and equipment inaccuracy, which affects conformity. Some industries have managed to solve these challenges by operating during off-peak hours of 12:00 am to 6:00 am, when power tariffs are relatively low, to reduce production costs.

COVID-19 Impact

Seventy-six percent (44/58) of processors reported shifts in production as a result of COVID-19 disruptions to transportation in the country and across the globe. Relatedly, delayed freight and imports clearance further limited access to fortificants/premix, which meant reluctance to comply and adopt food fortification. Access to other inputs, such as maize grain, which experienced significant shifts in availability and affordability, affected the industry.

COVID-19 affected quality control services through delays in submission of samples for testing by industries, increased testing costs, and UNBS delays in sending test results back to industries.

4.2.2 Quality Control and Quality Assurance Challenges

Thirty-three percent (19/58) of respondents raised delays in receiving results from UNBS as a challenge, largely attributed to few laboratories for testing in the country. About 17 percent (10/58) stated that the limited capacity and technical skills of most industries to conduct internal testing was a significant challenge.

Poor post-handling practices, especially by maize grain farmers, posed a challenge for 31 percent (18/58) of food processors, through investments in preparation to meet the product certification requirements for attainment of the Quality Mark issued by UNBS under the mandatory product certification scheme. Most millers operate in rented premises, this prevents them from establishing permanent infrastructural investments that are requirements for GMPs and GHPs as a prerequisite for product certification.

Relatedly, the charges for annual renewal of UNBS certification were considered high, affecting cost of production. Charges vary between three to 10 million Uganda shillings, or higher, depending on the size of the company and number of products to be certified.

4.3 Opportunities

Opportunities to foster the fortification program are categorized into production, technology, advocacy and sensitization, and the market for fortified flour.

Production

Maize millers had an average installed capacity of 44 MTs per day and actual production capacity of 37 MTs. Those producing both edible oils and fats had average installed capacity of 613 MTs per day and actual production capacity of 577 MTs. These are all way above the mandatory threshold for food fortification and adoption of food fortification.

Milling clusters were observed in the Central and Eastern regions, which present an opportunity as quick avenues for delivery of pro-fortification interventions, such as training; sales and distribution of fortificants/premix and other process inputs; and sensitisation campaigns on the benefits of food fortification. Exploration can also be considered to determine contextually feasible and sustainable mechanisms for premix supply, quality control, and cost recovery for the typical milling units in such clusters.

Technology

Continuous hammer mills are in place among maize millers in the Western and Central regions. The mills are easy to operate with basic training, are affordable, and support integration of food fortification.

Skilled Technical Personnel

Most food processors had functional internal quality control measures in place, including merit-based recruitment for personnel in production and quality control sections. Staff were found to have

training in food processing and prior experience in milling. This presents an opportunity that the requisite technical personnel are available to ably monitor industry fortification processes.

Advocacy and Sensitization

Continuous sensitization and training of millers on food fortification was highlighted as an opportunity for many to adopt fortification. Relatedly, consumer education was equally suggested to motivate consumer drive for fortified foods.

Mass media campaigns around fortified foods have been proven in other contexts to be most effective when conducted as part of a multi-pronged strategy that includes mass media communication, interventions in primary schools, and community communication programs.

Sales and Marketing

From the survey, 58 percent of food processors cited distribution strategies, among others, as effective drivers for their fortified products. The opportunity exists to scale up and replicate this strategy across all four food vehicles to increase market coverage of fortified foods and drive consumption.

Harmonization of standards across the East African region has enhanced regional integration and contributed to emerging markets for fortified products in neighboring countries like the Democratic Republic of Congo (DRC). This equally presents the opportunity for market expansion for fortified foods, which is envisaged to further drive demand and production of fortified foods, especially maize flour.

Advocacy for procurement of fortified maize flour in schools through the school feeding policy will help increase demand for fortified flour, hence increased production.

4.4 Lessons

Knowledge on Food Fortification

Whereas knowledge on food fortification application was limited, a majority—74 percent (43/58)—of food processors understood food fortification as adding nutrients to food, and they were interested in learning the food fortification processes, including dosing and calibration, for conformity to the standards.

Rationale for Food Fortification

Motivation for undertaking food fortification among 33 percent (19/58) was mostly because it is a government regulation requiring specific industries to fortify. However, 27 percent (16/58) of food processors understood that food fortification aims to combat micronutrient deficiencies in the population, while 21 percent (12/58) relate to food fortification as just value addition to the finished product.

