TechnoServe: Business Solutions To Poverty

Edible Oil Study -The Opportunity For Oil Fortification With Vitamin A

NOV 2019

Study conducted by Nkem Joseph- Palmer (Viral Business Consulting) with support from TechnoServe





LIST OF ABBREVIATIONS

- CAGR Compounded Annual Growth Rate
- CBN Central Bank of Nigeria
- CET Common External Tariff
- ECOWAS Economic Community of West Africa State
- EOPAN Edible and Vegetable Oil Producers Association of Nigeria
- FAO Food and Agricultural Organisation
- GAIN Global Alliance for Improved Nutrition
- ICBT- Informal Cross Border Trade
- LBN Local Brand Name
- MT Metric Tonne
- NAFDAC National Agency for Food Drug Administration and Control
- NBO National Brand Owner
- NBS National Bureau of Statistics
- NCS Standard Organisation of Nigeria
- NPC National Population Commission
- OSPAN Oil Seed Processors Association of Nigeria
- POFON- Plantation Owners Forum of Nigeria
- RPO Refined Palm Oil
- RSP Retail Selling Price
- SON Standard Organisation of Nigeria
- SPO Special Palm Oil
- UNICEF United Nation Children Emergency Fund
- USDA United State Department of Agriculture
- VODEP Vegetable Oil Development Program
- WHO World Health Organisation



CONTENTS

| TITLE | PAGE |
|---|------|
| Executive Summary | 5 |
| Introduction | 8 |
| Methodology | 9 |
| Market Overview | 11 |
| Environmental Scanning | 26 |
| Stakeholder Analysis | 29 |
| Product Specification | 31 |
| Supply Chain Dynamics | 34 |
| Vegetable Oil Fortification Awareness Survey | 43 |
| Strategic Framework For Improving Compliance To Fortification | 52 |
| Conclusion | 54 |
| Annex | 60 |



LIST OF FIGURES

| TITLE | PAGE |
|--|---|
| Projected Global Vegetable Oil Market Growth | 11 |
| Import of Vegetable Oil Into Europe | 12 |
| Export of Oilseeds and Oil Seeds Products By Region | 13 |
| Evolution of World Oilseed Prices | 14 |
| Oil and Fats Production and Consumption in Nigeria | 16 |
| Daily Vegetable Oil Production Output by Regions | 18 |
| Sales Growth Forecast for Edible Oil | 19 |
| fMarket Share for Edible Oil Producers | 20 |
| Brand Share for Edible Oil | 21 |
| Vegetable Oil Exportation Data | 22 |
| Special Palm Oil Importation Data | 23 |
| Refined Vegetable Oil Importation Data | 23 |
| Estimate of Illegal Importation of Vegetable Oil | 24 |
| Vegetable Oil Price in USD Per Metric Ton | 24 |
| Vegetable Oil Importation (Legal vs. Illegal Volume) | 25 |
| Supply Chain Model | 24 |
| Supply Chain Process Flow | 25 |
| | TITLEProjected Global Vegetable Oil Market GrowthImport of Vegetable Oil Into EuropeExport of Oilseeds and Oil Seeds Products By RegionEvolution of World Oilseed PricesOil and Fats Production and Consumption in NigeriaDaily Vegetable Oil Production Output by RegionsSales Growth Forecast for Edible OilfMarket Share for Edible Oil ProducersBrand Share for Edible OilVegetable Oil Exportation DataSpecial Palm Oil Importation DataRefined Vegetable Oil Importation DataEstimate of Illegal Importation of Vegetable OilVegetable Oil Price in USD Per Metric TonVegetable Oil Importation (Legal vs. Illegal Volume)Supply Chain ModelSupply Chain Process Flow |

LIST OF ANNEXES

| ANNEX | TITLE | PAGE |
|-------|---------------------------------|------|
| 1 | Processor Enumeration Data | 60 |
| 2 | Processors Survey Questionnaire | 64 |



EXECUTIVE SUMMARY

Vegetable oil is found in the daily diets of almost every Nigerian family. Consumption has increased dramatically both in the use of household cooking oils as well as through commercial products like noodles, margarines, biscuits, baked goods and fried snacks.

With an average per capita consumption of 15-20 grams per day, fortification of vegetable oil with Vitamin A offers a significant opportunity for improving the health and nutrition of Nigerians.

Despite this favorable environment, market surveys suggest that less than a quarter of cooking oil sold in Nigeria complies with the fortification standard. There is little reliable or comprehensive data to allow for a full assessment of the reasons for this poor performance, however, there is inference to show that issues like consumer awareness, poor technical regulation, and production cost dynamics influence performance. Furthermore, broad outlines of Nigeria's complex cooking oil markets indicate significant barriers to industry growth and profitability – and these create steep barriers to compliance.

The lead barrier to fortification and industry growth is the large percentage of illegal and unbranded oil in the market. Several reports indicate that a mix of smuggled and domestically produced unbranded oil represents 60-70% of all vegetable oil consumed in Nigeria. Nearly all unbranded oils contain impurities and chemical compounds in excess of safe levels specified in national food quality standards. Whether imported or domestic, unbranded oil is considered a threat to consumer health and safety by medical, health and food regulatory agencies.

This objective of this report is to offer the result of an evaluation conducted on the Nigerian vegetable oil market. It also provides in-depth qualitative insight, historical data, and variable projections about market size, distribution, volumes etc. Furthermore, this report concludes by presenting a strategic framework to improve compliance of vegetable oil to fortification standards.

- Some of the key conclusions indicate that market domination from branded imports and illegal distribution of unbranded oil leads to:
- An oversupply of domestically produced and unbranded goods
- Underutilized local processing capacity
- Lower sales and revenues for the formalized market players
- Downward pricing pressure effecting industry profit margins

One must note, however, that upon concluding this study in July of 2019, government has taken some measures to overcome the aforementioned challenges related to importation of inadequately processed vegetable oil. Recent attempts have been made to address loopholes enabling large volume imports of duty free packaged branded cooking oils.



EXECUTIVE SUMMARY

POLICY RECOMMENDATIONS TO OPTIMIZE FORTIFICATION

In order to sustain these efforts, and in parallel intensify initiatives around effective fortification, the following recommendations should be considered by relevant government entities.

$[] \square \square$ CREATING A DATA PLATFORM AIMED AT CAPTURING INFORMATION RELATED TO IMPORTED AND DOMESTIC EDIBLE OIL

This mechanism will, in essence, ensure that the following factors are reported in an ongoing and transparent basis.

- Volume of edible oil coming into the country
- Origin of importation
- Fortification status upon arrival to the point of entry
- Regular testing of imported supply which would inform joint regulatory efforts from government agencies, and lead to adequate enforcement through immediate action at point of entry
- Information related to the vegetable oil value chain from all government agencies interfacing with the sector (e.g. information on local processors- production levels, accreditations and certifications, recalls, nonconformance, food fraud etc)

BUILDING CAPACITY

Provide direct technical assistance and training to improve quality and cost effectiveness of Vitamin A procurement, storage, addition and quality control.

a CREDENTIALING FOR INDUSTRY

Work with the Oil Seeds Processor Association, public regulatory agencies, and National Board for Technical Education to develop industry-driven self-regulation, a "microcredentialing system" which integrates fortification and GMP.



EXECUTIVE SUMMARY

POLICY RECOMMENDATIONS TO OPTIMIZE FORTIFICATION

MARKETING SUPPORT AND CONSUMER AWARENESS

Encourage and support companies to develop and promote fortification. There are models from several countries where an industry credentialing and quality system, is tied to a marketing seal and associated media and marketing campaign. Drive public advocacy programs on fortification targeted at the bottom of the pyramid, and other tiers of the society. Consumers would naturally reflect their preferences for fortified oil through their buying patterns, requiring processors to comply with standards. Additionally, efforts should be made towards building the capacity of Consumer Protection Organizations to use legal means to ensure that importers and producers of edible oil comply with the food fortification regulations.

Δ PREMIX TARIFF EXEMPTIONS

Companies currently investing in fortification face an unfair "playing field." While the 5% tariff on premix represents only ~\$0.12 per metric ton, exempting companies from this small burden demonstrates government partnership and burden sharing. Otherwise, revenues collected from the fortification tariff could be applied to the industry support activities above.

W REFORMING REGIONAL TRADE AGREEMENTS

The study outlines several opportunities for fortification advocates to influence national and regional processes to support the growth and profitability of the national cooking oil industry. An immediate action could be for customs, revenue and regulatory bodies such as NAFDAC and SON to establish a collaborative border control mechanism that ensures imported quantities of edible oil are recorded and conform to Nigerian Standards creating a more level playing field with local processors.



INTRODUCTION

The Strengthening African Processors of Fortified Foods (SAPFF) Program, in collaboration with Partners in Food Solutions (PFS), aims to increase the compliance rates of private sector food processors against national food fortification mandates by increasing the production of fortified food staples in Nigeria, Kenya and Tanzania.



One of such food staples is vegetable oil. Vegetable oils are triglycerides obtained from plants and are comestible. Comestible vegetable oils are used for preparing food consumed by human through cooking and often as supplements. They are popularly known as "edible oils".

Vegetable oil is found in daily diets of almost every Nigerian family and presents a veritable vehicle for improving the nutrition of the populace through fortification with micronutrients; it presents an opportunity to reach the population band that tends to achieve poor nutrition penetration due to poverty, poor education and other social practices.

Currently with an estimated population of 193 million, Nigeria's household consumption has dramatically gone up, along with the fast food industry where products like noodles, margarines, cooking oil, biscuits, bakery, frying lard, fat in snack and many other items use vegetable oil.

The vegetable oil processing landscape is fraught with challenges and chief amongst them is the dearth of data that should help in providing solutions and interventions in the sector.

Currently, Nigeria has a deficit of palm oil (responsible for about 60-70% of vegetable oil produced after further processing) of about 900,000 metric tons estimated at \$800 million.

Conversely, trade statistics for international business development says legal import falls within the range of \$224 to \$546 million. Essentially 300,000 to 700,000 MT are being informally imported. This implies that smuggling and informal importation may be responsible for bridging the supply gap, however there is no clear data to justify this.

The challenges of processors, the vagaries of the supply chain, government outlook and position on compliance, awareness of fortification of vegetable oil with Vitamin A by processors and consumers, as well as the role of all stakeholders in the vegetable oil processing sector must be assessed towards improving the health of the populace through micronutrient fortification.

This report offers the result of an evaluation of the Nigerian Vegetable Oil market. It also provides an in-depth qualitative insight, historical data, and verifiable projections about market size, distribution, volumes etc. It also presents the result of survey analysis used to determine the level of awareness of national mandatory fortification and challenges with compliance. This report presents a strategic framework to improve compliance to vegetable oil fortification.

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METHODOLOGY

This study employs systematic research methodologies in arriving at the results and derived recommendations. The methodologies employed include:

DESK REVIEW

This is based on information collected through a systematic review of the available literature relevant to the study. Information was collected through a systematic review of the available literature relevant (policies, strategies, reports, regulations and other related documents) to vegetable oil processing in Nigeria, as well as from web research and one-on-one interviews. Qualitative research and its techniques have been used for the desk review and literature review was done by analysing primary and secondary data.

DATA MINING

Large pre-existing databases relating to vegetable oil were mined and examined in order to generate new information. Large data sets for edible oil industry were sorted and the patterns studied to establish relationships through data analysis. The datasets include foreign trade in goods, vegetable oil import/export, vegetable oil sales, production capacity of local processors, etc.

SURVEY/QUESTIONNAIRE

The SurveyCTO software application was used to evaluate 105 processors selected across (sampling frame was based on refining capability) all the six geopolitical regions of Nigeria to conduct a survey to verify and validate output capacity, GPS location, address, compliance to the mandatory fortification requirements etc. An online consumer survey (using the Survey Monkey app) was conducted for the middle and upper class segment of the market, with 250 people respondents.



METHODOLOGY

This study employs systematic research methodologies in arriving at the results and derived recommendations. The methodologies employed include:

INTERVIEWS

One-on-one interviews were conducted for selected local processors. This was in a bid to evaluate their understanding of the requirements for vegetable oil fortification and to understand the issues and challenges they face in complying with regulatory requirements. One-on-one interviews were used to survey vegetable oil awareness for the largely uneducated and the bottom of the pyramid, with 144 respondents.

DATA ANALYSIS

To facilitate our decision and draw relevant inferences from the data collected, statistical tools were used to analyse the data. The tools used include data visualization, infographics, excel, SPSS, etc.

Other analytical methods used to aid decision-making are PESTLE Analysis (for environmental scanning), Cycle of Influence Analysis (for stakeholder analysis), Puttick Grid Analysis (for product placement), etc.

The limitation to this methodology is that information collected using the above listed methods might be missing details, components or underreporting the specific issues, largely because of limited information from traditional sources. It is also important to acknowledge the time constraint in gathering the information herein.



GLOBAL MARKET OVERVIEW

This section reviewed the global and local vegetable oil industry. It evaluates the global and local market share, compounded annual growth rate (CAGR) forecast, volume and price growth forecast, usage, demand, consumption per capita, sales, etc.

FIGURE A: PROJECTED GLOBAL VEGETABLE OIL MARKET GROWTH



Availability of a broad range of products and wide application in food and industrial sector are driving the market. Developing markets are gaining attention due to innovation in new flavours and health-focused ingredients, and the importance of these in the nutrition status of populations; this is expected to boost consumption in the coming years.

Growing demand for organic, healthy and natural products is also driving the market. The vegetable oil market is expected to expand with qualities such as low-fat, low-cholesterol, and low-calorie in the products. Increasing demand for edible oils in developing countries like China and India, due to improving economies and population growth majorly drives growth in vegetable oil consumption.



