REPORT OF THE WORKSHOP ON POLICY-DRIVEN ANALYSIS OF FOOD CONSUMPTION AND ACCESS DATA TO IMPROVE MICRONUTRIENT INTAKES

Rome | March 11-15, 2024

Contents

Acknowledgements

Abbreviations and Acronyms

BMGF	Bill & Melinda Gates Foundation
CATI	Computer Assisted Telephone Interview
DHS	Demographic Health Survey
DInA	Micronutrient Forum Data Innovation Alliance
EAR	Estimated Average Requirement
FACT	Fortification Assessment Coverage Toolkit
FAO	Food and Agriculture Organization of the United Nations
FCCPC	Federal Competition and Consumer Protection Commission
FRKs	Fortified Rice Kernels
GIFT	FAO/WHO Global Individual Food Consumption Data Tool
GRFC	Global Report on Food Crisis
HCES	Household Consumption and Expenditure Survey
IPC	Integrated Food Security Phase Classification
LSFF	Large-Scale Food Fortification
LSMS	Living Standards Measurement Study
LSS	Living Standards Survey
MAPS	Micronutrient Action Policy Support Project

MDD-W	Minimum Dietary Diversity for Women
MIMI	Modelling and mapping risk of inadequate micronutrient intake
MINIMOD	Micronutrient Intervention Modeling Project
MMS	Multiple Micronutrient Supplements
NFA	National Fortification Alliance
NAFDAC	National Agency for Food and Drug Administration and Control
NFCMS	National Food Consumption and Micronutrient Survey
PDS	Public Distribution System
SON	Standards Organisation of Nigeria
SUA	Supply Utilization Accounts
TAG	Technical Advisory Group
UIC	Urinary Iodine Concentration
UL	Upper Limit
WAFCT	West Africa Food Composition Table
WB LSMS	World Bank Living Standards Measurement Study
WFP HQ	World Food Programme Headquarters
WHO	World Health Organization

Executive summary

There are currently several global research and evidence generation projects working to inform micronutrient programming, particularly fortification, using household- or individual-level dietary data and modelling techniques. While these projects collaborate and keep each other updated, there had been limited opportunity to work together in-person and explore opportunities for aligning analytical approaches and evidence outputs intended. As well as identifying complementary research that, together, provide a stronger, more comprehensive evidence base. There was also an interest in ensuring policy relevance and applicability of these analyses and evidence generation and seeking guidance on how to improve this as a group.

The five-day workshop on **policy-driven analysis of food consumption, micronutrient status and access data to improve micronutrient intakes** was a collaborative effort to bring together global nutrition modelling and data projects (including **MIMI, MAPS, MINIMOD, Fraym, DInA, and the FAOSTAT Food & Diet Domain and FAO/WHO GIFT Platform**) with national policymakers, to better understand the functions and outputs of each project, combine analysis and outputs and explore how this work could be more policy responsive. The workshop aimed to explore how analytical approaches and data used by various projects could be combined to respond to prioritised policy questions for a case study country. This process was supported by the presence of a small number of policy stakeholders and data partners from Nigeria, the case study country.

Three exemplar policy questions were jointly identified on the first day of the workshop:

> 1) Why are we fortifying what we are fortifying?
>
> 2) How to make a case for scaling up rice fortification in Nigeria?
>
> 3) What minimum and maximum levels of micronutrients should be specified in Nigeria's mandatory fortification standards?

To achieve the workshop's objective, three cross-project working groups were formed to plan and conduct analysis and develop evidence outputs to respond to these policy questions. Analysis was conducted using available household-level food consumption microdata from the 2018-19 Nigeria Living Standards Survey, preliminary summary results from the 2021 Nigeria Food Consumption and Micronutrient Survey and available 2011 individual-level food consumption microdata from the FAO/WHO GIFT Platform.

Groups presented updates and outputs from their analysis work on each consecutive day of the workshop and received feedback and suggestions from other participants, led by the Nigerian policy representatives. Cross-cutting discussions focused on improving the communication and packaging of evidence products for policy use, and how to build capacity for analysts and researchers in Nigeria to utilise the soon-to-be-released National Food Consumption and Micronutrient Survey (NFCMS) in order to respond to policy questions.

This selection of participants was not done with an aim to be, nor presumes to be representative of all views or policy stakeholders for fortification, nutrition policy or nutrition data analysis, either globally or in the Nigerian context.

Many of the projects have workshops or meetings in Nigeria planned in their 2024 workplan to meet with a broad array of relevant stakeholders and invite their feedback into the individual pieces of analysis and any analytical outputs.

1. Introduction

1.1 Background and aim of the workshop

Innovative dietary data analysis and modelling approaches can provide granular information on the micronutrient intake and intake status of populations, dietary risk factors, and the potential reach, equity, contribution, cost, and cost-effectiveness of interventions to address deficiencies. Several projects and initiatives exist in this space, and the following needs and opportunities have been identified by country-level partners, policy makers, donors, project members, and other stakeholders in recent years:

- Opportunity to explore how the policy relevance and responsiveness of evidence generation could be enhanced.
- Possibility of bringing together and layering evidence generated by different projects to provide more comprehensive and compelling answers to identified policy questions.
- The need to coordinate the activities of active in-country projects with overlapping aims.
- The need for clear communication regarding what evidence different projects generate and what policy questions can be answered, and synergising efforts for achievement of desired results.

In early 2024, members of these projects had the idea of bringing a small group of partners carrying out similar nutrition analysis using household consumption and expenditure survey data together, particularly to inform food fortification, to respond to these identified needs and opportunities. There was also a desire to provide opportunity for more technical and analytical team members across the projects, who do not always have the opportunity to participate in global or country-level meetings, to enhance their understanding of the policy space and these partnerships. Through a number of discussions, project members suggested an intensive 'workshop' week in which analysts from the different projects (**MIMI, MAPS, MINIMOD, Fraym, DInA, and the FAOSTAT Food & Diet Domain and FAO/WHO GIFT Platform)** could work together on the same datasets from a case study country to answer policy questions and jointly develop policy-facing evidence outputs, with a view to shared learning, relationship building, deeper understanding of aims, objectives, and methods across projects, and better coordination between projects.

Nigeria was selected as a case study country due to the familiarity of the represented projects with the [Nigerian Living Standards and Measurement Survey (LSMS) and the possibility to access preliminary results from the 2021 Nigeria Food Consumption and Micronutrient Survey (NFCMS)](). The workshop thus brought together nutrition modelling analysts with a few policy stakeholders from Nigeria to co-design priority research questions in support of micronutrient policy and programme decision making. The aim was to generate realistic policy-relevant outputs that could be refined and applied to inform decision making and use this as an example of how the represented projects can collaborate in the future.

The workshop format was designed to minimise stakeholder burden, facilitate cross-learning between projects, and triangulate analytical findings to generate and validate robust evidence products aimed at informing specific policy questions or supporting key advocacy messages *(Annex 1 – Workshop Concept Note and Agenda).*

In preparation for this workshop, preparatory reading material was shared with the participants *(Annex 2 – List of Participants)*. This material included the workshop concept note, select common terms used in micronutrient data space adapted from the [DInA Lexicon](#) *(Annex 3 - Select Common Terms)* and information about each of the participating projects.

1.2   Objectives of the workshop

The primary objectives of this workshop were:

1) To understand prioritised policy questions related to large-scale food fortification (LSFF), in the context a case study country; Nigeria.
2) To consolidate and generate evidence and combine analysis methods relevant and applicable to each of the prioritised policy questions and work with a small number of policy representatives from Nigeria (case study country) to refine analytical outputs and enhance their relevance and use;
3) To draft a communication plan and relevant evidence outputs that could be potentially applied to answer the prioritised policy questions and inform evidence-based decision-making;
4) To reflect on lessons learnt and implications for future collaboration, analysis, and dissemination.

2. Setting the scene
2.1. Opening remarks

In the opening remarks, Abigail Perry, Director of the WFP Nutrition and Food Quality Service, highlighted the indispensable role of data for supporting program and policy decision making within WFP and for partners. Stressing the ongoing commitment to providing technical support to government partners and in making evidence-based decisions, Perry extended a warm welcome to Nigerian government officials present, emphasising the significance of their participation. She acknowledged the workshop as a unique opportunity to assemble nutrition and dietary data partners to explore how they can work together to collaboratively address relevant policy questions. Furthermore, she underscored the importance of evidence generation translating into better informed policy making. She concluded by reiterating the value of investing in and using data wisely and prioritising resources accordingly.

2.2. Overview of data priorities

Jonathan Gorstein, Senior Program Officer at the Bill & Melinda Gates Foundation (BMGF) outlined the Foundation's "one nutrition approach," which aims to address nutrition holistically across different population groups, including preschool children, adolescent girls, women of reproductive age, and pregnant women with deficiency/anaemia. This holistic strategy integrates diet quality improvement, biofortification, supplementation, and therapeutic interventions within agri-food, health, and social protection systems. The foundation's LSFF strategy is articulated through five critical initiatives, described as "big bets." These initiatives range from data improvement, research, and development, to

fostering public and private sector collaborations, and ensuring digital compliance for monitoring and evaluation.