External Controls

On average, food processors receive two external control visits per year from UNBS to check compliance of the fortified products, but all (58/58) food processors visited did not acknowledge NDA visits to check for conformity to fortificants/premix.

Criterion for Fortification Technologies and Premix Selection

Forty percent (23/58) of food processors rely on efficiency and equipment quality, as well as what is available in the market, when acquiring fortification technologies.

In determining the suppliers of premix, 33 percent (19/58) of food processors mostly consider premix quality in terms of stability and formulation, and based on certificate of analysis. Other considerations include cost of premix and NDA approvals.

Occupational Health and Safety

Seventy-four percent (43/58) of food processors that reported implementing occupational health and safety measures indicated increased productivity and quality of products.

Millers' Clustered Zones

Maize millers normally have concentrated clustered zones of operation in the same locality, with batch processing and hammer mill as the most-used technology. For example, in the Central region, one of the clustered mills included Bbira, Kawanda, Kisenyi, Namunkekeru, Nateete, and Rubaga. These networks provide an opportunity promoting food fortification through sensitization.

Besides milling, the clustered groups have established avenues for generating revenue, such as Saving and Credit-Cooperative Societies (SACCOs), which could be explored by members to access capital for offsetting fortification inputs.

Sales and Marketing

Fifty-nine percent (34/58) of respondents relied on distribution as the most effective sales and marketing strategy for their fortified products. This was mostly employed by maize flour processors (40 percent or 23/58), followed by wheat flour processors (12 percent or 7/58). Thirty-four percent (20/58) of respondents also reported use of radio channels as a sales and marketing strategy, and 22 percent (13/58) reported the use of social media.

Similarly, respondents from industries cited trade shows and customer referrals as alternative mediums for marketing and to increase product sales. Product distribution strategies have been proven as powerful market drivers and have found wide adoption globally to increase uptake of fortified foods, primarily because they markedly increase product availability in market spheres.

Relatedly, emerging markets for fortified flour in neighboring countries, like the DRC, present an opportunity for driving demand on production of fortified food products, coupled with expansion of the Common Market for Eastern and Southern Africa (COMESA), which promotes cross-border trade.

4.5 Recommendations

The assessment garnered key recommendations from the food processors intended to help scale up production of fortified foods and strengthen the food fortification program.

Standards and the Regulation

All food vehicles highlighted the need to simplify and translate standards into common local languages like Luganda, Luo, Lusoga, and Runyankole to aid routine sensitization on food fortification to scale up production of quality and safe foods through the different platforms, although majority were from the maize industry, as seen in Annex 5. This aligns with the request by UNBS who emphasizes the need for standard simplification and translation, from the Landscape Analysis 2022 report.

Stable and Affordable Supply of Electricity

To improve production, food processors emphasized the need for a stable and affordable supply of electricity from the energy sector and reduction of taxes by the Uganda Revenue Authority (URA). The stable supply of electricity would reduce breakdown in machinery, which results in high operational costs and inconsistency in premix dosing, thus affecting quality of the final product.

Technical Assistance Support

Training and routine mentorship on the theoretical and practical application of food fortification was emphasized to attract food processors to fortify, thus scaling up production and supply of fortified foods.

Food processors requested a central information platform where companies can access up-to-date information and resources on food fortification, such as on fortificants/premix equipment.

Food processors also highlighted the need for the NWGFF, MOH, MTIC, and regulatory bodies to build capacities of the associations and industries by creating platforms for routine access to new global and local developments on food fortification; by creating learning and feedback platforms; and by engaging the industries in national or policy discussions on food fortification.

Technology

Food processors requested increased access to quality equipment, like dosers, and advanced technologies that support food fortification, coupled with training on their use.

Tax exemption for fortification equipment and all inputs was also proposed as one of the incentives to make a business case for fortifying industries.

Respondents also recommended routine monitoring and inspections by regulatory bodies to measure compliance to standards, which would measure the effectiveness of the new technologies.

Access to affordable and quality fortificant/premix

To increase access to quality fortificant/premix, food processors recommended that the NDA generate and distribute a prequalified list of fortificant/premix suppliers.

Fortifying food processors also highlighted the need for zero tax on fortificants/premixes to ensure affordability, to enable scale-up of fortified food production and consistency by industries.