KEY MARKET TRENDS: INCREASED DEMAND FOR PALM OIL IN DEVELOPED COUNTRIES

Attributed to the multi-functional properties of palm oil in food and other industries, the segment remains the highest consumed oil in the world.

Moreover, palm oil is one of the most disbursed vegetable oils in the world. The primary users of palm oil include China, India, Indonesia, and the European Union. India, China, and the European Union do not produce crude palm oil and their demand is entirely met by imports.

There is substantial demand for palm oil from various end-user sectors across the world since it costs 20% less than most vegetable oils and is very versatile. In the past few years, palm oil production has amplified significantly, with almost all production growth determined in Malaysia and Indonesia. There is an increase in the demand for biofuel in most of the developed regions, which augmented the demand for palm oil.



FIGURE B: IMPORT OF VEGETABLE OIL INTO EUROPE IN 2015 (1000S TONNES)



GLOBAL PROJECTIONS

Vegetable oil has one of the highest trade shares (41%) of production of all agricultural commodities. This share is expected to remain stable throughout the outlook period, with global vegetable oil exports reaching 96Mt by 2027.

Vegetable oil exports will continue to be dominated by Indonesia and Malaysia, which are strongly export orientated: nearly 70% of Indonesian and more than 80% of Malaysian vegetable oil production is exported. In both countries, the share of exports is expected to slightly decline as more vegetable oil will be used as feedstock for biofuels.

Consumption for food use will also gain importance. Indonesian exports will grow at 1.6% p.a. compared to 5.8% p.a. in the last decade.



FIGURE C: EXPORT OF OILSEEDS AND OIL SEEDS PRODUCTS BY REGIONS



Source: FAO

Nominal prices of oilseeds and oilseed products are expected to recover over the medium term due to rising demand for vegetable oil and protein meal, although they are not to attain previous highs. Vegetable oil consumption is driven mainly by food demand in developing countries as a consequence of population and income growth. Additionally, the assumed low crude oil prices and the limited additional policy support imply a very small growth in vegetable oil uptake for biodiesel production.



FIGURE D: EVOLUTION OF WORLD OILSEED PRICES



LOCAL MARKET OVERVIEW

For close to two decades, Nigeria's vegetable oil output has remained virtually the same, even when consumption has surged owing to growth in population (at about 3% annually) and expansion in food processing industries.

Nigeria's vegetable oil market is made up of:

| SMALL TO MEDIUM SCALE PROCESSORS | The largest category of producers with daily output capacities ranging from 20 - 200 metric tons |
|-------------------------------------|---|
| LARGE SCALE PROCESSORS | Largely responsible for a major part of the local volumes produced |
| LEGAL IMPORTERS | Obtained special dispensation or allocation to import crude and specialty vegetable oil to bridge the supply gap despite the ban on importation |
| INFORMAL IMPORTERS | Ingress of small quantities of vegetable oil into the country due to human traffic across borders |
| SMUGGLING | Illegal movement of vegetable oil, mostly at night, across Nigeria's borders |

LOCAL PRODUCTION CAPACITY & GROWTH FORECAST

While it is difficult to gather accurate information about local processors, it is even more difficult to say precisely what their effective capacities are. This is because the operators interviewed confirmed that in certain instances, they source refined vegetable oil from other processors to meet up with demand. That means that measuring the capacity of the local operators just by examining their installed capacity may not be an accurate gauge. We have focused more on output capacity in this report.

From the information available to us, edible oils grew in 2018 by 6% in retail current value terms and 16% in volume terms to reach sales of NGN51 billion.

Growth driven by intense competition has led to the widespread availability of affordable products and average unit price in edible oils fell by 9%. This is mainly due to stiff competition and the use of local ingredients. PZ Wilmar remains the clear category leader with a 42% share of retail value sales in 2018. Over the forecast period edible oils is expected to post a value CAGR of 10% at constant 2018 prices to reach sales of NGN80 billion in 2023.*



FIGURE E: OIL AND FATS PRODUCTION AND CONSUMPTION IN NIGERIA IN 2007

| Supply Shortage (Surplus) | (1,700,000) |
|--|---------------|
| Total Production Per Annum In Tonnes | 1,300,000 |
| Other Sources Of Vegetable Oil (Groundnut, Cotton Seed, Soya Bean, etc) | 600,000 |
| Palm Kernel Production In Tonnes | 150,000 |
| Production By Small Holders and Wide Grove Per Annum In Tonnes | 400,000 |
| Production By Large Plantations Per Annum In Tonnes (Presco, Okomu, PZ Wilmar, etc) | 150,000 |
| PRODUCTION ESTIMATES | |
| | |
| Total Consumption Per Annum In Tonnes | 3,000,000 |
| Total Consumption Per Annum In Kilograms | 3,000,000,000 |
| Nigeria's Population | 200,000,000 |
| Per Capita Consumption Of Palm Oil Per Annum In Kilograms | 15 |
| CONSUMPTION ESTIMATES | |

Sources: FAO, NPC, NBS, NIFOR



PALM OIL PRODUCTION IN NIGERIA 2014-2019 (METRIC TONNES)

| PALM AND VEGETABLE OIL PRODUCTION | | | | | | | | |
|-----------------------------------|---------|---------|---------|-----------|-----------|-----------|--|--|
| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | | |
| Palm Oil Production | 940,000 | 955,000 | 990,000 | 1,025,000 | 1,015,000 | 1,015,000 | | |
| Vegetable Oil Production* | 831,638 | 844,909 | 875,875 | 906,840 | 847,993 | 847,993 | | |

*Estimate from data from USDA *Vegetable oil production volume estimated from palm oil production data from USDA and applying the formula: Calculated figures based on production conversions (SPO*0.98) =RPO; (RPO*0.65) = Percentage Palm Olein

**Palm oil makes up about 72% of vegetable oil production in Nigeria (Oyaide, 2004)

Source: United States Department of Agriculture

VEGETABLE OIL PRODUCTION IN NIGERIA (METRIC TONNES)

| VEGETABLE OIL IN NIGERIA | |
|----------------------------|-----------|
| Annual Growth In Demand | 5% |
| Annual Domestic Production | 1,300,000 |
| Palm/Palm Kernel Oil | 72% |
| Groundnut Oil | 23% |
| Others | 5% |
| Annual Production Deficit | 5% |

Source: Oyaide, 2004



From the data obtained from field visits, 104 local processors were evaluated and 59 had verified production capacity totalling about 9,833.55 MTPD (metric tons per day). 52 processors are currently active with total production capacities of 8,033.55 MTPD.

The average number of production days per annum is 225 days.



FIGURE F: DAILY VEGETABLE OIL PRODUCTION OUTPUT BY REGIONS

| ASSUMPTIONS | |
|-------------------------------|-----------|
| Running Days | 255 |
| Off Seasonal Period | 150 |
| Capacity During Off Season | 70% |
| Full Capacity Period | 105 |
| Annual Yearly Production (MT) | 1,687,045 |



The sales of edible oils in Nigeria is expected to grow from NGN 51B in 2018 to about NGN 150B in 2023.

FIGURE G: SALES GROWTH FORECAST FOR EDIBLE OIL





COMPETITIVE LANDSCAPE - MARKET SHARE

In the local market place, PZ Wilmar Ltd remains the market leader with about 41.5% of the market share. The three leading top players are PZ Wilmar, Affcot Nigeria Ltd and Dufil Prima Foods PLC with about 55.8 % of the market share by Retail Value RSP.



FIGURE H: MARKET SHARE FOR EDIBLE OIL PRODUCERS



Source: Eurostat

Devon Kings, Mamador and Power oil are the leading brands in Nigeria with about 66% share amongst themselves.



FIGURE I: BRAND SHARE FOR EDIBLE OIL

Source: Eurostat

EXPORT

Export data available was obtained from FAO as shown:

| FIGURE J: VEGETABLE OIL EXPORTATION DATA (MILLION TONNES) | | | | | | |
|---|----------------------------|-----------------------|-----------------------|--|--|--|
| | 2009/2010 Average Value | 2012/2013 Estimate | 2013/2014 Forecast | | | |
| Import | 1.0 | 1.0 | 1.8 | | | |
| Export | O.1 | 0.2 | O.1 | | | |
| Utilization | 2.7 | 2.8 | 2.9 | | | |

Source: FAO

IMPORTATION

Despite the ban on imports, a lot of unbranded bulk vegetable oil are still smuggled through our borders. Smugglers make use of the porous nature of Nigerian borders making their way through bush parts to bring in vegetable oils into the country. Custom officials connive with smugglers to push vegetable oils into the Nigerian market. This smuggling leads to oil glut making it difficult for local investors to make reasonable margins from their products. Because the bulk of imported vegetable oil are done through illegal means, it is difficult to obtain reliable data on the volume of imported vegetable oil.

Estimating the volume of vegetable oil imported illegally is difficult. Derived method is used to make estimate using legal import value and unaccounted value for Special Palm Oil (SPO).



FIGURE K: SPECIAL PALM OIL IMPORTATION DATA

| | | 2012 | 2013 | 2014 | 2015 | 2016 | _ |
|--------------|--|-----------|-----------|-----------|-----------|-----------|---|
| V L | alue In Million ISD | 224.5 | 261.3 | 546.9 | 374.3 | 278.3 | |
| L T | egal Import In onnes | 733,660 | 853,921 | 1,787,255 | 1,223,203 | 909,477 | |
| L E ir | Inaccounted stimated Import Millions USD | 575.5 | 538.7 | 253.1 | 425.7 | 521.7 | |
| L E ir | Inaccounted Estimated Import In Tonnes | 1,880,719 | 1,760,458 | 827,124 | 1,391,176 | 1,704,902 | |

Calculated figures based on production conversions (SPO*0.98) =RPO; (RPO*0.65) = Refined Vegetable Oil; \$=N306

FIGURE L: REFINED VEGETABLE OIL IMPORTATION DATA

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|--|------|-------|-------|-------|-------|
| Volume of Legal Import | 143 | 166.4 | 348.4 | 238.4 | 177.3 |
| Unaccounted Estimated Import in Millions USD | 367 | 343.2 | 161.2 | 271.2 | 332.3 |

Sources: Proshare, International Trade Centre; common-sized figures from Proshare data



FIGURE M: ESTIMATE OF ILLEGAL IMPORTATION OF VEGETABLE OIL (MILLIONS USD)



FIGURE N: VEGETABLE OIL PRICE IN USD PER METRIC TON

| | 2011/2012 | 2012/2013 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| Palm Oil | 791 | 803 | 626 | 628 | 699 | 626 | |
| Groundnut Oil | 1934 | 1430 | 1265 | 1294 | 1496 | 1491 | |
| Average Price | 1014 | 907.1 | 741.7 | 749.8 | 847.4 | 793.7 | |

Sources: Proshare, International Trade Centre; common-sized figures from Proshare data



FIGURE O: VEGETABLE OIL IMPORTATION (LEGAL VS. ILLEGAL VOLUME)

| | 2011/2012 | 2012/2013 | 2014/2015 | 2015/2016 | 2016/2017 |
|---|------------|------------|------------|------------|--------------|
| Average Oil Price | 1014 | 907.1 | 741.7 | 749.8 | 847.4 |
| Legal Import Value (M' USD) | 143 | 166.4 | 348.4 | 238.4 | 177.3 |
| Illegal Import Value (M' USD) | 367 | 343.2 | 161.2 | 271.2 | 332.2 |
| Estimated Legal Import Volume (MT) | 168,759.44 | 196,374.62 | 411,159.37 | 281,344.41 | 209,238.10 |
| Estimated Illegal Import Volume (MT) | 433,109.89 | 405,022.66 | 405,022.66 | 320,052.87 | 7 392,159.18 |

Price Data Source: United States Department of Agriculture



ENVIRONMENTAL SCANNING

To analyse the impact of external factors in edible oil business and compliance to fortification of vegetable oil, PESTLE analysis is used. PESTLE analysis considers the impact of Political, Economic, Social-cultural, Technology, Legal and Environmental factors.

| | PE | STLE ANALYSIS | |
|-----------|---|--|---|
| CATEGORY | EXTERNAL FACTOR | IMPACT ON VEGETABLE OIL FORTIFICATION | MANAGEMENT PLAN |
| POLITICAL | Ban on importation of vegetable oil | Improve local production It should reduce the possibility of infiltration of adulterated vegetable oil Improve local producers' earning and local economies. | Government should ensure strict compliance to ban Plan to create more awareness on the need for fortification |
| | The Presidential Initiative on the Development of Edible Oil in Nigeria | Encourages local production Market opportunities for vegetable oil producers | Awareness campaign and capacity building on best practices for the processors Access to low interest loans for the small players in the industry |
| | African Continental Free Trade Agreement | This presents opportunity for regional business, but could encourage illegal importation of banned items, if strict measures are not in place | Strict regulation and enforcement on sensitive consumer goods like vegetable oil |
| | Import Policy: Restriction to forex access for vegetable oil | Encourages local production and conversely illegal smuggling | Water-tight borderlineStrict penalty for defaulter |
| | Export Policy: Stringent international standards | Discourages local producer from exporting sub-standard vegetable oil and the local market becomes the easy dumping ground | Implement similar standards in the local market Copy best international practice |