Jonathan underscored the critical role of data in designing LSFF programs to maximise public health impacts, especially for vulnerable groups. He advocated for a focus on identifying where the most vulnerable individuals live and who would benefit most from LSFF, moving beyond merely tracking the production and consumption of fortified foods. He detailed a strategic approach for the collection, analysis, and application of data to inform key decisions in the planning and execution of LSFF initiatives. This approach entails identifying suitable food vehicles for fortification, assessing the food industry's capabilities, determining the magnitude of nutrient deficiencies, setting appropriate nutrient levels for fortification, creating an enabling environment for food fortification through legislation, public-private partnerships, and building the capacity of the food industry. The aim is to ensure that fortified foods meet set standards and reach all segments of the population, particularly the most vulnerable, to improve nutrient intake, reduce vitamin and mineral deficiencies, and enhance neurocognitive development. In the Nigeria context, regarding the policy question on whether fortified foods are reaching the most vulnerable, Jonathan mentioned that a combination of primary data from the 2021 NFCMS and modeled proxy data is needed. He also suggested DInA could be a potential platform to bring together a community of analysts/modelers to support analysis in Nigeria.

Moreover, he highlighted a structured LSFF data value chain that guides the entire process from planning and regulatory framework establishment to implementation, monitoring, and evaluation. The key data needed to close the feedback loop are: a) Are countries fortifying with the right nutrients? and b) Does LSFF reach those who are most vulnerable?

To conclude, an overview of how different BMGF data initiatives align with the nutrition data value chain to improve data use was shared.

Presentation Link

3. Project overviews

Each participating project was asked to present for 15 minutes and share a brief project overview focusing on:

- Data collected or existing data sources used;
- Types of analysis conducted/supported or indicators that are/can be generated;
- Policy questions that the analytical approach can answer;
- Overview of evidence or policy-facing outputs (including visualisations, tools, dashboards) that the project can generate or support;
- Brief overview of evidence generation activities in Nigeria to date/planned.

3.1 Modelling and mapping risk of inadequate micronutrient intake (MIMI) project

The Modelling and mapping risk of inadequate micronutrient intake (MIMI) project is helping close gaps in the nutrition data landscape by applying novel approaches to model and map the risk of inadequate micronutrient intake to immediately inform national-level decision making on fortification and other micronutrient programmes.

Through WFP's country presence, stakeholder engagement, qualitative research and documentation of the intended use and uptake of project outputs, MIMI hopes to be able to understand and respond to evidence needs across fortification policy process and support evidence-based decision-making.

MIMI has two main approaches to quantitative data analysis: In contexts with more data diversity, the MIMI project applies modelling approaches to estimate the household-level risk of inadequate intake of individual micronutrients and the risk of inadequate micronutrient intake overall, using household consumption and food composition data. These estimates can be disaggregated by geography, urban/rural residence, and socioeconomic status. Risk is estimated by redistributing household-level food consumption from the HCES across the household, calculating foods consumed per adult female equivalent and comparing to harmonised reference values per micronutrient. The same datasets are used to estimate the reach and coverage of potentially fortifiable food vehicles (using redistributed consumption and consumption quantities). This provides the ability to compare estimates of risk by gender and target group. These estimates are used as a base on which to model the potential contribution that different micronutrient interventions, such as food fortification scenarios could have to reducing the risk of inadequate micronutrient intake and exploring the equity of such interventions, namely the extent to which the needs of the most vulnerable could be met.

MIMI has also developed models to predict the risk of inadequate micronutrient intake in contexts where there is less data diversity or where food consumption data are out of date or poor quality. These machine learning models use other variables that can be found in secondary sources, such as food group diversity, socioeconomic, education, housing, food price, climate, and conflict data. These models can be used to help identify populations that are most vulnerable to inadequate micronutrient intake within countries.

MIMI-generated evidence will be applied to add a nutrition lens to WFP's [Hunger Map Live](). By incorporating data on the risk of inadequate micronutrient intake with actual or predicted data on food insecurity, it is hoped this will encourage a more holistic consideration of the role of WFP in improving diet quality for the most vulnerable.

Discussion:
- Correlation between actual versus predictive data and performance of the predictive models.
- Need to further engage with the government of Nigeria to enhance the quality and ownership of data outputs.
- The delay between conducting the Nigeria Food Consumption and Micronutrient Survey in 2021 and the realisation of results in 2024 highlights the need for timely data analysis and application to close existing gaps.
- MIMI has been presented and discussed at the Nigeria Fortification Alliance but would also benefit from collaborating with the Ministry of Budget & Economic Planning as there's a need to integrate nutritional initiatives within the broader fiscal and policy planning frameworks of the government. This approach could facilitate the allocation of resources.

3.2 Micronutrient Action Policy Support (MAPS; www.maps.africa)

The Micronutrient Action Policy Support (MAPS) tool provides sub-national insights into nutritional assessments, targeting both current scenarios and future projections. A collaborative endeavor, MAPS can be finely tuned to suit the context of its users, focusing on equipping national institutions and policymakers with the data necessary to tackle micronutrient deficiencies effectively. The tool's capacity to assimilate and process data offers a gateway to understanding micronutrient supplies, future nutrient availability, and speculative diet scenarios. It can adeptly merge apparent food consumption with food composition data, automating the creation of nutrient conversion tables for a comprehensive nutrient intake analysis. MAPS has drawn insights into the dietary habits and micronutrient intake within populations in different countries to inform nutrition-focused policies and interventions.

Key to the MAPS initiative is the integrated multi-disciplinary, international project team, and extensive training offered to its primary user community of public nutrition and agriculture/nutritious food system professionals, and researchers in sub–Saharan Africa, fostering a robust foundation for community and skill development.

Discussion:
- It is essential the tool is user-friendly and accessible to a wide range of stakeholders, including government officials, policy makers, and health professionals. The design should be intuitive, with clear guidance and support to facilitate effective use.
- Engaging government bodies early in the process can ensure the tool is aligned with national data/information systems and capacity-building efforts, allowing for a seamless integration and utilisation of the tool in national health and nutrition programs.
- There is a need for ensuring the food system data within the tool remains current as various data sources are dated. Regular updates and close collaboration with data providers, including governmental agencies, will be crucial for maintaining the tool's relevance and utility.
- Examples from Ethiopia and Malawi showed how MAPS has been utilised in response to questions about applications and outcomes in similar contexts. MAPS have built a salt fortification model in response to public sector demand. Understanding these examples can provide valuable lessons and best practices for implementing and leveraging the tool in Nigeria.
- Clarification on the distinction between MAPS and MIMI. The MIMI approach (not a tool) can estimate or predict the risks of inadequate micronutrient intake and the potential contribution of LSFF, focusing on different situations of data availability. MAPS provides a tool for analysing HCES and/or FBS data via a user-friendly interface, incorporating biomarker data where relevant, and cost-effectiveness analysis.
- MAPS, especially the University of Ibadan team members, plans to engage with various stakeholders through the platform of the Nutrition Society of Nigeria, which brings together different actors in the field.

3.3 Micronutrient Intervention Modeling Project (MINIMOD; https://minimod.ucdavis.edu/)

MINIMOD uses existing data (individual-level 24hr dietary recall data or, more typically, household consumption and expenditure survey data) to identify which micronutrients are inadequate in diets and to predict the impact of existing and hypothetical micronutrient interventions (including LSFF, biofortification, and supplementation) on the micronutrient adequacy of diets. Analyses are conducted at different scales to understand how inadequacy and the predicted impact of micronutrient interventions varies spatially, by residence, and by household income. This can help target interventions to address inadequate micronutrient intakes more effectively. MINIMOD also uses activity-based costing to estimate the cost of micronutrient interventions and, placed alongside predicted impacts, estimates and compares the cost-effectiveness of alternative micronutrient intervention programs. This can aid in identifying a set of effective and cost-effective intervention programs.

Evidence generated by MINIMOD on the potential impacts, cost, and cost-effectiveness of multiple micronutrient-fortified bouillon has been used extensively to inform policy discussions around the development of bouillon fortification standards in Nigeria.

Discussion:
- Micronutrients assessed would depend on the scope of the analysis and the available data. Typically, analyses focus on key micronutrients known to be commonly inadequate in the diets of certain populations, such as vitamin A, iron, zinc, folate, and vitamin B12. The selection of micronutrients for analysis in MINIMOD would likely be guided by public health priorities and the nutritional status of the target population.
- How can data from MINIMOD be used to set baselines and track progress over time in reducing micronutrient inadequacies?

Presentation Link

3.4 Hunger Map^{Live} (https://hungermap.wfp.org/)

In addition to the projects focused on generating or analysing data on food consumption and micronutrient risk, information about WFP's Hunger Map^{Live} was shared due to its application of remote data collection, data science to predict food insecurity and presentation of data on global map dashboards. This is relevant to a number of participating projects.

The WFP's Hunger Map^{Live} provides an analysis of global acute food insecurity. WFP and its partners have identified an urgent need for robust, real-time food security monitoring and effective response strategies. In response, the WFP has developed a real-time remote monitoring suite designed to provide analytics on food security, enabling timely diagnosis, rapid survey triggering, and more informed decision-making for targeted operational responses. This suite leverages continuous remote data collection and analysis, utilizing the Integrated Food Security Phase Classification (IPC) indicators to offer near real-time insights into the food security status across 36 countries. Furthermore, WFP's innovative use of machine learning, through models like XGBoost and Reservoir Computing, predicts current and

future levels of insufficient food consumption for additional countries, enhancing food security assessments and allowing for immediate and effective action in critical situations.