Food processors also highlighted the need for routine NDA inspection of fortificant/premix suppliers to ensure quality imports, which, if coupled with sensitization on proper handling and storage, would address non-compliance to standards.

Quality Control and Quality Assurance

Food processors requested routine training to increase knowledge and skills in internal quality control procedures, especially related to food fortification for conformity to standards. They also recommended development of SOPs for internal quality controls, specifically for testing capacity as key in strengthening quality control processes.

Respondents recommended that UNBS improve the turnaround time for test results and certification, coupled with regular monitoring/inspection visits.

They also requested that UNBS reduce testing fees and establish regional testing centers to reduce the distance for sample submission.

Occupational Health and Safety

Food processors recommended developing SOPs and conducting sensitization of workers on occupational health and safety. This should be complemented with support supervision by designated officials to ensure adherence to the SOPs.

Marketing of Fortified Foods

To promote sales and marketing of fortified foods and products, food processors emphasized the need to invest in demand generation approaches for increased consumption of fortified foods. For example, the GOU should make it a policy for schools and other public institutions to procure and consume fortified foods. Increases in demand is envisaged to incentivize manufacturers to scale up production.

They also suggested that creating regional market opportunities, such as lifting cross-border (non-tariff) barriers through establishing COMESA to promote cross-border trade, is a good incentive to the fortifying industries to tap into cross-border markets for products that meet regional standards.

5.0 Conclusion

The assessment identified organizational/institutional, enabling environment, and technical capacity needs, coupled with documented best practices, challenges, opportunities, lessons, and recommendations. These will be disseminated to the NVGFF and private-sector stakeholders for scale up and targeted support to the industries based on need. This targeted support provided in collaboration with private-sector food processors will contribute to strengthening of the food fortification program in Uganda, especially on compliance with standards and the regulation.

Annexes

The assessment garnered key recommendations from the food processors that will inform support areas to strengthen the food fortification program. This is presented by different thematic areas in Annex I below.

Annex I: Best practices of food processors by food vehicle

Area	Best practices	Edible oils	Edible oils and fats	Maize flour	Salt	Wheat flour
Production	Product packaging for customer preference	1		4	1	3
	All processes			4		3
	Milling			4		3
	Cleaning of grain before milling			4		
	Dehulling for effective bran separation			4		
	Testing of raw material at reception			2		
Quality control and assurance	Production of quality flour	2		15	2	4
	Adoption to GMPs	1		7	1	3
	Improved compliance	2	1	4		3
	Training in Hazard Analysis Critical Control Point (HACCP)	2	2			
	Recruiting based on education	6	3	22	1	12
	Recruiting based on experience	6	1	21	2	9
	Recruiting based on technical skills			7		1
	Adherence to PPE use			3		
Fortification	Routine calibration of fortification equipment		2	4	2	6
	Monitoring of dosage rates		1	5	1	4
	Documented SOPs for operation			1		3
	Routine cleaning of dosers	1		1		2
	Skilled personnel to operate the equipment	1				1
Frequency of calibration	Calibration/cleaning-daily	4		7	3	8
	Calibration-six months	1	2	3		4
	Calibration-once a year	1	1	2		1
	Calibration/cleaning-weekly		1	1	1	3
	Calibration-monthly					2
Premix procurement	Dependent on production capacity	3	3	6	2	13
	Dependent on production projection	2				
Premix handling	Appropriate premix storage	2	1	2	2	4
	PPE use in premix handling			2	1	2
	Premix stock planning	1	1	1		
	Compliance to specification	1	1			
	Use of automatic dosers			1		1

Note: Total respondents = 58 (maize = 32, wheat = 14, edible oils and fats =10, and salt = 2)

Annex 2: Key challenges of food processors by food vehicle

Section	Industrial challenges	Edible oils	Edible oils and fats	Maize flour	Salt	Wheat flour
Production	Limited skills to calibrate the doser		1	8	1	6
	Difficulty in accessing good quality premix, dosers		1	6		6
	High cost of production		1	4		1
	High cost of premix and mixers		6	8		5
	Limited awareness about fortified foods			11		1
	Limited technical skills to operate the dosers		1	16	1	6
	Frequent power fluctuations affecting premix dosage		8	10	1	11
	Difficulties in maintaining appropriate premix storage	4		3		5
	Limited local supply of spare parts		2	10	1	1
Quality control (internal and external)	Reception of poor-quality grains			13		5
	Limited capacity for testing of final product and premix quality verification		2	5		3
	Testing of raw materials due to poor quality grain supplied		1	7		1
	Delayed test results		3	10	1	5
	Expensive tests and renewal certification fees		2	8		1
	Inconsistency in test results		1	5		2
Occupational safety	Inappropriate premix storage facilities		4	3		5
	Limited adherence to PPE use	5	5	21	1	1
	Health safety knowledge gaps	3	3	3		8
Market	Color and safety of fortified flour			4		3
	Price of fortified products		2	3		2