ENVIRONMENTAL SCANNING

| | | PESTLE ANALYSIS | |
|----------|---|---|---|
| CATEGORY | EXTERNAL FACTOR | IMPACT ON VEGETABLE OIL FORTIFICATION | MANAGEMENT PLAN |
| ECONOMIC | High demand and market growth due to increasing population | Under-supply of fortified vegetable oil can create opportunity for local producers to push unfortified product to the market | SON/NAFDAC to capture database of all producers and enforce compliance Public-private partnership should be encouraged |
| | Price of fortified vegetable oil | • Low income earners may not be able to afford the branded and fortified vegetable oil and hence will opt the cheap unfortified alternative | Price regulation by the government Rebate should be provided on raw materials for processors. |
| | Demand-supply imbalance | • Same as above | • Same as above |
| | Inadequate funding | Leading to moribund oil mills and supply shortage Encourage smuggling of unfortified vegetable oil into the country | Government should provide access to low interest loan to processor Support the reactivation of idle milling plants |
| CATEGORY | EXTERNAL FACTOR | IMPACT ON VEGETABLE OIL FORTIFICATION | MANAGEMENT PLAN |
| SOCIAL | Population demographics | • High rate of population growth at annual rate of 5.7% leading to higher demand | Fortification awareness campaign Reactivation of moribund plants to increase production |
| | Level of education | Low literacy level affecting processors' adoption of fortification | Develop program for public education on vegetable oil fortification |
| | Lifestyle | • People living in the rural areas, which make up about 46% of the entire Nigerian population, are not aware of the health implication of unfortified oil | There should be a program to reach out and educate people living in the rural areas |



ENVIRONMENTAL SCANNING

| | PE | STLE ANALYSIS | |
|-------------|---|---|--|
| CATEGORY | EXTERNAL FACTOR | IMPACT ON VEGETABLE OIL FORTIFICATION | MANAGEMENT PLAN |
| TECHNOLOGY | Innovation in processing technology | • Embracing new technology and deviating from the subsistence and outdated technology will help produce high-grade vegetable oil that meets industry standards | Government should create technology hub for processors Government should implement low tariff for importing advanced technology/ equipment |
| | Emerging ICT | Adoption of latest technology in managing our border and the vegetable oil supply chain. This can check illegal smuggling of unfortified oil into the country | Government should initiate a scheme that facilitates cross border tech transfer and rural/urban knowledge transfer for processors and stakeholders |
| CATEGORY | EXTERNAL FACTOR | IMPACT ON VEGETABLE OIL FORTIFICATION | MANAGEMENT PLAN |
| LEGAL | Government legislation, regulation and policies | Affects consumer decision on vegetable oil Controls and regulates local producer on fortification compliance | Government should create public awareness on existing policies and regulation Implement controls to check defaulters |
| CATEGORY | EXTERNAL FACTOR | IMPACT ON VEGETABLE OIL FORTIFICATION | MANAGEMENT PLAN |
| ENVIRONMENT | Ecological issues | • Climate change and changes in rainfall pattern affect the cropping cycle, this affects vegetable oil production | Reduce import duties on feedstock for processors that comply with the standard. This will ensure availability of feedstock and reduce plant downtime |
| | Community issues | Frequent communal & farmer- herder clashes displaces farmers and causes drop in feedstock | Develop a sustainable solution to livestock management |
| | Environmental issues | Erosion and desertification reduce arable land available for cropping which affects productivity | Strict regulation and enforcement of laws on desertification |



STAKEHOLDERS ANALYSIS

The main stakeholders in the vegetable oil supply chain in Nigeria include the government, research institutes, farmers, processors, essential nutrient suppliers, investors and traders. They play roles in the origination, trade, management, processing, regulation and sustainability of the industry.

CYCLE OF INFLUENCE

The cycle of influence shows the level of impact each stakeholder has on vegetable oil production and fortification. The level of influence increases from level 1 to level 5, with level 1 being the most influential and level 5 the least impactful. The management plan for each stakeholder depends on the level of influence it has. The level of engagement for each stakeholder depends on the influence and the impact it has on the fortification of vegetable oil in Nigeria.

POWER – INFLUENCE

The power-influence grid in conjunction with the cycle of influence is used to carry out stakeholders' evaluation and their engagement plan.





STAKEHOLDERS ANALYSIS

STAKEHOLDERS EVALUATION

The cycle of influence shows the level of impact each stakeholder has on vegetable oil production and fortification. The level of influence increases from level 1 to level 5, with level 1 being the most influential and level 5 the least impactful. The level of engagement and management plan for each stakeholder depends on the level of influence it has.

| STAKEHOLDER | PLACEMENT | ROLE WITHIN INDUSTRY | SCENARIO MANAGEMENT PLAN |
|---|-------------------------------------|---|---|
| Government Agencies (NPC, NAFDAC, SON) | L1 (Regularly engage) | License and regulate processors. | Public campaign on vegetable oil fortification. Use of technology to verify oil quality. |
| Development Partners (GAIN, WHO, DFID, UNICEF, FAO) | L2 (Actively consult) | Support developmental programs and access to fund. Provide policies and data. | Engage these stakeholders for collaboration in knowledge and technology transfer. Support low capital processors with funding. |
| Organized Private Sector | L3 (Maintain interest) | Provide investment and partnership in the sector. | Engage these stakeholders for public private partnership for reviving moribund plant. |
| Nigeria Custom Service (NCS) | L2 (Actively consult) | Responsible for safe-guarding national borders and ensuring that no unregulated brand enters illegally into the country. | Collaborate with other agencies to ensure water-tight borders. |
| Pressure Groups, Unions and Associations (POFON EOPAN, OSPAN, etc. | L2 (Actively consult) N,) | Acts as pressure group and fight for common interest. | Collaborate and sensitize the public on danger of consuming unfortified vegetable oil. |
| Suppliers | L3 (Maintain interest) | Supply feedstock to vegetable oil producers. | Put a stringent quality control measure in place for suppliers. Audit and certify suppliers. |
| Distribution Partners | L3 (Maintain interest) | Support the processor in distributing vegetable oil to the retail outlets and consumers. | Ensure availability of the branded vegetable oil to the last mile. Audit of the distribution partners by the processors. |
| Consuming public | L3 (Maintain interest) | The general public purchase for domestic consumption. | Educate these stakeholders on the dangers of consuming unfortified vegetable oil. |



PRODUCT SPECIFICATION

All fortified vegetable oil is expected to meet a minimum requirement in order to meet the standard specified by NAFDAC and WHO.

VITAMIN A FORTIFICATION

No person shall manufacture, package, import, export, advertise, distribute or sell any vegetable oil as specified in Schedule I to these Regulations, unless, it is fortified with Vitamin A to a level not below 20,000 I.U./kg.

COTTON SEED OIL

| Relative Density (20C/Water at 20C) | 0.918 - 0.926 |
|--|--------------------------------------|
| Refractive Index at (40C) | 1.458 - 1.466 |
| Saponification Value (mg KOH/g Oil) | 189 - 198 |
| lodine Value (Wijs) | 100 - 123 |
| Unsaponification matter | Not more than 15g/kg |
| Acid Value | Not more than 0.6mg KOH/g Oil |
| Peroxide Value | Not more than 10 milliequivalents |
| Insoluble Impurities | Not more than 0.05% (m/m) |
| Soap Content | Not more than 0.005 (m/m) |
| | |

MUSTARD OIL

| Relative Density (20C/Water at 20C) | 0.910 - 0.921 |
|--|---|
| Refractive Index at (40C) | 1.461 - 1.469 |
| Saponification Value (mg KOH/g Oil) | 168 - 184 |
| Iodine Value (Wijs) | 92 - 125 |
| Unsaponification matter | Not more than 15g/kg |
| Acid Value | Not more than 4mg KOH/g (Virgin) Not more than 0.6mg KOH/g (Nonvirgin) |
| Peroxide Value | Not more than 10 milliequivalents |
| Insoluble Impurities | Not more than 0.05% (m/m) |
| Soap Content | Not more than 0.005 (m/m) |
| Allyl Isothiocyanate Content | Not less than 4g/kg |

REFINED OIL

| Acid Value |
|-------------------------|
| Peroxide Value |
| Matter Volatile at 105C |
| Insoluble Impurities |
| Soap Content |

0.910 - 0.921 Not more than 10 milliequivalents Not more than 0.5% (m/m) Not more than 0.05% (m/m) Nil



PRODUCT SPECIFICATION

OLIVE OIL

| Relative Density (20C/Water at 20C) | 0.910 - 0.916 |
|--|-----------------------------|
| Refractive Index at (40C) | 1.4677 - 1.4705 |
| Saponification Value (mg KOH/g Oil) | 181 - 196 |
| lodine Value (Wijs) | 75 - 94 |
| Bellier Index | Not more than 17 |
| Unsaponification matter | Not more than 15mg KOH/g |
| Acid Value | Not more than 15mg KOH/g |
| Peroxide Value | Peroxide oxygen /kg |
| Insoluble Impurities | not more than 0.1% (m/m) |
| Soap Test | Negative |

PALM OIL

| Relative Density (20C/Water at 20C) | 0.891 - 0.899 |
|--|--|
| Refractive Index at (40C) | 1.449 - 1.456 |
| Saponification Value (mg KOH/g Oil) | 190 - 209 |
| lodine Value (Wijs) | 50 - 55 |
| Unsaponification matter | Not more than 12g/kg |
| Acid Value | Not more than 0.6mg KOH/g |
| Peroxide Value | Not more than 10 millieguivalents |
| Insoluble Impurities | Not more than 0.005% (m/m) |
| Soap Content | Not more than 0.005 (m/m) |
| Total Carotenoids in Red Palm Oil | 500mg/kg - 200mg/kg calculated as beta carotene |
| Iron (Fe) | Virgin 5.0 mg/kgNon virgin 1.5mg/kg |
| Lead | 01.mg/kg |
| Arsenic | 01.mg/kg |
| | |

SUNFLOWER SEED OIL

| Relative Density (20C/Water at 20C) | 0.922 - 0.927 |
|--|--------------------------------------|
| Refractive Index at (40C) | 1.467 - 1.470 |
| Saponification Value (mg KOH/g Oil) | 186 - 198 |
| lodine Value (Wijs) | 135 - 150 |
| Unsaponification matter | Not more than 15g/kg |
| Acid Value | Not more than 0.6mg KOH/g |
| Peroxide Value | Not more than 10 milliequivalents |
| Insoluble Impurities | Not more than 0.05% (m/m) |
| Soap Content | Not more than 0.005 (m/m) |
| MIneral Oil Test | Negative |

SOYA BEAN OIL

| Relative Density (20C/Water at 20C) | 0.922 - 0.927 |
|--|--------------------------------------|
| Refractive Index at (40C) | 1.467 - 1.470 |
| Saponification Value (mg KOH/g Oil) | 186 - 198 |
| Iodine Value (Wijs) | 104-120 |
| Unsaponification matter | Not more than 15g/kg |
| Acid Value | Not more than 0.6mg KOH/g |
| Peroxide Value | Not more than 10 milliequivalents |
| Insoluble Impurities | Not more than 0.05% (m/m) |
| Soap Content | Not more than 0.005 (m/m) |
| MIneral Oil Test | Negative |
| | |



PRODUCT SPECIFICATION

QUALITY CONTROL PROCESS

The management of the quality of vegetable oil requires a comprehensive approach; from the supplier selection process to the supply chain process to the customer. Process approach in quality control and quality assurance of the final product require good understanding of the entire process. Conducting Hazard Analysis Critical Control Point (HACCP) will help eliminate the possibility of toxic substance ingress into the final product.

The SIPOC diagram below helps the processors to identify all the stakeholders involved in the manufacturing and establish a plan for managing them.





SUPPLY CHAIN DYNAMICS

FIGURE P: SUPPLY CHAIN MODEL



FIGURE Q: SUPPLY CHAIN PROCESS FLOW



TECHNOSERVE

SUPPLY CHAIN DYNAMICS

The raw material flows into the processing unit mainly through the following channels:

LOCAL SOURCES IMPACT ON FORTIFICATION

| STAKEHOLDER | ACTIVITIES | EFFECT ON OIL FORTIFICATION | MANAGEMENT PLAN |
|----------------------|---|---|---|
| Farmers | Cropping and supply raw material to merchant or distributor | None | • None |
| Distributors | Aggregate the feed stock and sell to processors | Can smuggle and deal illegally in unfortified vegetable oil | Auditing and licensing of all dealers and merchants |
| Primary Processor | Begins the value adding process to the feed stock and supply to the secondary processor | Can sell the unfortified intermediate product to the consumer | LicensingCapacity building |
| Transporter | Movement of raw materials from the distributor to processing plant | Diversion of products | Selection/audit process Contract management |

FOREIGN SOURCES IMPACT ON FORTIFICATION

| STAKEHOLDER | ACTIVITIES | EFFECT ON OIL FORTIFICATION | MANAGEMENT PLAN |
|---------------------------------|---|---|---|
| Importer | Importation and supply of raw material to merchant, distributor or processors | Could be involved in illegal importation of banned product | Watertight border line Enforcement and penalty for defaulter Licensing process |
| Distributors | Aggregate the feed stock and sell to processors | Can smuggle and deal illegally in unfortified vegetable oil | Auditing and licensing of all dealers and merchants |
| Primary Processor | Begins the value adding process to the feed stock and supply to the secondary processor | Can sell the unfortified intermediate product to the consumer | LicensingCapacity building |
| Transporter | Movement of raw materials from the distributor to processing plant | Diversion of products | Selection/audit process Contract management |
| Regulatory Agencies (NCS) | Regulate and license importers | Could connive with importer to bring banned product | Transparent recruitment process Strict penalty Training and retraining Reward system |



SUPPLY CHAIN DYNAMICS

The vegetable oil supply chain consists of the processors, their suppliers, transporters, warehouses, retailers and customers. Within the oil processing company, the supply chain includes all functions involved in receiving and filling a customer request including product development, marketing, operations, distribution, and finance and customer service.

The vegetable oil supply chain is mainly affected by the seasonality of raw materials, low yield from farm produce (due to poor agricultural extension services and aging plantations), poor financial support to primary producers, ineffective and inefficient use of modern technology and inadequate support from research institutes. Other factors are; the absence of produce boards and the prevalence of middlemen/brokers, high cost of farm and processing tools/ equipment, crude processing technology and other input problems (land tenure system, poor infrastructure, high energy costs etc.)