Discussion:

- The methodology of the Hunger Map incorporates a meticulous process of triangulation, involving expertise from domain experts and integration with other data sources.
- Differences between HungerMap's food security predictions and the Integrated Food Security Phase Classification (IPC) estimates.
- Data collection efforts are currently concentrated in specific states of Nigeria, but expansion is feasible.

Presentation Link

3.5 Fraym (https://fraym.io/)

The goal of Fraym's Large Scale Food Fortification Project is to map fortified food access, to explore drivers of coverage, and better understand what barriers households face in acquiring fortified and fortifiable foods through a community-level data lens. Fraym started by doing a data landscape of all existing data and a literature review of what factors might contribute most to limiting access to fortified foods. Based on this they developed a fortified food access framework and set about collecting any indicators unavailable in existing surveys through a questionnaire and primary data production. Fraym created a questionnaire with input from food fortification experts in Nigeria which were used to run a mobile survey across the country in the summer of 2023 with their vendor GeoPoll. Their survey incorporated specific coverage and reach questions directly from both the NFCMS and the Fortification Assessment Coverage Toolkit (FACT). In order to get a nationally representative sample, they conducted a Computer Assisted Telephone Interview (CATI) using random digit dialing to ensure all phone subscribers from age 18-69 in the country have an equal probability of being sampled. They also developed a sample frame based on interlocking demographic quotas that encompass geographic location, age bracket, and sex as well as national education and socioeconomic quotas. In total, they collected a national and state representative sample of over 7,000 while also incorporating indicators from the Demographic Health Survey (DHS) into the model. Fraym then used their machine learning algorithm to predict population estimates at the $1km^2$ level.

In addition to indicators around availability, affordability, agency, and awareness used to build the Access Index, they also produce data around coverage and reach estimates for 6 food vehicles - maize flour, sugar, salt, edible oil, and bouillon cubes. This allows them to validate data with other surveys like the NFCMS and to evaluate the interplay between the 4A's and household coverage. The benefit of Fraym's data is that indicators can be produced rapidly at any administrative level of analysis and provide answers to questions specifically related to fortified and fortifiable foods that current household surveys cannot.

Discussion:
- Inquiry into collaboration partners within Nigeria, specifically questioning which agencies were involved.

- The intent to enhance integration with government agencies was expressed, highlighting that the current status of the project is at a trial phase.

3.6 The Micronutrient Forum Data Innovation Alliance (DInA; https://micronutrientforum.org/micronutrient-datainnovation-alliance/)

There are three related issues which affect the micronutrient data ecosystem: a scarcity of reliable, segmented, and normalized data; insufficient analysis of available data; and inadequate use of existing analysis which prevent countries from accessing the data needed to cost-effectively design well targeted programs, monitor progress, and plan strategic actions to address micronutrient malnutrition. The Micronutrient Data Innovation Alliance (DInA) is an alliance of diverse members collaborating to improve the availability, quality, accessibility, and use of data to support national-level decision-makers to better design, implement, evaluate, and optimize programs and policies; and its activities are organized into three overarching themes: global-level coordination and guidance; national-level support and advocacy; and data exchange and dissemination.

Current DInA activities include:

1) DInA has collated a repository of definitions in a Lexicon for the collection and analysis of micronutrient and LSFF data;
2) DInA provides a quarterly platform in which more than 30 global data groups can come together in the Global Micronutrient Data Group meeting to share updates and has developed a landscape of partners and projects related to micronutrient data to help connect global and national stakeholders;
3) DInA has undertaken a Root Cause Analysis to examine the barriers to and facilitators of micronutrient data collection, analysis, and use across the data value chain to help establish future priorities for DInA and other partners and stakeholders;
4) DInA, in collaboration with UC Davis, UC Berkley and other institutions, is proposing to develop predictive models of micronutrient deficiency prevalence using machine learning, with proxy indicators of deficiency from various data sources;
5) DInA is developing a cohesive investment framework including clear and specific investment cases for the collection and utilization of micronutrient data, to ensure that national decision-makers and funders are aware of the cost and impact of micronutrient data and increase support of activities prioritized by DInA;
6) DInA is currently working on a micronutrient data guide which will allow national policymakers, advisers, program planners, and researchers to receive information and guidance on data sources that are specifically linked to policy questions throughout the micronutrient program life cycle;
7) DInA is working with partners from the Food Fortification Initiative (FFI), Global Alliance for Improved Nutrition (GAIN), and Iodine Global Network (IGN) on a joint effort to improve the availability, stewardship, and presentation of fortification data through the Global Fortification Data Exchange (GFDx), an online analysis and visualization tool;

8) DInA is collaborating with the Learning Network on Nutrition Surveillance (LeNNS), as well as the USAID Enhancing Nutrition Monitoring, Evaluation, Research, and Learning in the Health Sector (NuMERAL) project led by RTI, the CDC and WHO to host a workshop on anaemia in East Africa in June to provide training related to the collection, curation, analysis, and communication of data related to the assessment of anaemia; and

9) In 2023, DInA launched its annual Small Grants Program to support its alliance members. This program provides small grants of up to $15,000 USD to support organizations in low- and middle-income countries with capacity building activities and advocacy efforts for micronutrient data to be carried out over a 1-year period.

Discussion:
- Strategies for continuing discussions in Nigeria were explored.
- Emphasis on investment framework accompanied by cases on micronutrient data to ensure decision-makers understand the costs and impacts associated with data collection.
- Introduction of a web-based tool for selecting data collection tools aligned with specific policy questions was discussed.
- Clarification was sought regarding the relationship between DInA and the National Fortification Data Alliance.
- Considering the Regional East Africa Anaemia Workshop, questions were raised about similar plans for West Africa.

Presentation Link

3.7 FAO Dietary Data Platforms

Individual-level quantitative dietary intake data provides important information on the type and quantity of all foods consumed by different age and sex sub-groups of a population, therefore providing an understanding of the distribution of food consumption and nutrient intake within a household. These data, usually collected through 24-hour recalls, provide key information that can be used by a wide range of stakeholders to improve micronutrient intakes. The FAO/WHO Global Individual Food consumption data Tool (FAO/WHO GIFT) is a global database containing individual-level quantitative dietary intake data from multiple countries, in particular Low-and-middle Income Countries (LMICs), aimed at improving access to this type of data by policymakers, researchers, and program planners. FAO/WHO GIFT allows for free download of dietary datasets and provides data visualisations tailored for users from different fields, from nutrition to food safety.

The number of LMICs that have carried out nationally representative individual-level dietary intake surveys, however, is still limited. In the absence of quantitative dietary intake data collected at the individual level, other types of dietary data can be used to complement each other and inform policies and programmes. The FAOSTAT Food and Diet Domain is the first centralised location for the sharing of statistics on all forms of diet-related data. The Domain provides energy, macro- and micro-nutrient statistics and is composed of four subdomains presenting: 1) availability based on FAO supply utilization accounts (SUA) data; 2) apparent intake based on household consumption and expenditure surveys

(HCES); 3) intake based on nationally representative individual-level quantitative dietary data surveys; and 4) statistics related to the Minimum Dietary Diversity for Women (MDD-W) indicator.

Discussion:

- The active engagement of FAO dietary data platforms in Nigeria was appreciated.

Presentation Link

4. Mapping project functions

Following the project overviews, participants mapped the evidence that each project can generate to policy questions that may be asked across the food fortification policy cycle. The objectives were to outline the functions of each project for easy understanding, highlight complementarities and any need for alignment or harmonisation where there is overlap and to identify gaps in the evidence that can be provided by this group. The group used a series of posters with policy questions and relevant indicators, modified through a MIMI qualitative research activity from the FAO/WHO Food Fortification 'Orange Book' and Adams et al, 2022. Additional questions or headings were added as needed. Participants filled the posters with relevant information or indicators that can be generated from their projects. The resulting information is summarised in table 1 below.