Note: 58 total respondents (maize flour = 32, wheat flour = 14, salt = 2, edible oils and fats = 3, edible oils = 7)

Annex 3: Lessons learned by food vehicle

Thematic areas	Lessons	Edible Oils	Edible oils and fats	Maize flour	Salt	Wheat flour
Knowledge on food fortification	Fortification process	3	2	24	1	5
	Dosing			5		2
	Fortification benefits			4		2
	Premix accessibility	1		4		
	Cost of fortification	1		3		1
	Fortification technology			3		2
	Toxification			2		2
COVID-19 impact on production	Market ventures		1	2		
	Reduced production capacity	5	1	27		11
	Restricted supply chain	2	1		2	7
	Low sales			8		1
	Reduced market	4	1			2
	High production costs	1		3		1
	Machine maintenance	1		4		
Rational for food fortification	Increased sales			2		
	Government regulations	4	2	4	2	7
	Fight micronutrient deficiencies	2	2	6	1	5
	Product value addition	2		7		3
	Marketing strategy			4		1
	Social responsibility	1		1		1
COVID-19 impact on quality control and quality assurance	Customer preference		1	1		
	Compromised quality	2		6		2
	No UNBS audits		1	6		2
	Limited technical personnel	1				3
	Additional testing costs			2		
	Restricted movements			2		
Criterion for fortification technologies and premix selection	Delayed sample submission	1	1			
	Efficiency	2	1	9		11
	Equipment quality			6		7
	Availability	1	2	1		1
	Affordability			1		3
	Management decision				1	1
	Spare parts availability					2
	Consistency			1		1
	Premix quality	4	1	3	1	10
	Company certification	2	2	1	1	2
	Premix price	1		2	1	3
	NDA approval	1		1		1
	Delivery time	1		1		1
COVID-19 impact on premix	Expensive premix	1	1	3		4
	Limited access to premix	1	1	2		3
	Procurement delays	2	1			2
	No production	1		3		1

	High transportation cost			1		1
Benefits of occupational health and safety	Reduced accidents	5	26	3		9
	Increased productivity		6			
	Quality products	1	3			
	Compliance and certification	3				1
	Improved health		2			1
	Incentives promoting compliance		2			
Sales and marketing	Distribution	2	1	23	1	7
	Radio	3		11	1	5
	Social media	3		4		6
	Trade shows	1		1		3
	Customer referrals	1		3		
	Community radio			2		1
	Flyers			3		

Note: 58 total respondents (maize flour = 32, wheat flour = 14, Salt = 2, edible oils and fats =3, edible oils = 7)

Annex 4: Key recommendations to address the identified capacity needs

Area of focus	Recommendations	Lead institution	Collaborating institutions
Standards and the regulation	Sensitization and training on standards and the regulation	UNBS, MOH	MTIC, NDA, food processing industries, Ministry of Agriculture Animal Industries and Fisheries (MAAIF), PSFU, USAID Advancing Nutrition, and other partners
	Standard simplification, translation and dissemination	UNBS, MOH	MTIC, NDA, Food processing industries, MOH, MAAIF, PSFU, consumer associations, USAID Advancing Nutrition, and other partners
	Quick turnaround for sharing test results and certification	UNBS, MTIC	MOH, food processing industries, UNBS-recognized labs, PSFU, USAID Advancing Nutrition, and other partners
	Reduction in testing fees and establishment of regional testing centres to reduce distance	UNBS, MTIC	MOH, food processing industries, UNBS-recognized labs, PSFU, USAID Advancing Nutrition, and other partners
	Conduct bi-annual monitoring/surveillance visits to fortifying industries and markets	UNBS, NDA	MOH, MTIC, food processing industries, UBOS
	Enactment of a regulation on mandatory procurement of fortified maize flour in public and private institutions	Public Procurement and Disposal of Public Assets (PPDA)	Food processing industries, UNBS, MTIC, OPM, Ministry of Internal Affairs
Review minimum requirements for maize flour processing operations			
Technology	Sensitization on the quality and safety, and maintenance of equipment on compliance	UNBS, MTIC	Ministry of Labour Gender and Social Development (MOLGSD), food processing industries, regulatory authorities
	Increase access and information to quality equipment (e.g., dosers/mixers)	MTIC, UIRI	PSFU, UMA, food processing industries, research Institutions
	Tax exemption to fortification equipment and other inputs for affordable and to make business sense on food fortification	Ministry of Finance Planning and Economic Development (MOFPED), URA	NDA, MOH, MTIC
	Benchmarking on feasible fortification technologies and efficient model	PSFU	Food processing industries, UMA, MTIC
Fortificant/Premix	Sensitization of food processors on the right quality of premix, their handling, including proper storage	NDA	MOH, MTIC, food processing industries, UNBS
	Regular NDA inspection on fortificants/premix suppliers to ensure quality of fortificants/premix	NDA	MOH, MTIC, food processing industries, UNBS
	Consideration of mutual recognition schemes for verification of fortificant/premix quality	NDA	MOH, PSFU