Due to constraints associated with raw materials, many vegetable oils plants in Nigeria limit their capacities to enable them to maintain constant operations. Capacities range from 30 metric tons per day to 700 metric tons per day. Refiners in the southeast, southwest and south-south concentrate on production of refined palm kernel oils, refined palm oil, and to a lesser extent refined soya oil. Refiners from the North Central and northern Nigeria concentrate on soya oil, groundnut oil and cottonseed oil. Coconut oils are mainly found in the Badagry area of Lagos due to abundance of coconut fruits.

Majority of the numbers of local processors are artisanal and produce small volumes for their market, however a sizeable number produce at output capacities above 40 metric tons per day. Economies of scale, largely due to the restrictions placed by the cost of refining units, limit the entrance of many local processors into the premium refined vegetable oil market. This is largely because there is no local refining technology and the importation costs of refinery units are prohibitive and require a high capital adequacy.


There is no local production of most processing materials (e.g. Vitamin A, Bleaching Earth etc) and this affects sustainability of production as well as exposes the input costs to fluctuations in dollar rates and other import related issue. This is one of the challenges faced by processors in complying to vegetable oil fortification. This is further laid bare from the result of the survey. Also multiple taxation, environmental management costs, unavailability of skilled manpower (largely because of the poor remuneration in the industry), downtime due to breakdown of equipment and availability of spare parts, and high energy costs all add to the cost profile of the industry, and squeeze profit margins.

The 2012 mandatory fortification of vegetable oil in Nigeria brought a significant change to the supply chain of the oil processors. Many processors had to build in the requirements of fortification equipment into their factory configuration, and the demand for premix surge, without commensurate supply availability. This led to the relatively high cost of premix at that time, and the continuing perception (despite improvements over the years) that the cost of premix is high and increases aggregate costs of vegetable oil manufacturing significantly. This perception continues to affect vegetable oil fortification compliance.

Inconsistent government policies (uncontrolled smuggling, importation of products despite ban etc), poor infrastructure for the supply of raw materials and distribution of finished products and community-oriented issues like youth restiveness add to the mix of inefficiency and reduce productivity as well as profitability. The importation of refined vegetable oil or its crude form affect sales dynamics and this along with energy costs are among the most important factors that have ensured that Nigeria has the most expensive vegetable oil in the world.

In July 2017, members of Oil Seeds Processor Association of Nigeria (OSPAN), called on the Federal Government to immediately fortify the nation's borders against the influx of adulterated foreign vegetable oil into Nigeria's domestic market which, they alleged, is posing a threat to the health of Nigerians and local industry. The association asserted that "the challenges we are facing in the oil processing industry is the smuggling of finished vegetable oil, which is mostly contaminated and because of some changes at the borders of the customs and immigration services, there are lots of contaminated oil coming into the country". Whereas the status of the smuggled oil as "contaminated" is debatable, the fact remains that smuggling of unregulated vegetable oil into Nigeria is of veritable concern.



One major effect of the regulation on the value chain is increase in cost. Vitamin A is not locally sourced; the processors import it. According to report from a local processor, Vitamin A cost between 75,000 to 80,000 naira per kilogram. This increase in cost increases the final cost of the product in the market, which affects the willingness of most of the Nigerian consumers to buy. Processors must also buy from suppliers certified by NAFDAC. This situation apparently increases the bargaining power of the suppliers, which reduces profitability of the industry

This is exacerbated by the quality of the Vitamin A. Vitamin A supplied by Chinese companies are known to be of a low quality which can affect the quality of the vegetable oil, even though they are much cheaper than other brands.

It has been observed that inadequate statistics on both producers of vegetable oil in Nigeria and production quantity has become one of the major challenges facing the industry and many other related industries. Even the apex data production body in Nigeria (National Bureau of Statistics) cannot boast of having accurate data on vegetable oil producers and vegetable oil production capacity over the years. Sister agencies such as Standard Organization of Nigeria (SON) and National Agency for Food and Drug Administration and Control (NAFDAC) can only provide very limited data on the companies involved in vegetable oil production in Nigeria.

However, these agencies do not have data on the production capacity of these vegetable oil producers. The inadequacy of reliable data in the vegetable oil industry in Nigeria has made planning very difficult and as a result of this, many misleading policies have been made in the industries.



FINISHED GOODS FLOW

The finished good flow is the flow of the final product (vegetable oil) from the processing mill to the final consumer. The source of vegetable oil consumed in Nigeria is either from local producers or importers.

The route – to – market shows the model used generally by the processor to get their product to the customer.



IMPACT OF SMUGGLING ON LOCAL PRODUCTION AND COMPLIANCE TO FORTIFICATION

Government had banned the importation of bulk unbranded vegetable oils into the country. However, branded and properly labelled NAFDAC and SON registered brands are allowed into the country. Due to large number of foreigners residing in Nigeria, certain vegetables oils whose oil seeds are not peculiar to our terrain are allowed in, to carter for foreigners who consume such oils. Examples are castor and sunflower oils. Despite the ban on imports, a lot of unbranded bulk vegetable oils are still smuggled through our borders, chief culprit here is the Seme border. Smugglers make use of the porous nature of Nigerian borders through bush paths to bring in vegetable oils. Furthermore, custom officials connive with smugglers to push vegetable oils into the Nigerian market. This smuggling leads to oil glut making it difficult for local investors to make reasonable margins from their products.

There is need to secure our borders, increase honesty and accountability within the custom service and holistically enlighten our citizens on the danger of consuming unbranded vegetable oils.



According to a This Day Newspaper report, 70% of the vegetable oil in Nigeria is unbranded. A representative of a local processing company puts the figure at 66%. The implication is that 60 – 70% of the vegetable oil consumed in Nigeria is presumably not safe.

This situation is so because of several reasons chief among which is the activities of people who smuggle vegetable oil into the country. The This Day investigation shows that nearly all unbranded oils in the country meet the features of contamination laid down by NAFDAC. This puts the lives of Nigerians at risk, which is the very reason for the fortification program in the first instance. The effect of this is that local oil processors operate below their capacity with many of them functioning between 60 and 70% capacity. The idle capacity creates a loss in revenue and profitability. This also reduces the ability of the operators to build sustainable businesses and adopt programs like the fortification program - a sheer reluctance to increase their production costs.

FACTORS ENCOURAGING SMUGGLING (ECOWAS DYNAMICS)

Factors encouraging smuggling include the ECOWAS Trade Liberalization Scheme (the ETLS provides for goods produced in any member state to be imported into any member state at zero percent duty rates. This includes, prohibited items provided that such goods have 40% local value addition to satisfy 'rule of origin' required, while the common external tariff (CET) harmonizes all customs duties across the board for all imports from a third party country), which makes it easy for smugglers to import unbranded and non-fortified vegetable oil from neighboring West African Countries and bribe their way through the Nigerian border.

Nigeria entered ECOWAS protocols with the hope that the rule of origin, which means that genuine production from member countries is would enjoy zero duty tariff, but member countries have allowed Malaysian companies to build vegetable oil tank farms in Cote'd'Ivoire, Ghana, and Togo. The Malaysian companies send vegetable oil, through bulk shipping, to these countries where packaging is done, and products sent across the Nigerian border under the ECOWAS treaty without paying duty. According to a Nigerian senator who highlighted this issue in 2016: "Now these ECOWAS countries will receive duty on bulk cargo delivered to them, get employment for their citizens who will repackage the products, and then move the products to Nigeria without paying duty and enjoy the benefits of our market free."



Perhaps one of the gains of having a common external tariff (CET) for ECOWAS, as advocated by some regional interests, is that it may reduce the temptation of smuggling into Nigeria. VAT in Nigeria is 5%, in Ghana 12.5%, (plus an additional 2.5% surcharge, a total of 15%), and in the francophone bloc it is 18% (plus a 2% as surcharge, a total of 20%). This implies that it is more profitable for exporters in neighbouring countries to export and smuggle goods into Nigeria, where the governance tax regime is more lax and where profits for products like vegetable oil is supported by a price gradient that finds Nigeria at disadvantage- Nigeria's input costs make her vegetable oil much more expensive than those of neighbouring countries. The ECOWAS Trade Liberalisation Scheme (ETLS) aims to address this by the establishment of a free trade zone and eliminates tariff and non-tariff measures through a CET.

A significant portion of the imports of vegetable oil in neighboring West African countries, notably Benin Republic and Togo, ultimately gets re-exported to Nigeria. According to a 2014 report by the United States Department of Agriculture (USDA), of the 470,000 tons of palm oil imported into Benin Republic, 390,000 tons of the product was exported, with Nigeria as the final destination. Although official trade statistics between these neighboring countries are insignificant, divergent trade tariffs - high and protectionist in Nigeria (but low in Benin and Togo in order to promote entrepot/re-export activities), and the ease with which informal operators can ship goods across borders are largely responsible for the large volume of smuggling within the shadow economy of these countries. More effective customs policing and strengthening of the country's borders are required to save Nigeria's manufacturing sector and secure government revenue via the payment of appropriate customs duties.

In West Africa, recorded intra-regional trade is small but informal cross-border trade (ICBT) is pervasive, despite regional integration schemes intended to promote official trade. The ICBT must be understood in light of two features of West African national boundaries: divergent economic policies between neighboring countries and the ease with which informal operators can ship goods across borders. Two ICBT clusters stand out in West Africa: Senegal-The Gambia and Nigeria-Benin-Togo. Nigeria and Senegal have protected their domestic industries with high import barriers, whereas Benin, Togo and The Gambia have maintained lower import taxation. These differential trade policies, together with high mobility of goods and people across borders, lead to widespread smuggling, with goods imported legally in low-tax countries and re-exported unofficially to countries with higher import duties.



Based on trade data analysis and investigations, there are four possible channels through which imported surplus of high-tariff and banned import goods ends up in Nigeria:

- CHANNEL 1: Smuggled re-exports of imports that pay the ECOWAS CET and originating country's value-added tax (which can be detected by a lack of discrepancy in mirror statistics but high consumption per capita compared to neighbouring countries)
- CHANNEL 2: Official re-exports to Nigeria from originating country (detected by a high share of official re-exports)
- CHANNEL 3: Smuggling into Nigeria of imports that are officially in international transit while crossing borders (detected by a high share of goods declared in transit)
- CHANNEL 4: Smuggling into Nigeria of imports that were unofficially imported to neighbouring countries.

This study indicates that the major factor affecting local manufacturing of vegetable oil in Nigeria is uncontrolled importation. Smuggling thrives because the cost is less than local manufacturing. These vegetable oils imported are largely unfortified and therefore do not meet up to the standard set by SON nor the regulations of NAFDAC.

The intensification of efforts by government agencies to limit or eliminate vegetable oil smuggling is an important factor for growth. Radical sensitization of the consuming public on the health risk of unfortified vegetable oil is another important factor for growth. As people become aware, the tendency to buy unbranded and unfortified oil will be greatly reduced.

In summary, Nigeria is the perfect target for regional smuggling rings; all the enablers exist

- 1. Heavy import duties and restrictions on import of certain commodities
- 2. Cumbersome customs procedures
- 3. Reluctance to obtain quality standards and certifications
- 4. Dire socioeconomic situation and lack of sufficient employment options in border regions
- 5. Lack of competitive advantage in domestic products
- 6. Partial government policies in controlling prices of domestic and foreign products.



To evaluate the awareness of the processors and the public about vegetable oil fortification, awareness survey was conducted where questionnaires were distributed to about 40 processors selected across all the six geographical regions of Nigeria to survey the vegetable oil fortification awareness and assess their compliance to the mandatory fortification requirement. An online survey was also conducted for the middle and upper income and about 250 people responded. Another online survey was conducted for the bottom of the pyramid (lower income) and there were 144 respondents.

ONLINE SURVEY ON PUBLIC AWARENESS (LOWER INCOME)

The results of the survey are summarized in the table below:

| Maria | | | | | |
|-------|---------------|----------|---------|----------|---------------|
| Key | Very positive | Positive | Neutral | Negative | Very Negative |

| Summary of Surv | | | | | | |
|--|-------------|-----|-----|-----|-----|--|
| Category/Response code | | | | | | Comment |
| Reaction to unbranded vegetable oil | 12% | 8% | 32% | 20% | 28% | Negative reaction to unbranded vegatable oil |
| Quality rating of Nigerian vegetable oil | 16% | 35% | 24% | 19% | 6% | Medium rating for Nigerian Vegetable oil |
| Knowledge of vitamin A fortification | 10% | 25% | 20% | 29% | 16% | Low knowledge of Vitamin A fortification |
| The need for Vit A fortification | 4 4% | 25% | 19% | 8% | 4% | People see the need for Vitamin A fortification |
| Tendency to intentionally buy vit A fortified vegoil | 54% | | 14% | 24% | 8% | People will buy vitamin A forified vegetable oil intentionally |
| Tendency to buy new brand of fortified vegetable oil instead of competing brand of unknow fortification status | 15% | 35% | 18% | 26% | 6% | 50% of the people will buy new brand of fortified vegetable oil instead of competing known brand |
| Likelihood of replacing current product with a known fortified product | 24% | 34% | 22% | 16% | 4% | About half of the respondents will replace their current product will with a known fortified brand |



ONLINE SURVEY ON PUBLIC AWARENESS (LOWER INCOME)

Q1 What is your first reaction to unbranded Vegetable Oil?



Q3 How much do you know about Vitamin A fortification?



Q5 Would you intentionally buy Vegetable Oil fortified with Vitamin A?



Q2 How would you rate the quality of available Nigerian Vegetable Oil?



Q4 When you think about Vitamin A fortified Vegetable Oil, do you think of it as something you need or don't need?



Q6 If a new brand of fortified Vegetable Oil were available today, how likely would you be to buy it instead of competing products currently available from other companies but of unknown fortification status?