Table 1 Relevant evidence that can be generated by participating projects to respond to fortification policy questions

Approach	Policy questions					
	What is the need and who is at risk?	Which foods should be fortified?	Which micronutrients?	What level of micronutrients to add?	How to implement?	Is the programme appropriate and effective?
MINIMOD	Estimates risk of inadequate micronutrient intake using household-level food consumption data, nationally and disaggregated by region, urban/rural residence, household SES	Estimates reach and apparent consumption of fortifiable foods using household-level food consumption data	Dietary gap analysis using HCES Analyses of effectiveness and cost effectiveness of LSFF and biofortification	Scenario modelling using HCES data to explore potential of meeting recommended micronutrient intake, micronutrient losses and potential risk of high intakes	Stakeholder-specific costing anaylses	Modelling of potential contribution of micronutrinet interventions to filling dietary micronutrient gaps. Cost effectiveness and economic optimisation
MAPS	Estimates risk of inadequate micronutrient intake using household-level food consumption data and local food composition data. Analyses available data on micronutrient deficiency risk, including seasonality Projects micronutrient availability under alternative socioeconomic development scenarios Estimates of micronutrient deficiency prevalence with the use of individual biomarker data for different population groups	Compares apparent intake of purchased and own-produced /gifted foods, disaggregated by residence, socioeconomic position and geography	Analyses and compares data on deficiencies to dietary estimates Analyses cost, effectiveness, and cost-effectiveness of LSFF and biofortification. Estimates of micronutrient deficiency prevalence for a wide range of micronutrients	Scenario modelling using HCES data to explore potential of meeting recommended micronutrient intake, micronutrient losses and potential for high intakes, compared to biomarker data summary report	Fortification and biofortification scenarios using HCES Includes functionality to enable stakeholder-specific cost and effectiveness analysis. Prior funding (GeoNutrition) assesses feasibility and acceptance of agronomic biofortification	Customisable cost effectiveness analysis For example, spatial data from MAPS on deficiency risks have been used to inform selection of study locations of double fortified salt pilot (Ethiopia)
MIMI	Estimates risk of inadequate micronutrient intake using household-level food consumption data Predicts risk of inadequate micronutrient intake where primary data unavailable/old	Estimates reach, coverage and effective coverage of fortifiable staples using household-level food consumption data Exploring ability to predict access to fortifiable foods where data not available	Estimates extent of inadequate intake of individual micronutrients using household-level food consumption data Predicts risk of inadequate micronutrient intake where primary data unavailable/old	Modelling scenarios of potential contribution to micronutrient intake (inc. potential of meeting UL) assuming different fortification levels, and nutrient losses	Modelling various scenarios of fortification levels, consumption quantity and provision of/access to fortified foods (e.g., via social protection)	Modelling potential contribution of fortification scenarios to filling nutrient gaps
Fraym	Estimates of barriers households face to consuming fortified foods	Measures household consumption of six food vehicles		Determining acceptability via targeted questions around perceptions and knowledge	Population segmentation or targeting based on subgroup analysis and using access index	Can monitor effectiveness of coverage/reach via high-frequency data production
FAO/WHO GIFT and Food & Diet Domain	Uses individual-level dietary intake data to enable estimation of prevalence of micronutrient inadequacies	Uses individual-level dietary intake data to enable analysis of foods consumed and portion sizes used to select fortification vehicles	Uses existing individual- or household-level food consumption data to enable analysis of the extent of inadequate intake of micronutrients	Understanding amount of foods consumed at the individual level, supporting analysis to set levels for fortification		

	Policy questions					
Approach	What is the need and who is at risk?	Which foods should be fortified?	Which micronutrients?	What level of micronutrients to add?	How to implement?	Is the programme appropriate and effective?
	Calculates MDD-W as a proxy of micronutrient intake adequacy					
DInA	Will model risk of vitamin and mineral deficiency prevalence (new project with UC Davis)	The Global Fortification Data Exchange (GFDx) uses national data to identify potential food vehicles;	Small grants programme helping to identify micronutrient gaps or vulnerable groups	The GFDx provides information on the potential per capita nutrient provided by fortification based on existing country standards		Micronutrient investment case to inform pathways to investment

5. Case study country context

5.1 Overview of the Nigeria Fortification Context

Eva Edwards, Director, Food Safety and Applied Nutrition at NAFDAC highlighted Nigeria's extensive efforts in food fortification to combat micronutrient deficiencies since 1993. The initiative began with

salt iodization and expanded to include the fortification of staples like wheat flour, maize flour, sugar, and vegetable oil with vitamins and minerals. The establishment of the National Fortification Alliance (NFA) in 2004 significantly pushed the fortification agenda. Despite considerable progress, challenges persist, including small-scale production of food staples, import of unfortified products and high costs of and logistical issues importing micronutrient premixes. These challenges are compounded by insufficient political will, inadequate budget/funding for monitoring and enforcement of food fortification regulations, and the preference among low-income consumers for cheaper, unfortified products.

Over three decades of implementation, Nigeria has gleaned important lessons, notably the essential roles of sustained political commitment, adequate funding, and robust public-private partnerships. Mrs Edwards stressed the transformative potential of quality data in steering planning, decision-making, and enforcement. Moreover, she stressed a need to find solutions to address micronutrient premix challenges and to increase the focus on micro- and small-scale millers/producers for simpler means of fortifying the quantities they produce.

Moving forward, Mrs Edwards proposed a number of recommendations such as fostering the NFA's role as a vital collaborative platform, reinforcing stakeholder partnerships, and advocating for regular compliance monitoring. There is a push for government-led advocacy to raise awareness about the benefits of fortified foods and encourage industry self-regulation and sustainable access to fortification inputs and infrastructure. She highlighted the need for local production of micronutrient premixes, ongoing capacity building for regulatory personnel, local research, and the integration of digital systems for better data oversight.

In conclusion, despite the strides made in food fortification within Nigeria, there is a need for continued innovation, collaboration, and learning to overcome existing challenges. The goal is not only to refine current practices but also to identify new food vehicles for fortification, like bouillon and rice.

Presentation link

5.2 Panel Discussion

Following the overview of the fortification context in Nigeria, a panel discussion was convened featuring participating policy stakeholders. The panel included John Uruakpa, Director at the Federal Ministry of Health; Mrs. Chito Nelson, Deputy Director/Head of the Food & Nutrition Division at the Ministry of Budget and Economic Planning; and Mrs Eva Edwards, Director of Food Safety and Applied Nutrition at NAFDAC and facilitated by Manita Jangid from WFP. The discussion focused on the priorities and challenges of LSFF programme and policy development in Nigeria.

Key Questions and Discussions:

1. Effectiveness of Current Fortification Policies

- **What current discussions are taking place regarding the fortification of wheat flour and edible oil in Nigeria?**
- **What kind of evidence is needed to support these discussions?**
    - Current discussions focus on how to improve and ensure compliance of products that should be fortified according to mandatory standards. There are challenges in flour and edible oil fortification, and the new NFCMS has indicated very low compliance of edible oil fortification and 73.3% of wheat flour collected was not fortified at all. Concentration of iodine in salt samples from NFCMS participant households were highly variable, with mean (±SD) of 60 (±35) mg/kg compared to a target range of 15-40 mg/kg. This could be due to compliance issues, but also variable and inadequate storage and nutrient losses.
    - There is a lack of data on coverage-related aspects, such as how many people have access to industrially processed edible oil.

2. Revisions of Standards and Regulations

- **Are there any plans to review minimum standards for fortification?**
- **What evidence would support the revision of existing standards?**
    - There are ongoing discussions about reviewing minimum standards for mandatory products. Previous revisions of standards took place in 2010, 2015, and 2019.
    - The need for research on setting minimum and maximum fortification levels across the value chain (factory, market, home) was raised. Currently, minimum standards are based on products leaving the factory, rather than micronutrient levels in foods at the market or once they reach the household. There is a need for studies on what the minimum fortification levels should be at different points along the value chain; including factory, market and home. The necessity to enhance laboratory capacity and reduce testing costs was highlighted.
    - The importance of establishing both minimum levels and upper limits to prevent the risk of nutrient toxicity was stressed. Concern was raised during the revision of preliminary findings from the NFCMS in which some vehicles were found to be fortified above the current standards.
    - NFCMS results reporting on high urinary iodine were highlighted as evidence, supporting in the review of maximum fortification levels.
    - Comprehensive standards review should include premixes, not just the final fortified product, addressing the entire supply chain's role in ensuring nutrient adequacy.

3. Rice Fortification Pilot and Scale-Up

- **What is the progress of the rice fortification pilot in Nigeria, and what evidence or advocacy is necessary for its success?**
- **How could rice fortification be effectively scaled up in Nigeria, and what strategies should be considered for its future?**

  - The long history of fortification in Nigeria and the specific challenges and economic considerations (affordability and changes in purchasing patterns) of scaling up rice fortification were emphasized.
  - Rice is a commonly consumed commodity, but consumer acceptability of fortified rice is crucial, particularly fortified rice kernels (FRKs). A concern raised was whether consumers would be receptive to FRKs or if they might select and remove them. There is some concern nationally about the bioavailability of iron in FRK.
  - Nigeria imports rice in large quantities, and this needs to be addressed if rice were to be fortified at a larger scale.
  - The potential role of government in subsidising fortified rice was discussed and the example from India where government provides fortified rice via the Public Distribution System (PDS) was discussed.
  - The selection of Kebbi State for a pilot program providing fortified rice via school meals was raised, noting the significant quantity of rice production in the state and the presence of varying scales of production facilities. This strategic choice aimed to test fortification across large, medium, and small-scale millers, thereby assessing the feasibility and impact of fortification initiatives across different production capacities.
  - The willingness and support of millers is crucial to the success of rice fortification and needs to be explored.
  - The importance of upcoming NFCMS to guide fortification strategy and identify vulnerable geographies and target groups was discussed.
  - Panelists reflected on the complexity and cost of conducting surveys, advocating for complementary modeling, such as that done through the MIMI project, to bridge gaps and provide evidence *updates* between national surveys.

6. Prioritisation of identified policy questions

The panel opened into a broader discussion about LSFF policy priorities and relevant policy questions. Below are the policy questions identified by the policy stakeholders present:

- How do we convince millers and others involved along the value chain to get onboard with fortification?
- What is the potential contribution to reducing risk of inadequate micronutrient intake of fortifying wheat flour, maize meal, oil, and salt?
- What additional contribution could there be from fortifying further food vehicles, specifically bouillon cubes and rice?
- LSFF is not functioning optimally, what are the challenges to effectively fortify wheat flour and edible oil?