Area of focus	Recommendations	Lead institution	Collaborating institutions
Production	Advocate for stable supply with direct lines to manage low voltage and cost of electricity to help reduce on operational costs; power fluctuation is linked to machinery breakdown and inconsistency in premix dosing		
	Training on the theoretical and practical food fortification application skills, especially regarding fortification		
	Government to establish a prequalified list of fortificant/premix suppliers to control to ensure quality and safety		
	Provide tax waivers to improve access to affordable premix		
Quality control and quality assurance	Improved industry QC/QA processes	MTIC	Food processing industries, UNBS, PSFU, NDA, UMA, and other processor associations
	Training food processors to improve knowledge and skill on food fortification QC/QA processes	MTIC, UNBS	Food processing industries, UNBS
	Develop SOPs and manuals on QC/QA for industries	MTIC, UNBS	Food processing industries, UNBS
	Build internal testing capacity of industries and strengthen QC/QA processes.	UNBS/food processing industries	MTIC, UIRI, PSFU, NDA, and other recognized laboratories
Marketing of Fortified Foods	Investment in awareness creation on the benefits of consuming fortified foods	MOH	Associations, PSFU, Media, food processing industries
	Linkages to regional market opportunities/tap into cross-border markets for products that meet regional standards as an incentive to fortifying industries	MTIC	UNBS, MAAIF
	Salt processors recommend the government to impose high excise duty on imports of salt from Kenya to hinder the country from selling salt cheaply, to cab competition (VAT elimination on salt)		
	Encourage Kenyan salt companies to establish processing plants in Uganda for a fair trade (import substitution)	MTIC, MOFPED	URA
Imported fortified foods	Promotion and implementation of the BUBU policy	MTIC, MOFPED	URA
	Develop safety policies and conduct training on implementation for operation in healthy and safe environments	MOLGSD	Associations, food processing industries, DIT, PSFU
	Provision of PPE materials	Food processors	MOLGSD
Occupational Health	Sensitization of workers on the pros and cons of occupational health and adherence to SOPs	MOLGSD	MTIC, NEMA, MTIC, and associations

Area of focus	Recommendations	Lead institution	Collaborating institutions

Annex 5: Recommendations on the fortification process flow by food vehicle

Department	Recommendations	Edible oils	Edible oils and fats	Maize flour	Salt	Wheat flour
Production	Stable electricity	2	2	10		6
	Reduce electricity costs	1		14		1
	Training and sensitization	1	3	18		3
	Prequalified suppliers			4		
	Tax exemption	2		1		1
Standards and regulations	Sensitization/standards simplification	1	1	7		1
	Training	1		5		1
	Faster test results and certification time	3		2		
	Regular UNBS visits			2	1	
	Reduced testing costs		1	2		
	Premix specifications			1		2
Quality control and assurance	Training and sensitization	3		21	1	4
	Quality checks			7		2
	Premix formulation			5		3
	Subsidise testing and machinery	2		3		2
	Access to dosers			5		2
	SOP adherence	1		2		2
	Technical personnel training	1		3		
	Laboratory capacity building	1		2		1
	Local premix availability	1		3		
Fortification technologies	Quality equipment	3		8	1	6
	Trainings and sensitization	1	1	5		5
	Premix access			2	1	4
	Tax exemption	1		3		1
	Routine monitoring		1	2		1
Premixes	Tax reduction/cost subsidies	5	1	3	1	9
	NDA premix supplier inspections	3				2
	Sensitization			3		1
Occupational health and safety	Safety policy training	5	4	34	1	11
	Provide PPE	2		20	1	6
	Sensitization	4	2	11		5
	Supervision	2	2	9	1	3
Sales and marketing	Awareness creation			5		5
	Rebranding			1		2
	Cross-border market					3
	New technology adoption			1		1