ONLINE SURVEY ON PUBLIC AWARENESS (LOWER INCOME)

Q7 How likely are you to replace your current product with a known fortified product?









ONLINE SURVEY ON PUBLIC AWARENESS (LOWER INCOME)

From the survey results, the top 10 characteristics respondents consider before buying vegetable oil below:



From the survey results, the top 10 areas respondents desired as improvement in vegetable oil below:

| ▼ Quality | | 32.85% | 45 |
|---------------------------------------|---|--------|----|
| Packaging | | 10.22% | 14 |
| Improved quality | | 8.76% | 12 |
| - Price | - | 7.30% | 10 |
| ▼ NiL | | 5.84% | 8 |
| Hygiene | | 5.84% | 8 |
| Quality Cost reduction | | 5.11% | 7 |
| Reduce price | | 4.38% | 6 |
| Vitamin fortified | | 3.65% | 5 |
| processing | | 3.65% | 5 |



ONLINE SURVEY ON PUBLIC AWARENESS (MIDDLE AND UPPER INCOME)

The results of the survey are summarized in the table below:



| Summary of Surv | | | | | | |
|--|-----|-----|-----|-----|-----|--|
| Category/Response code | | | | | | Comment |
| Reaction to unbranded vegetable oil | 4% | 3% | 23% | 34% | 36% | Negative reaction to unbranded vegatable oil |
| Quality rating of Nigerian vegetable oil | 2% | 28% | 52% | 16% | 2% | Not knowledgeable enough for rating of Nigerian Vegetable oil |
| Knowledge of vitamin A fortification | 6% | 24% | 34% | 28% | 8% | Very Low knowledge of Vitamin A fortification |
| The need for Vit A fortification | 47% | 32% | 16% | 3% | 2% | People see the need for Vitamin A fortification |
| Tendency to intentionally buy vit A fortified veg oil | 54% | | 24% | 16% | 6% | People will buy vitamin A forified vegetable oil intentionally |
| Tendency to buy new brand of fortified vegetable oil instead of competing brand of unknow fortification status | 16% | 34% | 28% | 18% | 4% | 50% of the people will buy new brand of fortified vegetable oil instead of competing known brand |
| Likelihood of replacing current product with a known fortified product | 14% | 41% | 28% | 14% | 3% | About half of the respondents will replace their current product will with a known fortified brand |



ONLINE SURVEY ON PUBLIC AWARENESS (MIDDLE AND UPPER INCOME)

Q1 What is your first reaction to unbranded Vegetable Oil?



Q3 How much do you know about Vitamin A fortification?



Q5 Would you intentionally buy Vegetable Oil fortified with Vitamin A?



Q2 How would you rate the quality of available Nigerian Vegetable Oil?



Q4 When you think about Vitamin A fortified Vegetable Oil, do you think of it as something you need or don't need?



Q6 If a new brand of fortified Vegetable Oil were available today, how likely would you be to buy it instead of competing products currently available from other companies but of unknown fortification status?





ONLINE SURVEY ON PUBLIC AWARENESS (MIDDLE AND UPPER INCOME)

Q7 How likely are you to replace your current product with a known fortified product?



Q8 How likely is it that you would recommend the new fortified product to a friend or colleague?





ONLINE SURVEY ON PUBLIC AWARENESS (MIDDLE AND UPPER INCOME)

From the survey results, the top 10 characteristics respondents consider before buying vegetable oil below:

| ✓ Brand | 15.77% | 38 |
|--------------------------------------|--------|----|
| Quality | 12.86% | 31 |
| ✓ cholesterol | 12.45% | 30 |
| ▼ oil | 8.71% | 21 |
| ▼ Price | 8.30% | 20 |
| packaging | 7.05% | 17 |
| ▼ good | 5.81% | 14 |
| cholesterol free | 5.39% | 13 |
| ▼ smell | 5.39% | 13 |
| ▼ content | 4.98% | 12 |

From the survey results, the top 10 areas respondents desired as improvement in vegetable oil below:

| ✓ Quality | | 23.73% | 56 |
|-------------------------------|---|--------|----|
| ▼ oil | - | 8.05% | 19 |
| ▼ healthy | | 6.36% | 15 |
| ▼ make | | 5.51% | 13 |
| | | 5.08% | 12 |
| ✓ vitamins | | 4.66% | 11 |
| ▼ brand | | 3.81% | 9 |
| packaging | | 3.81% | 9 |
| ▼ taste | | 3.39% | 8 |
| ▼ Good | | 3.39% | 8 |



ASSESSMENT SURVEY ON PROCESSORS AWARENESS

Awareness survey was conducted where questionnaires were distributed and interview conducted for about 40 processors selected across all the six geographical regions of Nigeria to access their knowledge of vegetable oil fortification process and assess their compliance to the mandatory fortification requirement. From the results (see Annex) we can deduce that:

- 1. The processors understand the reasons for vegetable oil fortification
- 2. There is a knowledge gap on the fortification process.
- 3. Only about 38% of the processors know the recommended vitamin A dosage standard.
- 4. Only about 10% use automated system for vitamin A dosage.
- 5. About 15% of processors interviewed do not have quality control systems in place and do not carry out analysis.
- 6. About 8% of the processors interviewed do not monitor the fortification process.



STRATEGIC FRAMEWORK FOR IMPROVING COMPLIANCE TO FORTIFICATION

CAUSE AND EFFECT TABLE FOR VEGETABLE OIL FORTIFICATION

| CAUSE | EFFECT |
|---|---|
| Illegal importation | Supply glut of unfortified vegetable oil |
| Low capacity utilization and high downtime of existing processing plant | Low output, price instability, inaccessibility by the low class |
| Lack of access to modern technology by the local processors | Low output, high downtime, high cost of production, high price, |
| Processors' knowledge gap | High downtime, low output |
| Poor awareness of vitamin A fortification and health implications | Regulate and license importers |
| Challenge of raw material accessibility and pricing | Low output, high price |



STRATEGIC FRAMEWORK FOR IMPROVING COMPLIANCE TO FORTIFICATION

IMPROVING LOCAL PROCESSORS'

CAPACITY UTILIZATION

REDUCING ILLEGAL IMPORTATION

• Funding: Provision of low interest loans Review policies and set processes and systems to check activities of to local processors. This can be achieved government agencies. Engage an through public private partnerships independent organisation to oversee • Support to Farmers: Training of farmers the activities of these agencies. on modern farming techniques for plantation farmers to enable the • Use of Technology: Frequent patrol and availability of raw materials all year the use of drones and satellite imaging round. to monitor the activities at the borders. • Support to Farmers: Special programs for farmers that allow them to access Recruitment and Training: Restructuring inputs at subsidized rates. Increased of the recruitment process. Training and the implementation of a reward system collaboration between farmers and local for high performing government agents. processors. PUBLIC EDUCATION AND ACCESS TO MODERN TECHNOLOGY AWARENESS CAMPAIGN Technology Transfer: Through strategic partnerships with other • Partnerships with NGOs: This will international processors, technology facilitate acess to the last mile. This and knowledge transfers can be vehicle can also be used to take this facilitated. message to primary and secondary schools. Collaboration/ Knowledge Sharing: Existing local processors should form a • Use of Mass Media: Use of radio to community and establish a platform for reach the local communities. Television. knowledge sharing on new methods newspapers, and internet to reach the and best practices. urban communities. • Establishment of a Technology Hub: • Partnership with the Health Sector: Government through the Ministry of Medical practioners should be engaged Science and Technology should to educate their patients on the establish a technology hub for importance of Vitamin A in their diets. processors.



Challenges faced by processors on vegetable oil fortification with vitamin A is multifaceted and require a multi-pronged strategic approach to fix. Government, government agencies and all other stakeholders need to act swiftly in the implementation of the recommendations and strategies outlined in this report. This is imperative not only because of the impact of consuming unfortified vegetable, but also because of the significant impact on the economy of the country (about 332.45 million USD is lost to illegal importation annually).

The biggest challenge faced in the course of this study is the non-availability of accurate data on activities of smugglers and illegal importers. This challenge has highlighted the need to carry out similar studies on vegetable oil fortification in the neighbouring African countries. Particular attention should be paid to countries like Niger Republic, Cameroon and Ghana, as the activities of these countries impacts the entire region.

There are a number of principles that underscore fortification control activities and these include:

- Recognizing that fortification control is a widely shared responsibility and requires interaction between all stakeholders in the fortification continuum
- Establishing a holistic, integrated and preventive approach to reduce risks of fortification failure all along the processing chain which is the most effective way to produce fortified foods
- Developing science-based control strategies
- Prioritizing activities based on risk analysis and effectiveness of risk management strategies
- Establishing emergency procedures for dealing with specific failures (e.g. product recalls)

Communication between the public sector (government), private sector (industry) and consumers is also crucial to micro nutrient fortification control. The key recommendation from this study is based on that fact that micronutrient fortification compliance for the vegetable oil sector is based on certain assumptions:

- Top management of processor companies are committed to fortification compliance
- Vitamin A premix is readily available for purchase and are of required quality
- Imported vegetable oils meet fortification requirements
- Smuggling is managed to as low as reasonably achievable
- Equipment and spares relevant to fortification are available and affordable



Our findings indicate that a major impediment to fortification compliance is the competence of personnel responsible for the fortification processes within vegetable oil manufacturing plants. There is a major knowledge deficit and, sometimes, complete ignorance of what fortification requirements mean, resulting in poor codes of practice.

Most refinery managers or plant managers we interviewed showed adequate knowledge of what compliance requirements entailed, even though they differed on codes of practice and fortification targets/goals; however, most of the operators we interviewed show little to barely adequate knowledge of what compliance obligations requires. This has far reaching implications in assuring that compliance is met, since 80% of reliance is on operators to perform at best practice, and most processors do not have the laboratory equipment to measure fortification targets, nor do they engage third-party assessors to validate fortification performance. The pressure to meet production targets also blurs the fortification expectation, and even when processors fortify, they do not meet anticipated targets are met. The lack of or inadequate application of Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) by most processors ensures that this inherent ineffectiveness (and inefficiency) from operator incompetence is exacerbated.

SAPFF is at the forefront of supporting processors to implement GMP and GLP through numerous interventions, however to further strengthen the gains, we recommend that a solution that is tied purposely to operator performance be harnessed. This would be in the form of an industry-driven micro credentialing system for operators and participants in the fortification process flow of manufacturers would go a long way in assuring that operators are conscious of competence and that fortification performance is markedly improved. This can be setup and moderated by SAPFF in partnership with the National Board for Technical Education, driven by the associations and industry stakeholders, and managed in a coordinated manner towards incrementally improving fortification compliance.

To complement the micro credentialing effort, further emphasis on GMP and GLP, and access to fortification testing kits for processors at affordable rates (government could encourage banks to fund purchase of these equipment for processors with sufficient liquidity, at discounted interest rates). A widely popularized stakeholder forum targeted at the general public, government agencies, processors and other stakeholders involved in the vegetable oil sector and focused on GMP and GLP, would not only promote compliance, but will promote consumer awareness.



According to Bloomberg, in 2018, Nigeria spent about \$500 million importing 600,000 tons of palm oil. Palm oil imports rose from 302,000 tons in 2017 to 600,000 tons by end of 2018, costing as much as \$500 million, despite placing the commodity on a forex-exclusion list.

The Federal Government of Nigeria plans to encourage investment in the vegetable oil sector by offering low interest loans to farmers for oil palm cultivation and erecting barriers on crude palm oil imports. Nigeria plans to increase its palm oil production 700% over the next eight years to help improve its foreign-exchange earnings that are largely dependent on crude oil export.

The new policy will boost local production to about five million tons from 600,000 tons a year by investing as much as 180 billion naira (\$500 million) beginning in 2019, the trade and investment ministry said in a report. This will mean an investment of 180 billion naira (\$500 million) to increase local palm oil production from around 600,000 tons a year to 5 million tons a year by 2027. The policy, which would double oil palm acreage from 3 million to 6 million hectares, aiming to meet all of the country's domestic palm oil demand by 2027.

Nigeria ranks third in the world in terms of land area planted with oil palm, but it is only the fifth largest palm oil producer due to low yields. The new policy also seeks to remove the 75% duty rebate granted on refined palm oil imports and extend a current three-year tax holiday for all producing and processing companies to five years. It will introduce a five-year restriction of crude and refined palm oil importation to large-scale refineries and crushing-plant owners.

This development has far reaching implications for the goals of the SAPFF Program for the edible oil sector, especially since about 65% of the edible oil production in Nigeria is from palm oil sources. The SAPFF Program must liaise with the Federal Government from the initiation of this current government intervention, and ensure that fortification considerations are part of the success story.

Presco Plc, the country's largest producer of palm oil, is driving an expansion plan that expects a 500-ton capacity refinery to begin operating in first quarter of 2020, with an additional increase of its milling capacity from 60 tons an hour to 90 tons an hour by next January 2020. By 2022, the company expects to push capacity to 210 tons an hour, with an additional 60 tons per hour in milling facilities. More vegetable oil production in Nigeria means more than just local supply, but provides an opportunity especially in the light of the ECOWAS Trade Liberalisation Scheme and the most recent African Continental Free Trade Agreement (AfCTA) to balance the dynamics of informal trade on vegetable oil, especially smuggling.



The ECOWAS Trade Liberalisation Scheme (ETLS), introduced in 1979, is a mechanism through which the Economic Community for West African States (ECOWAS) aims to establish Free Trade Area within the West Africa subregion.

The ETLS seeks to deepen the status of the region as a free trade area and fast-track the establishment of a customs union by ensuring the free movement of originating goods across the territories of member states, without being subjected to any form of barriers. However, trading with other developing African countries can only be beneficial when Nigeria has an added advantage of having developed industrial and agricultural sectors.