- Who has access to industrially processed foods? How should this inform our understanding of what LSFF can achieve?
- Are there any changes to mandatory fortification standards needed?
- If the mandatory foods were fortified, who would be reached and who would be left behind in terms of geographies, target groups, and socioeconomic groups?
- Is there a risk of toxicity given that in most cases, current fortification standards only specify a minimum value, rather than both minimum and maximum values?
- What would be the cost and cost effectiveness of scaling up rice fortification via markets, including cost to government and implementing agencies and cost to the consumer?
- What would be the cost and effectiveness of rice fortification scaled up via school meals?
- What would consumer willingness to pay and acceptability of fortified rice be?
- What could rice fortification do and not do in terms of improving micronutrient intake by target group and geography?

In the next round of discussion, based on the group discussion, time availability, and analytical ability of the projects represented, three key policy questions were prioritised for further examination during the workshop:

Question 1: Why are we fortifying the food vehicles that we are fortifying? What would the remaining risk of inadequate micronutrient intake be if all mandatory vehicles were fortified to standard and who would be left behind? Would there be any redundancies if all potential vehicles were fortified to the existing standards? Is there a need for additional fortification vehicles?

Question 2: How do we make a case for scaling up rice fortification in Nigeria? Using analysis to explain the potential coverage and micronutrient contribution of fortifiable rice for different target groups and geographies. Considering capacity needs for industry, health workers and regulatory agencies and examining the cost and cost effectiveness of scaling up rice fortification via markets and via school meals, including cost to government and implementing agencies and cost to the consumer.

Question 3: What minimum and maximum levels of micronutrients should be specified in Nigeria's mandatory fortification standards?

7. Group work

During the practical component of the workshop (days 2-5), in a highly interactive and participatory format, participants worked in three groups of 4-6 people from different projects and organisations to collate or analyse evidence, and develop outputs to answer identified policy questions. Participants were asked to collectively complete four 'tasks' over the course of five-day workshop and present daily 'outputs' in a plenary session for feedback. A brief description of tasks and outputs follows, and a full description of group work is provided as an attachment.

Task 1: Discuss and define your group's approach to answering your selected policy question
Consider: - Policy question being asked?

- Who is asking the question?
- What this group could contribute?
- How evidence would be used?
- Tasks needed
Output 1: Present a brief workplan for your group work, using the template provided

---

Task 2: Evidence generation

Using the time available, generate, bring together or visualise evidence to answer your policy question, considering:
- What can be done with evidence that has already been generated/external evidence?
- What level of analysis is needed to answer the question?
- What is feasible?

Output 2: Brief presentation of evidence

Present 1-3 slides (max) to the workshop to share an update of the most compelling or relevant evidence that the group has generated, brought together or visualised so far.

Task 3: Communication plan and key messages

Based on the evidence that your group has generated or brought together, generate a brief draft plan for communicating the findings and answering the policy question, based on the template.

Identify **1-3** objectives, for example decision support, advocacy, stakeholder engagement, awareness raising, creating common understanding or promoting what further analysis could explore. List the target audiences for communication under each objective. Define key messages to be shared with each identified audience. These will depend on the audiences' technical background, existing knowledge and interests and should be used consistently throughout any subsequent communication tools. Key messages should be concise, clear and supported by evidence.

Brainstorm some communication tools or policy outputs that you would use to disseminate these key messages, for example a policy brief, presentation, meeting or event, elevator pitch etc.

Output 3: Elevator pitches

Select one key message and audience and generate a 2-minute presentation (without slides or any visual materials) that could be shared informally with a stakeholder to recommend a certain course of action (calling a meeting to review fortification standards, investing in scaling-up rice fortification, encouraging millers to fortify their product etc.).

The elevator pitch should use simple language and natural delivery. It should be tailor-made to the audience and cover the following format:
- What the call to action is?
- Why should the audience care based on what they find important?
- What evidence we have to support this?
- What would happen if they took the recommended action?

Task 4: Policy output

Develop a draft presentation, policy brief or a poster for communicating a key message to one target audience.

Output 4: Policy-facing output

Present for a maximum of 15 minutes and then encourage feedback and discussion. Include a brief explanation of your draft communication plan, why you decided on the policy output you are presenting, how it was developed and any feedback questions you would like your colleagues to focus on.

7.1 Group 1: Why are we fortifying what we are fortifying?

<u>Group members:</u> Nduka Chito Nelson (Chair), Edward Kutondo, Fanny Sandalinas, Gareth Osman, Jonathan Gorstein, Keith Lividini, Louise Ander, Sean Walsh, Sherwin Gabriel

The group set out to answer the question: **"Are current LSFF interventions contributing to control iron deficiency in Nigeria?"** and then assess what opportunities could result to a significant public health impact, especially on the contribution of fortification vehicles by geography/wealth group?

The group discussed that currently both health system interventions and food system interventions are in place to prevent and control iron deficiency in Nigeria. LSFF has a wide-reach due to the focus on staple foods consumed across the population and inclusion of fortificant in any centrally processed products containing wheat flour, maize flour, and semolina. Supplementation is specifically targeted at priority demographic groups.

For this, the group reviewed the prevalence of iron deficiency from NFCMS among Women of Reproductive Age (WRA) across wealth quintiles. Then they developed an analysis plan using the Nigerian Living Standards Measurement Survey (LSMS) 2018-19 to understand the consumption patterns of potentially fortifiable foods in Nigeria. Towards the end of the week preliminary, summary, data from the NFCMS became available which showed a contrasting picture for iron.

Additionally, a deep discussion on preferred reporting formats was held which informed style of data communication (maps or graphs) and the layout of the draft policy brief.

Key evidence presented

- The deficiency and the dietary baseline from NFCMS indicate the same trajectory of a greater 'problem' in the wealthier households: the two datasets triangulated well. This increased burden in wealthier settings is unusual compared to findings for other nutrients in Nigeria, and in international comparisons for iron.
- Analysis showed that cereal flour LSFF is effectively reaching diverse populations, playing a critical role in nutrition.
- Additionally, the model for bouillon cube fortification emerged as highly equitable, benefiting those with limited financial resources. As the population in the lowest wealth quintiles tend to consume more bouillon than the rest of the population, as shown in the consumption data from the NFCMS, their intake of micronutrients from a fortified bouillon could be higher than for the rest of the population. Interestingly, the fortification of bouillon could therefore complement the fortification of wheat flour that tends to benefit mostly the wealthiest quintiles.
- However, current efforts still fall short of meeting the Estimated Average Requirement (EAR) for the entire population, signaling the need for complementary strategies, and potentially different food vehicles that are consumed by different categories of population.

Recommended next steps

- Ensure that the complementary benefits of other fortification vehicles, such as wheat flour, which serve populations consuming lower quantities of bouillon, are maintained.
- Communicate among public health professionals that the expansion of mandatory bouillon fortification is not intended to increase consumption of these vehicles, and thus sodium from the cubes; it is intended to make use of existing dietary patterns.
- Evaluate additional fortification vehicles that could reduce the prevalence of inadequate dietary intakes in the poorest populations, who typically have the lowest nutrient density in their diets.
- Considering the high prevalence of folic acid deficiency in Nigeria, explore feasibility of mandatory bouillon fortification and methods to incorporate folic acid into bouillon cubes.

Source of basic data: National Food Consumption and Micronutrient Survey
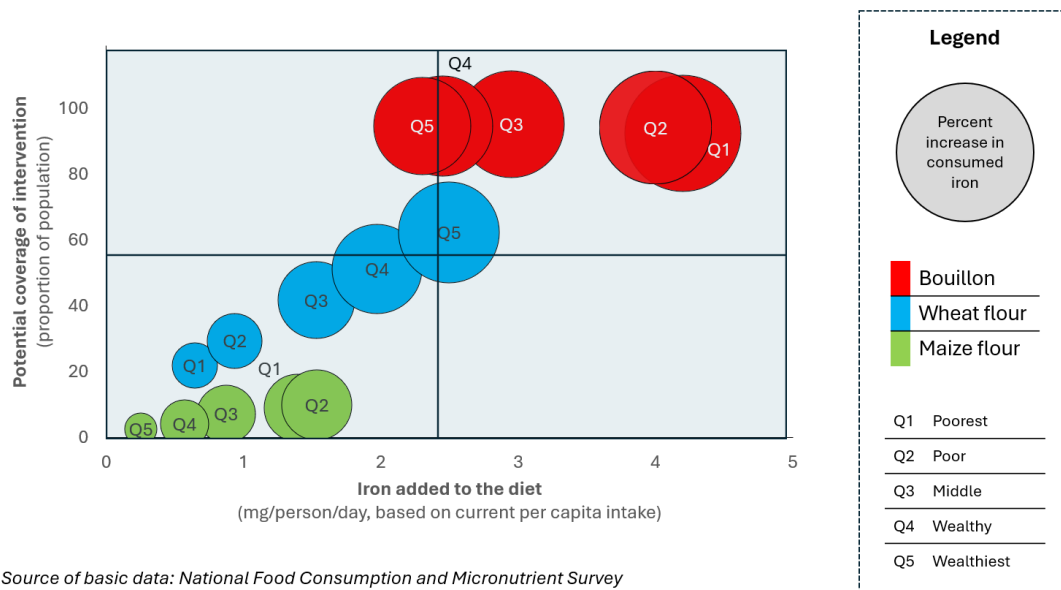
Outputs