Note: 58 total respondents (maize flour = 32, wheat flour = 14, salt = 2, edible oils and fats = 3, edible oils = 7)

Annex 6. Food processors operating in more than one food vehicle

Food processors	Edible oils	Maize flour	Wheat flour	Total
Aponye (U) Limited.				2
Bajaber Industries Limited.				2
Mandela millers Limited				2
Nile Agro Industries Ltd				2
SMA MILLERS (U) LTD				2
Mt. Elgon Millers (U) Ltd				2
Total	3	4	5	12

Annex 7: Capacity needs based on count* of responses by food processors per food vehicle

Food Processors	Food Vehicle	Capacity Needs																		
		Access to premiss & machinery	Access to regional markets	Capital grants	Cost of premiss	Demand creation	Develop vitamin A&D standards	Local supply of premiss	Power costs	Premiss verification	Provide incentives	Delayed UNBS feedback	Sensitization	Tax incentives	Testing capacity	Test kit for vitamin a	Training	Update standards	Access to affordable quality premiss	Subsidise costs
Aponye (U) Limited.	Edible Oil	1	1			1		4			1	1	1			5			1	
Mian Agro Limited	Edible Oil									1			1			2				
Mukwano group of Companies	Edible Oil			1		1				1		1	1			2	1		1	
Ngetta Tropical Holdings Limited	Edible Oil		1	1										2		2				
Nile Agro	Edible Oil		1							1		1				3		2		
Vegol Limited	Edible Oil									3			1			1				
Bajaber Industries Limited.	Edible Oils									1	1		1			2		1	1	
Afro Kai Limited	Maize flour					3					1					3		1		
Arise and Shine	Maize flour			1		1					1	2				3				
Birya United Agencies	Maize flour					1						2				4				
East African Basic Foods	Maize flour					1				2	1	2				1			1	
Grainpulse Ltd	Maize flour	1	1					2	1		1	1				2			1	
Granular Maize millers	Maize flour											2				5			1	
Jase Agro Point	Maize flour		1					3		1									2	
Kabana millers Limited	Maize flour			1		1				1		1				2		1	1	
Kawanda Grain Millers	Maize flour	1		1					1		1	1				1			2	
KK Millers (Tariq Millers)	Maize flour	1				1				2			1			1			1	
Mandela millers Limited	Maize flour					1				1				1					2	
Manyakabi Area Cooperative	Maize flour			1								1		1		4				
Mbale maize flour limited	Maize flour					1			1		1			1		2			2	
Mercy Business Solutions Limited	Maize flour					1						2				4				

MMACKS INVESTMENTS	Maize flour	1	1			1						2			3		
Mt. Elgon Millers(U) Limited	Maize flour			1											2		
Najakukola Millers Ltd	Maize flour					1						2			2		
Nakawuka Maize Millers	Maize flour					1			1			2			3		
Nanziga Associations Limited	Maize flour		1			1			1				1		2		1
New Kakinga Millers	Maize flour		1	1				1				1			3		
Njojo Agro Based Industries (U) Limited	Maize flour					1		1				2			3		1
Numa Feeds	Maize flour			1		1				1					3		
Pan Afric Impex Ltd	Maize flour		1			1						1			2	2	2
Patience Liz Millers Ltd	Maize flour	1						1							1		1
Real food Maize Millers	Maize flour	2				1		1							2		1
Reco Industries Ltd	Maize flour								3	1			1		2		1
Rhino Stars Genesis Limited	Maize flour		1	1		1									2		
Rochrista City Millers	Maize flour			3								1			3		
Rokana millers Ltd	Maize flour		1	1					1			2			1		1
Ryanja Millers Limited	Maize flour					1			1		1	1			3		
Sanyu Agro Harvest	Maize flour							1	1		1				3	1	
SMA MILLERS (U) LTD	Maize flour		1		1				2			2					1
Talian company Ltd	Maize flour					1		1				2			2		
West Acholi Cooperation Limited	Maize flour	1		1		1									2		1
Wondermeal Millers	Maize flour	2							1	1	1				2		1
Yahe International Limited	Maize flour			2					2		1		1		1		
Kampala Industry and Infrastructure Development Ltd	Salt							1					1				
Rukman International Limited	Salt		1						1		2	1			1		2
Ahmed Raza Food processors	Wheat flour							1	2		1				1	3	1
Alfil Millers (U) Limited	Wheat flour								3		1					1	
Bajaber Millers Ltd	Wheat Flour					1					2				2		
Bakhresa Grain Millers Limited	Wheat flour							1	1						2	1	3
Dei Industries International	Wheat Flour							1	1		1		1		2		3