The African Continental Free Trade Area (AfCFTA) Agreement is one of the flagship projects of the First Ten Year Implementation Plan under the African Union (AU) Agenda 2063 – 'The Africa We Want'. The AfCFTA negotiations have been split up into two phases:

- Phase 1 covers the areas of trade in goods and trade in services.
- Phase 2 will cover the areas of Investment, Intellectual Property Rights and Competition Policy.

The African Continental Free Trade Area (AfCFTA), which entered into force on 30 May 2019, represents a unique collaborative effort by African countries to bolster regional and continental economic integration, in a world marked by increasing protectionism and use of unilateral trade measures. In order to make the agreement operational for trade in goods, negotiations on tariff concessions need to be concluded and negotiating outcomes need to be inserted into the agreement.

Tariff and nontariff barriers will affect the regional vegetable oil market, as shown by the current Nigerian stance of closed borders. Contraband vegetable oil still find it ways through our porous borders, as poor trade logistics and, to a lesser extent, infrastructure remain major obstacles to further organized trade integration in the region.

Nontariff barriers like the initial ban on importation of vegetable oil was meant to enhance the local production of raw materials, but has been counterproductive and has led to increased smuggling and loss of revenue for the government. Before such barriers are put in place, government must stimulate the local production of vegetable oil with incentives and structured interventions geared at ensuring that the expected gains are harnessed.



While the SAPFF report focused on processor capabilities and output capacities, the Euromonitor report focused on market efficiencies and brand equity. A number of the companies evaluated by the Euromonitor report had brand presence in Nigeria, however had no local production facilities, implying that whereas they may be established processors in their countries of origin, they are not representative of the Nigerian local production numbers. ConAgra, for instance imports Wesson brand of canola oil from US; Lesieur is a Moroccan company (member of the Avril Group of France) and also produces Ethiopian sunflower oil; Sun Mark is Laser brand of olive oil & rapeseed oil from England etc. These are elite brands consumed by a selected few in Nigeria and can't outnumber local brands. See table below.

| PROCESSORS | TYPE OF EDIBLE OIL | REMARKS |
|-----------------------------------|---|--|
| PZ Wilmar Ltd | Palm Olein Oil | Evaluated by the SAPFF study. Daily Output = 200 tons |
| Afficot Nigeria Plc | Soya Oil | Evaluated by the SAPFF study. Daily Output = 30 tons |
| Dufil Prima Foods Plc | Palm Olein Oil | Raffles Oil, a subsidiary of Dufil Prima Foods Plc was evaluated. Daily Output = 100 tons |
| Grand Cereals & Oil Mills | Groundnut Oil & Suya Oil | Evaluated by the SAPFF study. Daily Output = 20 tons |
| ConAgra Brands Inc | Canola Oil | ConAgra imports Wesson brand of canola oil from the US |
| Transtell Ventures Nigeria Ltd | Palm Kernel Oil | Evaluated by the SAPFF study. Daily Output = 20 tons. Not readily available in the Eastern market. |
| Sun Mark Ltd | Olive Oil | Sun Mark is the Laser brand of olive oil and rapeseed oil from England. |
| Neipen Ltd | Edible Oils | Not evaluated. |
| Lesieur Cristal SA | Edible Oils | Not evaluated. Findings indicate that it is a Moroccan company and a subsidiary of Avril Group of France. Also produces sunflower oil in Ethiopia. |
| Apple & Pears Ltd | Soya Oil | Evaluated by the SAPFF study. Daily Output = 100 tons |
| Flour Mills of Nigeria Plc | Soya Oil, Palm Olein, & Palm Kernel Oil | Evaluated by the SAPFF study. Rom Oil, a subsidiary of Flour Mills of Nigeria Plc. Daily Output = 600 tons |
| H Products & Services Ltd | Edible Oils | Not evaluated. |
| | | |
| Ekulo Group of Cos | Olive Oil | Not evaluated. Impolrtation and distribution of products |

TECHNOSERVE

The Euromonitor report did not evaluate variables like vegetable oil fortification and other processing challenges. It focused more on the competitive landscape and related variables. The table below, however, compares similarity in report outcomes.

| REPORT OUTCOMES | SAPFF REPORT | EUROMONITO R REPORT |
|---|---|---------------------------|
| Growth Projection | X | Х |
| Local Production Capacity and Status | X | - |
| Market Analysis/ Competitive Landscape | X | Х |
| Stakeholder Analysis | X | - |
| Edible Oil Categorization based on Value, Sales, Distribution) | - | X |
| Supply Chain Dynamics | Х | Х |
| Environmental Scanning | Х | - |
| Product Specification | Х | - |
| Quality Control Process | Х | - |
| Fortification of Edible Oils | Х | - |
| Top Market Share Leader | PZ Wilmar (41.5%) | PZ Wilmar (42%) |
| Leading Brand of Vegetable Oil | Devon King's | Devon King's |
| Most Produced Vegetable Oils | Palm Kernel Oil, Palm Olein Oil and Soy | Palm Olein and Soy Oil |
| | OIL | |





| | | | | | | Output | | | | | |
|--------|------------|---------|--------------------------|-----------------------|------------|----------|------------------|---------------|-------------|-------------|-------------|
| | Catchmen | | | | Assumed | Capacity | | Fortification | | Contact | |
| S/N 💌 | t 🔻 | State 💌 | Processor 🛛 | Feedstock 🛛 | Capacity - | lday 🔽 | GPS Coordinate - | Complian | Contact 🔽 | Phone No 🝷 | Status - |
| | North | | Grand Cereal Oil Mill | | | | 9°45'36.5"N | | Augustine | | |
| 1 | Central | Plateau | (UACN) | Soya & Groundnut Oil | 800 | 40 | 8°51'23.2"E | Yes | Agbo | 08137838713 | Active |
| | North | | | | | | 7°32'16.1"N | | | | |
| 2 | Central | Benue | Hule Oil Mill | Soya Oil | 100 | 100 | 8°53'38.4"E | No | | 08024272018 | Active |
| | North | | | | | | 7°42'58.0"N | | Ben | | |
| 3 | Central | Benue | Seraph Nigeria Limited | Soya Oil | | 30 | 8°36'23.7"E | Yes | Agbecha | 08036640168 | Active |
| | North | | | | | | 7°48'02.3"N | | | | |
| 4 | Central | Kogi | Favour Oil | Palm Kernel Oil | | 2000 | 6°44'30.7"E | Yes | Romanu | 07030330536 | Active |
| | North | | | | | | | | | | |
| 5 | Central | Kogi | Canopy Industries Ltd | Palm Kernel Oil | | 100 | Nil | Yes | Nil | Nil | Active |
| | | Adamaw | | | | | 9°20'58.9"N | | llegieuno | | |
| 6 | North East | а | Afcott Oil Mills | Soya Oil | 200 | 30 | 12°12'19.0"E | Yes | Bawalkson | 07030354177 | Active |
| | | | | | | | | | | | |
| | | | and an and a second | | | | 10°26'59.8"N | | Simon | | |
| 7 | North East | Kaduno | Life Care Farm | Soya Oil | | 12 | 7°28'18.4"E | Yes | Adam | 08030404634 | Active |
| | North | | | | | | 10°36'13.5"N | | Emeka | | |
| 8 | West | Kaduna | Falke Industry Ltd | Soya Oil | 200 | 150 | 7°27'58.9"E | Yes | Anyimba | 08154542355 | Active |
| | North | | | | | | 10°31'20.0"N | | | | |
| 9 | West | Kaduna | Oxtrich Creations Ltd | Soya Oil | 80 | 150 | 7°26'08.8"E | Yes | Nil | Nil | Active |
| Cores. | North | 75 M | | Soya, Groundnut & | | | 11°04'47.0"N | | Ibrahim: A. | | |
| 10 | West | Kaduna | Sun Seed Oil Mill | Cotton Seed Oil | | 135 | 7°45'02.5"E | Yes | Abdulkadir | 08037042767 | Active |
| | North | | | | | | 11°57'16.4"N | | | | |
| 11 | West | Kano | Sharada Oil Mills Ltd | Groundnut & Soya Oil | | 70 | 8°30'32.4"E | Yes | Nil | Nil | Merger |
| | North | | | | | | 11°57'16.4"N | | Usman | | |
| 12 | West | Kano | Yakasai Oil Mills Ltd | Groundnut & Soya Oil | | 70 | 8°30'32.4"E | Yes | lbrahim: | 08032113959 | Active |
| | North | 275 | Fortunes Oil Mills(Salma | en væss | | 1000 | 12°00'36.1"N | Yes while | Hamisu | | |
| 13 | West | Kano | Oil Mills) | Soya Oil | 450 | 200 | 8°32'42.8"E | active | Sule | 08062495202 | litactive : |
| | North | | | Soya Oil & Cottonseed | | | 11°31'57.5"N | | | | |
| 14 | West | Katsina | ABJ Oil Mill | Oil | 200 | 120 | 7°19'33.4"E | Yes | Ismail | 08039380223 | Active |
| | North | | Katsina Inwala Oil | | | | 13°00'33.3"N | | | | |
| 15 | West | Katsina | Extraction | Groundnut Oil | | 80 | 7°38'30.5"E | Yes | Nil | 08067862450 | Active |





| | | | | | | Output | | | | | |
|-------|----------|---------|----------------------------|---------------------|------------|----------|------------------|---------------|-----------|-------------|------------|
| | Catchmen | | | | Assumed | Capacity | | Fortification | | Contact | |
| S/N 👻 | t 🔻 | State 👻 | Processor 🛛 🔽 | Feedstock 🔽 | Capacity - | /day 👻 | GPS Coordinate - | Complian | Contact 💌 | Phone No 💌 | Status - |
| | South | | PZ Wilmar (Olin- Power | | | | 6°40'27.0"N | | | | |
| 16 | West | Lagos | Oil and Emperor Oil) | Palm Olein Oil | 1000 | 200 | 3°30'45.9"E | Yes | Nil | Nil | Active |
| | South | | Devon King's Cooking | | | | 6°33'22.2"N | | | | |
| 17 | West | Lagos | Oil | Palm Olein | 2 0 | 100 | 3°21'21.8"E | Yes | | 01-7000.180 | Active |
| | South | | | | | | 6°27'22.3"N | | | | |
| 18 | West | Lagos | Nosak Group | Palm Olein Oil | 200 | 200 | 3°22'02.9"E | Yes | Bunmi | D8055333266 | Active |
| | South | | PZ Cussons (Joint | Palm Olein & Palm | | | 6°40'27.0"N | | | | |
| 19 | West | Lagos | venture with Wilmar) | Kemel Oil | | 400 | 3°30'45.9"E | Yes | Nil | Nil | Active |
| | South | | | | | | 6°28'47.7"N | | ldowu | | |
| 20 | West | Lagos | Pioneer Nig. Ltd | Palm Kernel Oil | 50 | 50 | 3°19'37.8"E | Yes | Olarenju | 08035003565 | Active |
| | South | | | | | | 6°33'07.9"N | | Sholey | | |
| 21 | West | Lagos | Spark Foods Ltd | Soya & Groundut Oil | | 40 | 3°22'05.4"E | Yes | Olayinka | 08052954474 | Active |
| | South | | | | | | 6°32'10.3"N | | | | |
| 22 | West | Lagos | Sunola Foods Ltd | Soya Oil | | 100 | 3°20'11.2"E | Yes | Nil | Nil | Active |
| | South | | Comfort Vegetable Oil | | | | 6°32'29.0"N | | | | |
| 23 | West | Lagos | Ltd | Palm Kernel Oil | | 100 | 3°13'38.6"E | No | NA | NAL | hactive |
| | South | | | | | | 6°34'42.8"N | | | | |
| 24 | West | Lagos | Golden Oil Industries Ltd | Palm Kernel Oil | | 100 | 3°20'35.5"E | Yes | Patricia | DB023229976 | Active |
| | South | | | | | | 6°37'18.6"N | | | | |
| 25 | West | Lagos | Om Oil Industries Ltd | Palm Kernel | | 500 | 3°20'08.8"E | Inactive | Adamu | 08066625830 | hactive |
| | South | | U.O.O Estate Ltd (U. O. | | | | 6°27'46.6"N | | | | |
| 26 | West | Lagos | O Industries) | Palm Olein Oil | | 340 | 3°23'11.8"E | No | Nil | Nil | Active |
| | | | | | | | | | | | |
| | South | | | Palm Kemel Oil & | | | 6°24'47.4"N | | | | |
| 27 | West | Lagos | Sainley:Nig Ltd | Coconut Oit | 100 | 60 | 2°54'50.7"E | Inactive | NØ | Nil | Inactive : |
| | South | | Raffles Oil (Subsidiary of | | | | 6°26'00.2"N | | | | |
| 28 | West | Lagos | Dufil Prima Foods Ltd) | Palm Olein | | 100 | 4°00'09.8"E | Yes | Aliu | | Active |
| | South | | Spectrum Nigeria Ltd | | | | 6°38'52.0"N | | Behel | | |
| 29 | West | Lagos | (Spectra Industries Ltd) | Soya Oil | | 340 | 3°19'14.2"E | No | Ogbode | 08059200091 | hactive: |
| | South | | Dangote Vegetable Oil | | | | 6°44'53.6"N | | | | |
| 30 | West | Ogun | Industry | Palm Olein Oil | 500 | 500 | 3°15'29.7"E | Yes | Samson | 08056409825 | hactive: |