- A draft policy brief detailing findings and recommendations

Reflections on group work during plenary

- The forthcoming rollout of Multiple Micronutrient Supplements (MMS) to WRA in Nigeria includes folic acid. Given the pervasive folic acid deficiency, additional intervention consideration is still justified.
- Is there possibility to link the risk of inadequate micronutrient intake to high-risk health impacts that are more 'visible' to policy makers, e.g., anaemia, goitre, etc.?
- How can we use these suggestions for analysing the 24-hour data going forward? (Note as this work evolves)
- Recommendations for revising visual representations to better communicate findings to the intended audience, such as transforming bar graphs depicting prevalence into more accessible by showing subnational maps by vulnerability, showing where the burden is highest, triangulate with coverage and tables by population groups.
- Given that poor households have typically monotonous diets, it is important to understand reasons for bouillon consumption among population. It is believed that the poorest households might add more bouillon to add flavor to a monotonous diet, but this has not been formally proven in formative research. The communication strategy should aggressively promote awareness to mitigate potential concerns related to fortification and unintended consumption increases.
- Incorporation of dietary diversification strategies, like utilising bioavailable iron-rich fermented locust bean 'stock' (bouillon) used in soups, which has very high bioavailable iron concentration, acknowledging the cost implications for consumers.

Link to group work outputs

7.2 Group 2: How to make a case for scaling up rice fortification in Nigeria

<u>Group members</u>: John Uruakpa (Chair), Katherine Pittenger Adams, Kevin Tang, Manita Jangid, Melas Adoko, Rupinder Sahota

In 2023, a pilot project has been introduced for fortified rice in the school-based programmes in Kebbi state. Decision makers have shown a growing interest to scale up the rice fortification via multiple programme modalities. They highlighted a need for evidence to understand the potential contribution of and costs of fortifying rice with micronutrients in Nigeria. The group attempted to answer: **"How to estimate the potential contribution and cost of expanding fortified rice programs in Nigeria on micronutrient intake, focusing on both current and proposed initiatives?"**

The group used data from the Living Standards Survey (LSS) 2018/19 and matched it with the INFOODS West Africa Food Composition Table (WAFCT) 2019 to model the nutritional impact. For compliance standards, the analysis assumes improved compliance for mandatory fortification vehicles such as wheat and maize flours. Commercial intervention: Examining the availability (via TechnoServe) and access (using LSS 18/19 data) to fortifiable rice. The analysis plan also looked at the cost analysis, evaluating the costs associated with FRKs, government monitoring, and industry fortification. Additionally, analyzing the industry characteristics, including the number of mills by production scale and the national number of primary school-age children attending public schools.

<u>Key evidence presented</u>

- Micronutrient inadequacy: The risk of inadequate micronutrient intake varies by geography and socioeconomic status, with a significant prevalence of iron, zinc, vitamin B12, and folate inadequacies.
- Beneficial impact in northern Nigeria: In regions facing food insecurity, fortified rice has the potential to significantly improve nutrient density.
- Feasibility demonstrated in Kebbi State: The pilot program validates the effectiveness of rice fortification in combating nutrient deficiencies.
- Cost-effectiveness: Fortification presents as a low-cost intervention, marginally increasing the cost of rice while offering substantial health benefits.
- Projected reduction in micronutrient inadequacy: Implementation could significantly decrease micronutrient inadequacy across the population.
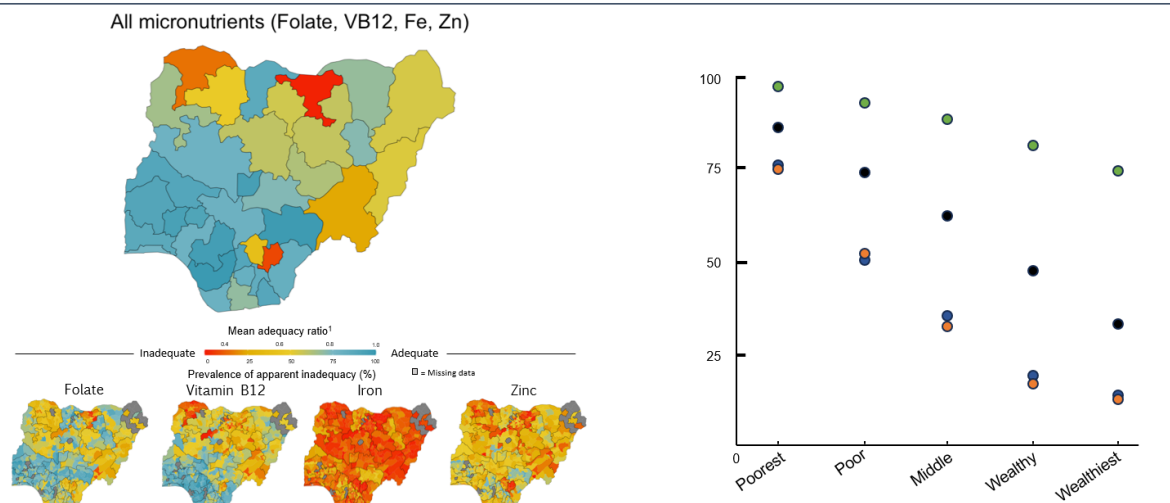
Risk of inadequate micronutrient intake by geography and socioeconomic position using the LSS18/19

Prevalence of apparent inadequacy assuming all mandatory vehicles are fortified according to standards (%)

Nigeria presents increasing demands for micronutrient interventions due to high risk of micronutrient deficiencies, especially in the north and for the poorest populations

Risk of inadequate micronutrient intake by geography and socioeconomic position using the LSS18/19
Prevalence of apparent inadequacy assuming all mandatory vehicles are fortified according to standards (%)

All micronutrients (Folate, VB12, Fe, Zn)

Mean adequacy ratio[1]
Inadequate — Adequate
Prevalence of apparent inadequacy (%)

Folate   Vitamin B12   Iron   Zinc

Legend: Folate, Vitamin B12, Iron, Zinc

Communication plan and key messages

Objectives	Target Audiences	Key Messages	Communication tools/ policy outputs
Evidence for decision making Advocacy for Rice Fortification (RF)	Federal level: Ministry of Education, Ministry of Health & Social Welfare, Ministry of Budget & Economic Planning, Ministry of Industries, Trade & Investments, Ministry of Agriculture & Food Security, Legislators.	Prevalence of nutrient inadequacy – Fe, Zn, Vit B12, Folate (NFCMS data). Political will Successful pilot in Kebbi state RF cost effective intervention – 0.25$ per person average incremental cost (in Naira). Rice fortification would lead to reduction in micronutrient inadequacy between 20-50%.	Slide deck Leaflet/ Poster Elevator Pitch Roll up banners at offices & health centres Policy brief references
	Regulatory bodies: NAFDAC, SON, FCCPC		
	National Committee on Food and Nutrition, State Committees on Food and Nutrition		
	State level governments: Nigeria Governors' Forum		
	Technical Advisory Group (TAG)		
Advocacy Buy-in for RF	National Fortification Alliance (NFA) Medium and large-scale millers and miller associations Big rice distributors TechnoServe Miller for Nutrition coalition	There is a demand from the government for fortified rice. The incremental cost for a bag of 50 Kg would be just 2.8%	Slide deck
Awareness raising for RF	Health workers, School teachers, Agriculture workers	Nutrient inadequacy is prevalent across Nigeria. Consuming fortified rice could lead 20-50% reduction in risk of inadequacy. Leading to a healthier population.	Capacity building
	Ministry of Information and National Orientation, Media, Civil society		Radio jingles Leaflet/Poster Radio programmes on airtime

Outputs

- Presentation slide deck

Reflections on group work during plenary

28

- How can we model the percentage of nutrients fortified in an individual or across the population?
- What is the rationale for selection of micronutrients such as folate, vitamin B12, iron, and zinc for fortification?
- When implementing school-based fortification programmes, what assumptions are made regarding the percentage of eligible children attending school? This consideration is critical for estimating the programme's reach and effectiveness.
- What justification is there for the age range for adult women?
- Why use an age range of an adult female?
    - Adult women are present in most households, if we can meet micronutrient needs for an adult woman, it is likely that the needs of other household members can also be adequately addressed.
    - To match a lot of individual intake data that focuses on women.
    - Targeting adult women allows for adjustments to be made for other household members, balancing the distribution of fortified foods and micronutrient requirements.
- Use of Household Consumption and Expenditure Surveys (HCES) for staple foods: Should there be a deeper conversation on how we utilise HCES data to model staple food fortification?
    - Raise another discussion about targeted fortification more generally.

Recommended next steps

- Further refine the analysis with additional data, particularly focusing on the NFCMS to explore spatial distributions and socioeconomic variations in micronutrient intake.
- Advance discussions with stakeholders, including government bodies and industry partners, to foster support for mandatory rice fortification standards.
- Continue monitoring and evaluating the impact of rice fortification on micronutrient inadequacy, adjusting strategies as necessary to optimise health and nutrition outcomes.