Engano Millers limited	Wheat Flour			1			1					2	1	1			
King Millers Limited	Wheat Flour	2											1	2	1	1	2
Mandella Millers	Wheat Flour				1			1					1	2	1	1	1
Master Grain Milling Industries	Wheat Flour				1				2		3			2			
Mt. Elgon Millers(U) Ltd	Wheat Flour		1								2			2		1	1
Nile Agro Industries Ltd	Wheat Flour					1		1				1		3			
Ntake Bakery	Wheat Flour							1	1			1		2			1
SMA Millers	Wheat Flour		1		1				1			1				3	2
		1	2	3	4	5											

*Key: Frequency a particular need was provided across the different program areas. (Green indicating low capacity need and Red high capacity need) by the food processor

Annex 8: Capacity Needs by Food Vehicle

Food vehicle	Section	Total
Edible Oil	Access of quality and affordable technologies	1
	Access to quality and affordable PPEs, and enforcement to PPE use adherence	7
	Tax incentives on fortificants, and premix storage capacity	2
	Reduced taxes on machinery and raw materials	4
	Regional laboratories for product testing, training and skills development in QC and Assurance	3
	Capacity in marketing of fortified products	1
	Training on food fortification standards and regulations	3
Maize flour	Access to affordable and quality technologies	3
	PPE use adherence	20
	Efficient procurement process of premix/fortificant, and packing premix in smaller quantities	2
	Technical capacity to carryout food fortification, and linkage to capital grants to invest in food fortification	26
	Training and skills development in QC and QA, improve post-harvest handling services	16
	Investments in demand creation for fortified foods, create linkages and access to regional markets	2
knowledge on food fortification standards and regulations, and simplification and translation of standards into local languages	26	
Salt	Training and skills development in quality control and Assurance	1
	Training on food fortification standards and regulations	2
Wheat flour	Tax incentives on fortification technologies	2
	Access to quality and affordable PPEs especially in premix handling	6
	Fast track premix verification, and harmonize fortificant dosage rates,	2
	Tax waivers on fortificants	7
	Short sample turnaround time, and reduction of sample testing fees	2
	Business modelling programs for fortifying industries	3
	Training on food fortification standards and regulations	8

Annex 9: Food Fortification Status, by Brand and Production Capacity

Region	Food vehicle	Food Processor*	Average Installed capacity MT	Average Actual Capacity MT	Fortification Status
Central	Edible Oil	Aponye (U) Limited.	30	10	Fortified
	Edible Oil	Bajaber Industires Limited.	250	200	Fortified
	Edible Oil	Mukwano group of Companies	300	190	Fortified
	Edible Oil	Vegol Limited	100	50	Fortified
	Edible Oil Total		170	113	
Central	Maize flour	Afro Kai Limited	20	15	Fortified and unfortified
	Maize flour	Aponye (U) Limited.	48	35	Fortified
	Maize flour	Arise and Shine	30	23	Unfortified
	Maize flour	East African Basic Foods	30	12	Fortified
	Maize flour	Grainpulse Ltd	43	43	Fortified and unfortified