| | | | | | | Output | | | | | |
|-------|----------|---------|---|-----------------------|------------|----------|------------------|-------------------|-------------|-------------|----------|
| | Catchmen | | | | Assumed | Capacity | | Fortification | | Contact | |
| S/N 🔻 | t 🔻 | State 💌 | Processor 🔽 | Feedstock 🛛 | Capacity - | /day 💌 | GPS Coordinate - | Complian | Contact 💌 | Phone No 🔽 | Status - |
| | | | | | | | 0010100 0001 | | | | |
| ~ | South | | | D | 50 | | 6°43'32.9"N | V. | A PUL | | |
| 31 | West | Ogun | AR- Rasheed | Palm Kernel Oil | 50 | 50 | 2°59'40.1"E | Yes | William | 08036702759 | Active |
| | | | T | | | | 0054100 4851 | | | | |
| 00 | South | ~ | losett Agro Industries | Paim Olein & Paim | 000 | 000 | 6°51'23.4"N | | | 0000700000 | |
| 32 | West | Ogun | Ltd | Kernel Oil | 300 | 200 | 3°46'51./"E | Yes | Badmus | 08067200998 | ACOVE |
| | South | | Amovine Oil Mill | | | | 6°40'58.4"N | | | | |
| 33 | West | Ogun | (Construction ongoing) | Palm Kernel Oil | | 30 | 3°05'07.2"E | No | Adelabu | 08034949542 | Active |
| | | | | | 200 | | | | | | |
| | South | - | Wasil Industry Ltd | | (expected | | 6°53'25.8"N | - 100 - 100 - 100 | | | |
| 34 | West | Ogun | (Construction ongoing) | Soya Oil | output) | 200 | 3°34'24.8"E | Compulsory | Tunde | 08039170953 | Active |
| | South | | | | | | 6°53'48.2"N | | | | |
| 35 | West | Ogun | Apples and Pears Ltd | Soya Oil | 100 | 100 | 3°34'20.7"E | Yes | Yinka | 08062265413 | Active |
| 3195 | South | | First Maximum Point | 75 FD 89. 1070744 | 10000 | | 7°15'26.7"N | - | 2504 - 2618 | | |
| 36 | West | Ondo | Industries Ltd | Palm Kernel Oil | 150 | 100 | 5°08'03.1"E | Yes | Princewill | 08038520247 | Active |
| | South | | 100000000000000000000000000000000000000 | Soya & Palm Kernel | | 1 | 7°13'09.7"N | | | | |
| 37 | West | Ondo | Jof Ideal Family Farms | Oil | | 100 | 5°36'03.7"E | Inactive | Abdul | 08137138769 | hactive |
| | South | | | | | | 7°19'55.4"N | | Adewumi | | |
| 38 | West | Оуо | Sudit Oil & Chemical Ltd | Soya & Palm Olien Oil | 150 | 200 | 3°53'33.2"E | Yes | M. A | 08032073732 | Active |
| | South | | Rosel Vegetable Oil | | | | 7°19'30.2"N | | Femi | | |
| 39 | West | Оуо | (Merged with Sudit Oil) | Crude Palm Kernel Oil | 150 | 80 | 3°52'08.6"E | No | Akinisi | 07057715543 | Active |
| | South | | Rom Oil (Golden Penny | Soya, Palm Olien & | | | 7°16'46.8"N | | | | |
| 40 | West | Оуо | Oil) | Palm Kernel Oil | 500 | 600 | 3°51'38.2"E | Yes | Gupta | 07033133121 | Active |
| | South | | | | | | 6°06'50.3"N | | | | |
| 41 | East | Anambra | Golden Oil Ltd | Palm Olein | 200 | 200 | 6°45'53.9"E | Yes | Emma | 08037893311 | Active |
| | South | Anambra | Transtell Group (Vino | | | | 6°07'08.2"N | | | | |
| 42 | East | /Enugu | Pure Vegetable Oil Ltd) | Palm Kernel Oil | 200 | 50 | 6°46'21.5"E | Yes | lkechukwu | 08032031508 | Active |
| | South | | | | | | 6°07'24.5"N | | | | |
| 43 | East | Anambra | Envoy Oil Ind Ltd | Palm Kernel Oil | 100 | 100 | 6°46'30.4"E | Yes | Obua | 08033523675 | Active |
| | South | | Rimco Vegetable Oils | Palm Kernel & Palm | | | 5°59'48.7"N | | | | |
| 44 | East | Anambra | Ltd | Olein Oil | 140 | 100 | 6°55'17.9"E | Yes | Cyril | 07036760124 | Active |
| | South | | E. A Agro Oil Industries | | | | 6°07'16.3"N | | | | |
| 45 | East | Anambra | Ltd | Palm Kernel Oil | 100 | 50 | 6°46'04.8"E | Yes | Precious | 08030987267 | Active |





| | | | | | | Output | | | | | |
|-------|----------|---------|--------------------------|--------------------|------------|----------|------------------|---------------|-----------|-------------|----------|
| 1.71 | Catchmen | | | | Assumed | Capacity | | Fortification | | Contact | |
| S/N - | t 🔻 | State 💌 | Processor 🗸 | Feedstock | Capacity - | /day 🔻 | GPS Coordinate - | Complianc | Contact - | Phone No 👻 | Status - |
| | South | | | | | | 5°06'44.5"N | | | | |
| 46 | East | Abia | New Era Foods Ltd | Palm Kemel Oil | | 100 | 7°25'15.9"E | Yes | Onyeobia | 08069455306 | Active |
| | | | Jilnax Nig. Limited | | | | | | - | | |
| | South | | (Fresh Vegetable Oil | | | | 5°32'04.5"N | | | | |
| 47 | East | Abia | Manufacturing Ltd) | Palm Kernel Oil | 150 | 50 | 7°28'18.2"E | Yes | Mercel | 07031575447 | Active |
| | South | | | Palm Kemel & Soya | | | 5°09'26.6"N | | | | |
| 48 | East | Abia | Kitchen Veg Oil | Oil | 235 | 200 | 7°20'05.8"E | Yes | Dike | 0803540874 | Active |
| | | | | | | | | | | | |
| | South | | | | | | 5°07'25.5"N | | Charles | | |
| 49 | East | Abia | Nifex Veg Oil | Palm Kemel Oil | 150 | 50 | 7°28'59.9"E | Yes | Ogbonna | 08132144547 | Active |
| | | | | | | | | | | | |
| | South | | Polema Industries and | | | | 5°09'53.9"N | | Joseph | | |
| 50 | East | Abia | Oil Mills | Palm Kernel Oil | 150 | 100 | 7°19'04.9"E | Yes | Bassey | 08030939699 | Active |
| | South | | Monica Integrated | | | | 5°29'43.4"N | | Kunle | | |
| 51 | East | Abia | Global Ltd | Palm Kernel Oil | 100 | 340 | 7°29'04.9"E | No | Oguns | 07037006598 | Active |
| | South | | | | | | 6°27'31.0"N | | | | |
| 52 | East | Enugu | Aniuzo Nig Ltd | Soya Oil | 100 | 2 | 7°34'46.6"E | Yes | Onuorah | 07036571998 | Active |
| | South | | Sunchi Integrated | | | | 6°27'00.6"N | | Eze | | |
| 53 | East | Enugu | Farms Ltd | Soya Oil | Nil | 1.75 | 7°34'17.3"E | Yes | Nwosibe | 08034911273 | Active |
| | South | | Solive Vegetable Oil | | | | 6°50'08.7"N | | Emmanuel | | |
| 54 | East | Enugu | Industries Ltd | Palm Olein Oil | 300 | 1.8 | 7°22'52.1"E | Yes | Onu | 08068104844 | Active |
| | | | | | | | | | | | |
| 1.277 | South | 74.8 | 15 DO 100.000 Month | 15 10- 14 entities | 157754 | | 5°30'00.7"N | | data an | | |
| 55 | East | lmo | Camela Nig Ltd | Palm Kernel Oil | 150 | 100 | 6°59'38.7"E | Yes | Njoku | 08033729047 | Active |
| | South | | | Palm Kernel & Palm | | | 6°08'21.8"N | | | | |
| 56 | South | Edo | Presco Plc | Olein Oil | 250 | 100 | 5°42'50.6"E | Yes | Prosper | 07084415508 | Active |
| | South | | | | | | 6°42'34.8"N | | | | |
| 57 | South | Edo | Owel Industry Ltd | Soya Oil | Nil | 11 | 6°08'49.2"E | Active | Kenneth | 08036384712 | Active |
| | South | | | | | | 4°48'39.2"N | | | | |
| 58 | South | Rivers | Mac-Cannon Ltd | Active | Nil | 100 | 7°02'19.1"E | Yes | Lessor | 07059249372 | Active |
| | South | | Rivers Vegetable Oil Ltd | | | | 4°48'43.6"N | | Nyebuchi | | |
| 59 | South | Rivers | (New RIVOC) | Palm Kemel Oil | 150 | 100 | 7°02'14.6"E | Yes | Wobo | 08060182333 | Active |





| Processors Awareness | | | | | |
|-------------------------|--|--|------------------------------|---|---|
| Survey | | Processor 1 | Processor 2 | Processor 3 | Processor 4 |
| C/N | Overtien | Affcot Oil Mills | Katsina Inwala Oil | Abj Oil Mill | Favour Oil (Kogi |
| 5/N | Question | (Adamawa State) | Extraction Cluster | (Katsina State) | State) |
| 1 | Why do you fortify your vegetable oils? | To replace destroyed vitamins and minerals due to temperature | To obtain high quality | To be the best standard | To improve Vitamin A intake |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | 10g of 1mlU/g in 1 ton of refined vegetable oil | 1000 litres to 7 gallons | 23cl per ton | 20,000 iu/kg |
| 3 | What are the steps involved in the fortification process? | Ensure Oil is refined, put on stirer and the addition of Vitamin A for proper mixing | | It is an automated process | i. Determine the appropraite technique and type of the Premix ii.WFP approved premix iii. Store premix iv. Monitor the procedure |
| 4 | How do you carry out quantitative analysis in the fortification process? | By ensuring that exactly 10g of Vitamin A is added to 1 ton of Vegetable Oil | Bymeasuring | Nil | By ensuring the exact quantity of premix |
| 5 | How do you verify proper premix addition in the fortification process? | By proper stirring of the mixed sample using a machine that has a stirer | By supervision | It is automated | By calculating the coefficient of variation |
| 6 | How do you monitor the fortification procedure? | By checking the expiration date of Vitamin A and also ensure the right | Closed Monitoring | Closed Monitoring | Making visual checks every 1-2 hours Keeping daily records |
| | | quantity is used | | | Lesting tinished |
| 7 | What quality control measures are taken during the fortification process? | Compliance with NAFDAC requirement and proper calculation | Undergoing lab assessment | Under going lab assessments at 2 hours interval | |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Temperature | | | |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | Proper Supervision by Quality Control department or people that know the job | Closed Supervision | Closed Supervision | Supervision by the Quality Control personnel |





| Processors | | | | | |
|---------------------|--|---|--|--|--|
| Awareness Survey | | Processor 5 | Processor 6 | Processor 7 | Processor 8 |
| S/N | Question | Fortunes Oil Mil | Spectrum Nig. | Grand Cereals Oil | Falke Industries |
| | Question | (Kano State) | Ltd (Lagos State) | Mill (Plateau State) | Ltd (Kaduna) |
| 1 | Why do you fortify your vegetable oils? | For Growth and Vision | It helps eyesight for children | It is a statutory/legal requirement and to provide nutrition | For Vitamin A deficiency Control |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | 20,000 iu/kg | 45iu/kg | The quantity is dependent on the legal/statutory requirements | 20,000 iu/kg |
| 3 | What are the steps involved in the fortification process? | Determine the quantity and quality of premix by Calculation, Mixing and Monitoring | Calibrated dozing with close monitoring | it is being weighed in batches then fortified by the temperature of 40oC OR below in order not ot destroy the vitamin A | It is an automated process |
| 5 | How do you verify proper premix addition in the fortification process? | | Coefficient variant is calculated | It is being carried out in the lab | An automated machine is used |
| 6 | How do you monitor the fortification procedure? | Routine Checks Compliance with the Quality control measure | Periodic analysis and checks | There is an SOP (Standard Operating Procedure) | By ensuring the right standards are maintained and thoroughly followed through |
| 7 | What quality control measures are taken during the fortification process? | Standard Operating Procedures | Temperature check | There is an SOP | Compliance with the statutory requirements |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Heat, Temperature, Light | | Temperature, Exposure to Air & Light | Temperature, Storage |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | Closemarking by the Quality Control personnel | Collaborating with stakeholders involved | Nil | Thorough supervision of the QC department and compliance to the standards |





| Processors | | | | | |
|---------------------|--|---|--|--|---|
| Awareness Survey | | Processor 9 | Processor 10 | Processor 11 | Processor 12 |
| S/N | Question | Seraph Nig Ltd (Benue) | Rom Oil (Oyo State) | Sunchi Integrated Farms Ltd (Enugu State) | Anuizo Nig Ltd (Enugu State) |
| 1 | Why do you fortify your vegetable oils? | T o meet up NAFDAC dietary recommendation | It helps to improve children's growth | Vitamin A is good for the eyes | Vitamin Ais necessary in the body |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | 20,000 iu/kg | 45 iu/kg | Minimum 20,000 iu, maximum 36,000iu | Minimum 20,000 iu, maximum 36000 iu |
| 3 | What are the steps involved in the fortification process? | Measuring | By calibrated dozing of the suplement into the | Calculation | Calculate the amount of Vitamin Apremix |
| | | Stirring | finished oil | Mixing | |
| 5 | How do you verify proper premix addition in the fortification process? | By analytical chemical process | Periodic analysis | By Analysis | By monitoring the amount |
| 6 | How do you monitor the fortification procedure? | Checking manual Stationing Monitoring staff | Nil | By being physically present | By being aware of the amount |
| 7 | What quality control measures are taken during the fortification process? | Ensuring Low temperature and avoiding high temperature | The environment must be clean | Container is neat | Avoid contact with oxygen |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Peroxide Value, Moisture Content, Temperature | Temperature, Oil quality, Storage | Heat, Air & Radiation | Heat and Light |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | Random Monitoring by Management Manual Guide | Quality Control department are equipped | Monitor Policy Control | By Proper Checkmating |