Link to group work outputs

7.3 Group 3: What minimum and maximum levels of micronutrients should be specified in Nigeria's mandatory fortification standards?

Group members: Eva Edwards (Chair), Agnieszka Balcerzak, Edward Joy, Frances Knight, Gabriel Battcock, Rashan Smith, Vasiliki Voukelatou, Victoria Padula de Quadros

Background:

Aside from vitamin A in fortified sugar, current mandatory fortification standards in Nigeria only indicate a minimum level of micronutrients to include, not a maximum amount. This reflects a minimum level of micronutrient that should be delivered to the consumer but does not consider overage to achieve this level at the point of consumption and a safe upper level to avoid risk of intake reaching the upper limit.

The recent NFCMS found some fortified foods (such as flour) that were fortified below standard and others (such as salt) with factory levels that greatly exceeded the minimum values. The NFA would like

to consider including maximum values. Initial analysis could guide further investigation (by analysts in the country, using the NFCMS data) and decision-making by the NFA.

Few samples of food vehicles met minimum standards during the NFCMS

Fortification status of food vehicle samples collected from non-pregnant women
NFCMS 2021 (Preliminary report)
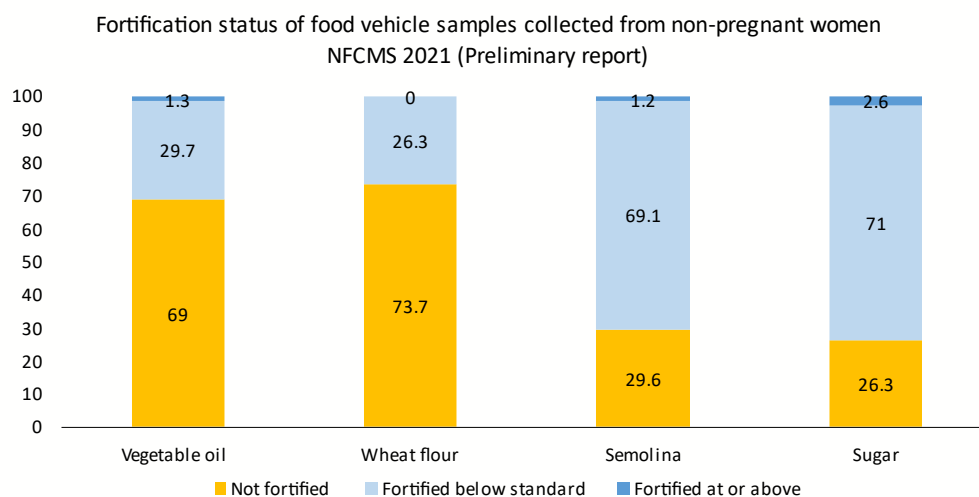
Source: NFCMS 2021 (Preliminary report)

Questions investigated:

1. *Is there any risk that mandatory fortification of oil, flour and sugar is providing excess levels of Vitamin A and how could the country define a range of relevant micronutrients in fortification standards?*
2. *What is the likelihood that the intake of iodised salt, either directly or as an ingredient in other foods such as bouilllon or bread, is leading to iodine consumption above the Upper Limit (UL)?*

Analysis plan

This group explored approaches for ensuring a balance where consumers receive adequate micronutrients from fortified foods without the risk of excessive intake.

To answer question 1, the group used household consumption data from the Living Standards Survey (LSS) 2018/19 matched with the INFOODS West Africa Food Composition Table (WAFCT) 2019 to model a base-case level of 'current' micronutrient intake across the country, for different population groups. Next, they modelled a scenario in which all mandatory vehicles were fortified at different levels (20%, 40% and 200% higher than the minimum standards), to explore whether there would be a risk of exceeding UL within the population based on apparent consumption of fortifiable vehicles. They then compared risk of exceeding UL across target groups and identified population groups, such as women of reproductive age and young children, who would be at most risk of inadequate intake with and without fortification.

To answer question 2, the team calculated and summed the expected iodine intake from different assumed levels of daily salt, bouillon and bread consumption and compared these estimates with

nutrient reference values for adults. The analysis also adjusted iodine content of salt and foods containing salt to assume a content of iodine that was at the average level from samples taken from the NFCMS households and 1SD and 2SD above this average and compared the likely iodine intake from these foods if consumed at observed levels.

Individual-level food consumption data available at the FAO/WHO GIFT Platform from 2011[1] was also used to assess average portion sizes consumed of fortifiable vehicles and key food items by target population groups (WRA and children 2-3 years old). In particular, portion sizes of vegetable oil, palm oil, wheat flour, maize flour, sugar, salt and stock cubes were derived, and results were used to complement information on apparent consumption derived from the LSS 2018/19 survey.

Key evidence presented

- Fortifying food products at the current minimum standards or even at levels 20% or 40% higher poses minimal risk for excessive Vitamin A intake among the general population, including WRA. In extreme experimental scenarios where foods were fortified with vitamin A at double the minimum levels, the intake of a small percentage of households could exceed the UL, especially those with young children. However, the risk of household-level intake exceeding the 'conservative' UL at these greatly exaggerated fortification levels would be much outweighed by the proportion of the population whose intake would be lifted above the minimum threshold by this intervention.
- Considering discretionary salt intake alone, iodine intake would exceed the Average Requirement for adults (including pregnant women) if salt was fortified at levels observed in the NFCMS and if daily consumption exceeded 6 g. In c.15% of NFCMS households, iodine concentration of salt was sufficiently high that consumption of 6 g/day salt would lead to intakes of iodine close to or above the UL of intake, indicating risk of toxicity. Bouillon cubes and bread are likely to provide additional meaningful quantities of iodine into diets. The group concluded by presenting a list of proposed analyses that should be considered by in-country specialists using the NFCMS data, to explore current risks of iodine toxicity in Nigeria due to excessive levels of iodine in salt (follows).
- Resulting list of proposed analyses to recommend to those responsible for analysing the NFCMS dataset to explore the potential for iodine toxicity:

Question	Recommended Approach
Are there particular at-risk groups?	Summary statistics of Urinary Iodine Concentration (UIC) disaggregated by sociodemographic variables and administrative districts (can use MAPS tool biomarker scripts) Improve accuracy of intake estimates considering also individual-level dietary data and disaggregate by sociodemographic groups
Are there areas of the country with higher exposures? Does this correspond to food system factors (e.g. dietary patterns, salt distribution chains, borders) or to environmental factors (e.g. climate, geology)?	Geospatial analysis of UIC e.g. Phiri et al. 2019
Is variability in iodine concentrations of discretionary salt driving variation in status?	Merge data on iodine concentrations in salt samples with biomarker and individual-level dietary data from the NFCMS – assess correlation with mixed effects model
Are high UIC partly a result of hydration status?	Analyse archived urine samples and adjust for hydration using specific gravity or osmolality (not creatinine)

---

[1] Nigeria – 2011 – HarvestPlus. Cassava Intake and Vitamin A Status among Women and Preschool Children in Akwa-Ibom, Nigeria

	Overlay existing data from e.g. borehole surveys, climate and geological datasets, and UIC. New targeted survey of borehole water iodine concentrations
What is the contribution of drinking water to iodine intakes?	

Communication plan and key messages

Objectives	Target Audiences	Key Messages	Outputs
Sharing information on recommended procedure for setting min and max standards	NFA – Responding to their request to provide information on this	There is a standard way of setting min and max levels using the cut point method and 20% higher and lower that the target to account for lab variance – this needs testing to check for risk of exceeding UL – we did the testing and there's min risk therefore recommending a max level.	Presentation at NFA, max 20 minutes Written brief to support presentation
Suggesting an appropriate max level for Vit A	Manufacturers within NFA	Explain reason for the range – helping control for lab variance (helpful)	Personal communication
Sharing considerations for future analysis of NFCMS to explore iodine	Chair of NFCMS TAG and those who will be analysing the NFCMS	NFCMS should be used to explore spatial distribution of urinary iodine concentration, individual consumption of salt and other high iodine foods and iodine levels in salt samples to inform review of salt fortification standards for the country and ensure the population is safe	Email on workshop proceedings with information on what was done and what further investigation is necessary
	National Nutrition technical working group.	Iodine levels are likely too high, available evidence shows this is likely due to discretionary consumption of fortified foods? and further investigation is needed	Will depend on when NFCMS report is released and whether other analysis are going on
	NFA – Awareness (they would ultimately review results of a study)	Results of analysis or details of analysis that should be carried out	TBD

Outputs

- Presentation slide deck

Reflections on group work during plenary

- The NFA is encouraged to revisit and review fortification targets and leverage the NFCMS data to examine the potential risk of inadequate intake as well as risk of intake reaching the UL, particularly for vulnerable groups like women and children.
- Participants were in favour of a data-driven approach to review of Vitamin A fortification standards, considering the minimal risk of exceeding Upper Limits for safety against the backdrop of widespread under fortification and the prevalent risk of inadequate fortification levels.
- There were questions about how to simultaneously consider vitamin A intake from supplements during this analysis. Others responded that given the occasional nature of high-dose vitamin A supplementation, it was not possible to consider in models looking at usual dietary intake.
- Preliminary UIC results from NFCMS indicate that many people are consuming excessive levels of iodine, consistent with findings on dietary exposures. Regional iodine intake variations, such

as lower urinary iodine levels observed in Northern Nigeria, underscores the importance of regional assessments in understanding and addressing iodine nutrition disparities.
- Regulatory considerations
  - o Standard development for bouillon fortification by the Standards Organisation of Nigeria (SON) is currently deliberating on whether to develop standards for bouillon cube fortification. Currently, companies have significant leeway in how they fortify bouillon cubes with iodine, if at all. Establishing standards could harmonise practices and ensure consistent iodine intake from these products.