	Maize flour	Jase Agro Point	10	10	Unfortified
	Maize flour	Kawanda Grain Millers	24	17	Unfortified
	Maize flour	KK Millers (Tariq Millers)	20	10	Unfortified
	Maize flour	Mandela millers Limited	72	50	Fortified
	Maize flour	Mbale maize flour limited			Unfortified
	Maize flour	MMACKS INVESTMENTS		40	Unfortified
	Maize flour	Nakawuka Maize Millers	50	50	Unfortified
	Maize flour	Nanziga Associations Limited	48	20	Unfortified
	Maize flour	Pan Afric Impex Ltd	180	180	Fortified
	Maize flour	Patience Liz Millers Ltd	10	10	Unfortified
	Maize flour	Real food Maize Millers	15	15	Unfortified
	Maize flour	Reco Industries Ltd	75	60	Fortified
	Maize flour	Rokana millers Ltd	20	10	Unfortified
	Maize flour	Ryanja Millers Limited	20	20	Unfortified
	Maize flour	Sanyu Agro Harvest	40	30	Unfortified
	Maize flour	SMA MILLERS (U) LTD	50	20	Fortified
	Maize flour	Talian company Ltd	18	10	Unfortified
	Maize flour	Wondermeal Millers		45	Unfortified
	Maize flour	Yahe International Limited	24	15	Unfortified
	Maize flour Total		40	32	
Central	Salt	Kampala Industry and Infrastructure Development Ltd	600	150	Fortified
	Salt Total		600	150	
Central	Wheat Flour	Ahmed Raza Food Industries	80	80	Fortified
	Wheat Flour	Alfil Millers (U) Limited	300	300	Fortified
	Wheat Flour	Bajaber Industries Limited.	240	192	Fortified
	Wheat Flour	Bakhresa Grain Millers Limited	1100	600	Fortified
	Wheat Flour	Dei Industries International	140	120	Fortified
	Wheat Flour	King Millers Limited	120	100	Fortified
	Wheat Flour	Mandela millers Limited	300	240	Fortified

	Wheat Flour	Ntake Bakery	192	192	Fortified
	Wheat Flour	SMA MILLERS (U) LTD	50	20	Fortified
	Wheat Flour Total		280	205	
Central Total			133	86	
Eastern	Edible Oil	Nile Agro Industries Ltd	1000	500	Fortified
	Edible Oil Total		1000	500	
Eastern	Edible oils and fats	BIDCO (U) Limited	1500	1000	Fortified
	Edible oils and fats Total		1500	1000	
Eastern	Maize flour	Kabana millers Limited	30	30	Fortified and unfortified
	Maize flour	Mercy Business Solutions Limited			Unfortified
	Maize flour	Mt. Elgon Millers(U) Ltd	120	100	Unfortified
	Maize flour	Najakukola Millers ltd			Unfortified
	Maize flour Total		75	65	
Eastern	Salt	Rukman International Limited	20	9	Fortified
	Salt Total		20	9	
Eastern	Wheat Flour	Engano Millers limited	220	220	Fortified
	Wheat Flour	Kengrow Industries Ltd	100	50	Fortified
	Wheat Flour	Master Grain Milling Industries	540	116	Fortified
	Wheat Flour	Mt. Elgon Millers(U) Ltd	120	100	Fortified
	Wheat Flour	Nile Agro Industries Ltd	200	200	Fortified
	Wheat Flour Total		236	137	
Eastern Total			385	233	
Northern	Edible Oil	Mian Agro Limited	7	7	Unfortified
	Edible Oil	Ngetta Tropical Holdings Limited	6	6	
	Edible Oil Total		7	7	
Northern	Edible oils and fats	MMP Agro Industries Limited	240	130	
	Edible oils and fats	Mount Meru Uganda Limited	100	100	Fortified
	Edible oils and fats Total		170	115	

Northern	Maize flour	Rhino Stars Genesis Limited	36		
	Maize flour	Rochrista City Millers	24		Unfortified
	Maize flour	West Acholi Cooperation Limited	72		Unfortified
	Maize flour Total		44		
Northern Total			69	61	
Western	Maize flour	Birya United Agencies			
	Maize flour	Granular Maize millers	24	18	Unfortified
	Maize flour	Manyakabi Area Cooperative	24	15	Unfortified
	Maize flour	New Kakinga Millers	120	60	Unfortified
	Maize flour	Njojo Agro Based Industries (U) Limited	30		Unfortified
	Maize flour	Numa Feeds	24		Unfortified
Maize flour Total			44	31	
Western Total			44	31	
Grand Total			162	108	

**Information on brand names is from the UNBS CIMS website, though UNBS doesn't display production capacity of each brand.*

Annex 10: Tools/Forms used in the CNA



CNA Tool for Edible
oils and fats_28.04.2



CNA Tool for
Maize_28.04.22 final



CNC Tool for
Wheat_28.04.22 fina