| Processors | | | | | |
|------------|--|---|---|--|---|
| Awareness | | Processor 13 | Processor 14 | Processor 15 | Processor 16 |
| S/N | Question | Solive Vegetable Oil Ind. Ltd (Enugu State) | Tahir Oil (Kano State) | Pioneer Nig. Ltd (Lagos State) | PS Mandrides (Kano State) |
| 1 | Why do you fortify your vegetable oils? | It is good for Oil to be rich in Vitamin A | T o prevent blindness and any other effect on the eyes | Helps to improve eye quality | To combat deficiency of Vitamin A |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | Minimum 20,000 iu, maximum 36000 iu | 20,000 iu/kg | 45iu/g | 2100 iu/kg |
| 3 | What are the steps involved in the | Mixing the premix | Activation of Vitamin A | By calibrating dozing of the | From Crude Vegetable Oil - Degumming,Refining, |
| ž | fortification process? | | Mixing of Vitamin A with other quantity of oil | supplement into the finalized oil | Bleaching, Dedorizing, Cooling, Fortification, |
| | | | Dosing with Vitamin A | | . contigning |
| 4 | How do you carry out quantitative analysis in the fortification process? | Determining the amount of Vitamin A | 1 ton of Oil will be fortified with 20g of Vitamin A | Semi quantitative method | Allowing the temperature of the oil to fall between 45-50°C. Ensuring the temperature of Vitamin A is at 60°C. Shaking the container of the premix for homogenuity. |
| 5 | How do you verify proper premix addition in the fortification process? | ByCalculation | Proper premix is fortified by adding a dose of pet ether and antimony chemical to the oil fortified and blue coloration will appear, this shows that the oil is well dosed. | By calculating the coefficient of variation | Vitamin A oily premix for gourmet certified source. Calirated fortification tank with agitator. Storage rooms devices. Quality Assurance Lab. Regulated dosage. Weighing scale/measuring cylinder. Recording booklet/register. |
| 6 | How do you monitor the fortification procedure? | Proper Inspection | As the Quality Control Officer, I did 90% of the work myself and monitor eac procedure | Periodic analysis | Storing at a room temperature in an opaque container. |
| 7 | What quality control measures are taken during the fortification process? | Container should be neat and avoid air exposure | Cleanliness of the environment, cleaniness and drying of the equipments, then followed the normal fortification | Ensure clean dosing environment | Allowing the temperature of the fortified oil to fall down to maximum of 60°C. Shaking the container of the Vitamin A premix very well for homogenuity |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Sunlight | The Vegetable to be fortified should not be too hot. Activation of the Vitamin A to its normal temperature | Storage, Temperature, Oil quality | Low Peroxide Value of the fortified Oil. Reusage- reduces the level of the Vitamin A activity. Dosing of the premix at temperature above 60°C reduces Vitamin A activity. |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | Proper Inspection | Provision of Vitamin A by the Management. Provision of the fortification equipments. Employment of experts with technical-know-how on Vitamin A fortification. | Equipping the Quality Control Manager/Depart ment | Close monitoring and supervision by the Quality Control Manager and other supervising officers |





| Processors | | | | | | |
|------------|---|--|---|--|---|--|
| Awareness | | Processor 17 | Processor 18 | Processor 19 | Processor 20 | |
| C/N | Question | Dangote Vegetable Oil | Rimco Vegetable Oils Ltd | New Era Food Ltd | Nifex Veg. Oil | |
| 5/N | Question | Industry (Ogun State) | (Anambra State) | (Abia State) | (Abia State) | |
| 1 | Why do you fortify your vegetable oils? | For Children's sight | To administer the Vitamin A which was removed during processing to the consumer | Fortification are done for the protection of the eyes | Health benefit for the eyes and immune system | |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | Standard dozage is 45iu/kg | 20,000 iu/kg of oil | Nil | 12g/ton of RVO | |
| | | | FI the tank to the 1 ton level. | After processing the | | |
| 3 | What are the steps involved in the fortification process? | Calibrated dozing before storage at a temperature | Stir the oil with the help of gitator FO5 MIND. | oil, it is sent to the lab for test and then | After testing, Vitamin is added at | |
| | fortification process? | 014000 | Pump to an overhead tank and fill in J/Cans | fortified | ule end | |
| 4 | How do you carry out quantitative analysis in the fortification process? | Periodic test | We carry out Semi Quantitative Spot anlysis with Vitamin A test kit by BASF Chemical Company | Ensuring that all necessary test and safety measures are considered | Making sure all necessary measures are carried out | |
| 5 | How do you verify proper premix addition in the fortification process? | The coefficient variation is calculated | By checking the Vitamoin A level in the oil using Vitamin A test kit by BASF Chemical Company | Through the lab test | After the test, the product is fortified and packaged | |
| 6 | How do you monitor the | Periodic checks | We monitor the fortification procedure | The use of dosing pipe (pump) | The use of dosing | |
| ×. | fortification procedure? | | by being present during the fortification process | | the quality | |
| 7 | What quality control measures are taken during the fortification process? | Temperature must not go above ambient | We measure accurately Plastic measuring cylinder to avoid possible contamination from bottles. We also allow a little excess to ensure adequate dose since the premix is viscous | Following the tasty acid level, extracting odour and moisture | Extraction of odour, moist and dirts | |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Temperature | Weather: Intense Sunlight destroy/deactivate Vitamin A. Temperature: High temperature also destroys Vitamin A | Temperature and Quality of oil | T ype of oil, T emperature, Acid level | |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed Partnering with all stakeholders to ensure success A Q | | A Quality Control Staff is always at the fortification point whenever oil is to be fortified | Check on the lab | T raining of staff to adhere to rules and ethics | |





| Processors | | | | | |
|------------|---|---|--|--|--|
| Awareness | | Processor 21 | Processor 22 | Processor 23 | Processor 24 |
| S/N | Question | Polema Ind. & Oil Mills (Abia State) | U.O.O Industries (Lagos) | Nosak Group (Lagos State) | Amovine Ventures (Ogun State) |
| 1 | Why do you fortify your vegetable oils? | Protection of the eyes | Prevention and Safety | It improves Shelf life | It is generally for eyesight improvement |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | 2,000 iu | Natural | 45iu/g | 45iu/g or 20,000iu/kg |
| 3 | What are the steps involved in the fortification process? | Addition of Vitamin at the end of the process | Determine the techniques | By calibrating dozing of Vitamin under a temperature of 40oC | Calibrating dozing of the supplement before storage |
| 4 | How do you carry out quantitative analysis in the fortification process? | Quality Contol Manager | Through each micronutrient in each batch | Regular quantitative method | Regular quantitative method |
| 5 | How do you verify proper premix addition in the fortification process? | Through the Quality Assurance Manager | Calculating the coefficient of variation | By calculating the coefficient of variation | Calculating the coefficient of variation |
| 6 | How do you monitor the fortification procedure? | Through Metric pump which is added at the end | Keep permanent record of variation | Close check & periodic analysis | Periodic analysis and close check |
| 7 | What quality control measures are taken during the fortification process? | T ype of Oil, T emperature, Moisture | Examination of the commodity | Maintain final oil temperature | Temperature control as high temperature will lead to loss |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Type of Oil, Temperature, Moisture | Fortificant losses during storage | Temperature, Storage | Temperature, Oil Quality |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | In-House training of staff | Monitoring | Quality Control Departent provided with required materials | Q.C.M was all in support to achieve our goal |





| Processors | | | | | | |
|------------|---|---|--|--|---|--|
| Survey | | Processor 25 | Processor 26 | Processor 27 | Processor 28 | Processor 29 |
| 6/N | Question | Yakasai Oil Mills Ltd | PZ Cussons | AR Rasheed | Rosel Vegetable | Golden Oil Industries |
| 3/N | Question | (Kano State) | (Lagos State) | (Ogun State) | Oil (Oyo State) | Ltd(Lagos State) |
| 1 | Why do you fortify your vegetable oils? | Because this is a Government Policy and will improve eyesight | lt reduces maternal natality | lt improves children's growth | It improves sight quality | Health benefit for children |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | Min 30,000 iu/l | 45iu/g | Recommed dosage is 45iu | 45iu/kg | 15,000 iu/g |
| 3 | What are the steps involved in the fortification process? | Under supervision of An Nawan Global Concept Consultants | By calibrated dozing of the supplement into finalized product | Calibrated dozing before storage | Caliberated dozing at the required temperature | By dozing the supplement |
| 4 | How do you carry out quantitative analysis in the fortification process? | Conducted by An Nawan Global Concept Consultants | Regular quantitative checks | Periodic Quantitative test | Periodic check for quality to avoid wastage | For it to be vaiform |
| 5 | How do you verify proper premix addition in the fortification process? | Conducted by An Nawan Global Concept Consultants | Calculating the coefficient of bthe variation | Nil | Calculating the coefficient of variation | Analysis |
| 6 | How do you monitor the fortification procedure? | Nil | Periodic analysis | Constant check | Periodic analysis and follow up | By watching the dozing constantly |
| 7 | What quality control measures are taken during the fortification process? | Nil | Ensure clean stainless vessel | Maintaining clean environment | Temperature must be controlled | It must be done in a well ventilated environment |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Nil | Storage and Temperature control | The chemical to be preserved and storage control | | Storage |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | Nil | Partnering with all stakeholders to ensure success | Partnering with all stakeholders to ensure success | Close monitoring of the process by top management | We are working together with Government agencies |





| Processors | | | | | |
|------------|---|---|--|---|--|
| Awareness | | Processor 30 | Processor 31 | Processor 32 | Processor 33 |
| S/N | Question | Spark Foods Ltd (Lagos State) | Apple and Pears (Ogun State) | First Maximum Point (Ondo State) | Sunseed Oil Mill (Kaduna State) |
| 1 | Why do you fortify your vegetable oils? | To improve the people's eyesight | It helps to improve eye quality | lt is used improve eyesight | Yes |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | 10,000 iu/kg | 45 iu/g or 20,000 in use | 20,000 iu/kg | Nil |
| 3 | What are the steps involved in the fortification process? | Automatic dozing unit | By calibrating dozing of Vitamin A under a temperature of 40oC | Calibrated dozing of the supplement before storing | Nil |
| 4 | How do you carry out quantitative analysis in the fortification process? | It will blend continously | By calculating the coefficient of varieties | Calculating the coefficient of varieties | Dosing machine |
| 5 | How do you verify proper premix addition in the fortification process? | Continous analysis | Periodic analysis and close check | | Certified laboratory testing. Specific samples are sent to the Nigerian Defence Academy, Kaduna |
| 6 | How do you monitor the fortification procedure? | By paying attention to the dozing fortification | Periodic analysis | Periodic analysis and close check | Full in-house quality assurance unit checks samples and ensure full compliance |
| 7 | What quality control measures are taken during the fortification process? | Sterilized environment | Maintain final oil temperature | Temperature control | Dosing machine ensures accurate fortification without manual intervention |
| 8 | Stability of added Vitamin A are dependent on some factors, what are these factors? | Storage quality | Temperature, Oil quality | Storage arrangement, Oil quality, Temperature control | Nil |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | Partnership with external regulators | Quality Control department are provided with the required materials | Quality Control department is supportive in achieving the goal | There is an hourly report that is automatically shared online with key managers |





| Processors | | | | | | | | |
|------------|---|---|---|---|------------------------------------|--|--|--|
| Awareness | | Processor 34 | Processor 35 | Processor 36 | Processor 37 | Processor 38 | Processor 39 | Processor 40 |
| S/N | Question | Presco Pic (Edo State) | E. A Agro (Anambra State) | Envoy Oil | Transtell Group (Anambra State) | RIMCO (Anambra State) | Jilnax Nig. Ltd (Abia State) | Camela Nig. Ltd (Imo State) |
| 1 | Why do you fortify your vegetable oils? | It enhances good and quality growth | It is generally good for the eyes | For good eye sight | Good for children's growth | Improves health | Good eye quality | It enhances growth in children |
| 2 | What is the recommended dose of Vitamin A fortification for Vegetable Oil? | 1.7gram/kg | 1.75gram/kg | 20,000iu/kg | Nil | 20,000iu | 1.79gram/kg | 20,000iu/kg |
| 3 | What are the steps involved in the fortification process? | Caliberated pump at the temperature of 40oC | Dosing pump | With Vitamin supplement pump | Nil | By using gear pump | By dozing with reciprocating pump | By automatic dozing unit |
| 4 | How do you carry out quantitative analysis in the fortification process? | No eye check but constant dozing | No equipment for that | Regular quantitative analysis | Nil | Quantitative check | No equipment | No equipment but NAFDAC monitors the procedure |
| 5 | How do you verify proper premix addition in the fortification process? | By calculating the variation | NAFDAC helps | By calculating the coeffiecient of variation | Nil | Government Ageny (NAFDAC) | Nil | Nil |
| 6 | How do you monitor the fortification procedure? | Laboratory department do the follow up | Checking the dozing pump always | Close watch on the dozing units | Nil | Quality Control department | People at Production & Quality Control Department | Quality Assurance Department oversees it |
| 7 | What quality control measures are taken during the fortification process? | Ensure neat dosing pan with low temperature | Must be free from contaminants | Must be dozed on low temperature | Nil | Ensure low temperature | GMP must be observed | Low temperature of the oil & clean environment |
| 8 | are dependent on some factors, what are these factors? | Temperature, Storage & Shelve life | Storage | Shelve life and temperature | Good environment | Temperature and Storage | Humidityand Oxidation | Free from contamination |
| 9 | What measures are been put in place by the management to ensure the processes are dully followed | More exposure to the consumers | Management partnering with NAFDAC | More orientation and workshop | Nil | Quality Assurance department are pressurized | Constant Training of concerned staff | Constant seminars for the concerned sraff |