Link to group work outputs

8. Group discussions
8.1 Reflections on the workshop and lessons learnt

In closing, participants reflected on the overall workshop approach, methodology, and lessons learnt during the five-day policy workshop. The purpose of this discussion was to collect feedback and suggestions for future activities. A post-workshop evaluation was also conducted to understand about the participants' feedback on various aspects of the workshop. This included assessing whether their expectations were met, the structure of the workshop, and its effectiveness in facilitating learning, engagement, and collaborative policy development. Detailed findings from the evaluation are available for reference *(Annex 7 – Evaluation).* Below is a summary of the group discussions on workshop reflections and lessons learned:

Participants felt the workshop reflected a comprehensive and participatory approach and emphasised the importance of those attending engaging fully not just during the week, but prior to the workshop by preparing necessary data and materials. The group also felt that the active leadership and contributions from participating policy experts not only enriched the dialogue but ensured that discussions remained grounded in practical policy implications. Crafting relevant policy questions and maintaining a focus on these questions throughout the workshop were pivotal in driving meaningful outcomes. Additionally, it was felt that the careful consideration of workgroup composition before division and ensuring groups were led by participating policy experts, helped keep policy questions sharply in focus.

The importance of workshop activities and outputs based on a real-life case study was a recurrent theme and encouraged participants to align research perspectives with potential policy outputs. Working sessions and cross-group check-ins with policy experts across the workshop agenda provided valuable contextual insights and fostered a dynamic environment where policy representatives could rotate among groups, further enriching the discussions with diverse viewpoints. This alignment facilitated the translation of analytical findings.

The workshop's organisation was commended, particularly the structure of tasks that built upon each other, contributing to a coherent learning and discussion experience. The right combination of skills within each group, coupled with good group dynamics, was felt to be instrumental in fostering a productive and collaborative atmosphere. The presentation of the Nigerian context on the first day was particularly appreciated, setting a relevant backdrop for the discussions that followed, however it was

suggested that in future similar events, the presentation of the case study country context could come even earlier, to frame the discussion about analysis possible under the participating projects.

8.1 Brainstorming about how this group could respond to capacity strengthening needs

Over the course of the workshop, participants stressed the relevance of capacity strengthening initiatives. A brainstorming session on HOW participating projects and the group could respond to capacity needs on data analysis and modelling was held on the last day. Below is a summary of ideas and insights shared by participants on capacity strengthening initiatives:

A significant insight drawn from the dialogue was that while the cost of conducting primary surveys can be prohibitive, existing data sources can be utilised effectively if novel modelling and analytical approaches are applied. Many government institutions such as statistics bureaus are interested in building internal capacity in analysis and modelling of existing data. Members of this group could support this by training public sector staff to run new scenarios, or through secondments, although this would be dependent on funding and resources.

A medium to long-term goal identified was the importance of building student capacity, by integrating this type of analysis and modelling into academic curricula in countries such as Nigeria. This would encourage a blend of skills among future professionals, encompassing both theoretical knowledge and practical ability. The discussion also highlighted the importance of having a diverse skill set within teams, comprising individuals who understand what needs to be accomplished and those who possess the technical skills to execute these tasks.

Another model mentioned was a demand-driven international community of practice, e.g. the LeNNS network, which is a valuable platform for sharing knowledge and best practices, identifying and responding to gaps, whether they pertain to data availability or expertise.

9. Next steps

In the last session, participants listed activities to be taken following the workshop, relevant to Nigeria only or to the global data community.

Nigeria

- Finalising workshop outputs as examples of analysis that can be done and sharing with the NFA, TAG, and LSFF partners and key governmental officials, including the Honorable Minister of Health and the Ministry of Budget and Economic Planning
- Identifying and engaging with local data modelers to build in-country capacities for data analysis.
- Identifying support mechanisms for initiatives like the National Nutrition Data Alliance.

- Communicate about workshop with NFCMS stakeholders and encourage data partnerships with data and LSFF partners at the country-level, with support from members of this group, if requested, relevant and appropriate.
- Maximise or support the use of existing evidence from the recently released National Food Consumption and Micronutrient Survey (NFCMS) and new evidence that could be developed from further analysis of the NFCMS (yet to be explored).

Global

- Finalise the analysis and report of the workshop.
- Promote the role of DInA as a global data convenor and relevant partner for coordinating any similar workshops and meetings to foster collaboration among data partners.
    - o DInA to develop a Nigerian / West African focused group
    - o Communicate findings to LeNNS - gauge interest from LeNNS members in similar technical workshops? E.g., Tanzania where new micronutrient survey is due to report soon.
- Engaging with Millers for Nutrition
- The Bill & Melinda Gates Foundation planned to convene a session in April 2024 in Cape Town to bring together partners working on delivery, the private sector, and compliance to harmonize outputs developed by various partners, emphasizing the importance of humility among partners for effective collaboration.
- A follow-up review meeting was proposed to further discuss and refine the draft report.

10. Closing remarks and way forward

This workshop aimed to simulate a collaborative process of generating evidence through different analytical approaches to answer priority food fortification policy questions for a case study country. A key component was understanding what the different analytical partners do and can do, communicated via project presentations, and illustrated in the project mapping table (table1). Participants worked collectively to prepare analysis plans, generate, and review evidence, identify key messages, and develop policy-facing outputs in response to policy questions provided from context experts. Throughout the workshop, there were discussions about understanding policy context and priorities and evidence generation to respond to specific questions. Participants also reflected on how global data partners can work cohesively and complement each other. The group discussions also reflected on potential capacity strengthening initiatives, next steps, and overall reflections on the workshop.

We extend our heartfelt thanks to all participants for their invaluable contributions and engagement throughout the workshop.

Annex 1. Concept note and workshop agenda

Concept note [link](#)

Agenda: Policy-driven analysis of food consumption and access data to improve micronutrient intakes - March 11th-15th 2024

	Monday	Tuesday	Wednesday	Thursday	Friday
08:30	Arrival and security processing	Arrival	Arrival	Arrival	Arrival
09:00	Participant Introductions and Housekeeping	Daily introduction	Daily introduction	Daily introduction	Daily introduction
09:15	Objectives, agenda and format	Work in subgroups - Task A	Work in subgroups - Task B	Work in subgroups - Task C	Work in subgroups - Task D
09:30	Scene setting				
09:45	Intro & Q&A: MIMI				
10:10	Intro & Q&A: MAPS				
10:35	10:35-10:50 BREAK	10:35-10:50 BREAK	10:35-10:50 BREAK	10:35-10:50 BREAK	10:35-10:50 BREAK
10:50	Intro & Q&A: MINIMOD	Thematic check-ins	Thematic check-ins	Thematic check-ins	Check in D - Final presentation and review
11:15	Intro & Q&A: HungerMapLive	Work in subgroups - Task A	Work in subgroups - Task B	Work in subgroups - Task C	
11:30	Intro & Q&A: FRAYM				
11:55	Intro & Q&A: DInA				
12:20	Intro & Q&A: FAO dietary data platforms	12:30 – 13:15 Lunch	12:30 – 13:15 Lunch	12:30 – 13:15 Lunch	12:30 – 13:15 Lunch
12:45	12:45-13:30				
13:15	Lunch	Check in A	Check in B	Check in C	- Discussion of implications for future work in other contexts - Reflection on lessons learnt - Agreement on next steps regarding guidance, workshop outputs and agreement on collaboration going forward
13:30	Mapping project functions (interactive session)				
14:00	Overview of the Nigeria Fortification Context				
14:15	Presentation and mapping of priority policy questions or advocacy needs from NFA and NAFDAC	Work in subgroups - Task B	Work in subgroups - Task C	Work in subgroups - Task D	
14:45	Questions and discussion				Summary of daily activities and close
15:00	15:00- 15:15 BREAK	15:00- 15:15 BREAK	15:00- 15:15 BREAK	15:00- 15:15 BREAK	End of workshop
15:15	Discussion to identify evidence that could help answer prioritised policy questions and opportunities to strengthen this by combining or triangulating analytical outputs	Work in subgroups - Task B	Work in subgroups - Task C	Work in subgroups - Task D	
16:00	Prioritisation of analysis, evidence triangulation or evidence products that could be completed and assignation of subgroups				
16:45	Daily summary	Daily summary	Daily summary	Daily summary	
17:00	Close	Close	Close	Close	
		Dinner - 19:00 Milea Art & Food		Dinner - 19:30 Ristorante Angelina a Testaccio	

Annex 2. List of participants

Ekene Onyeagba (online)
Food Fortification Expert
WFP Nigeria

Eva Edwards
Director of Food Safety and Applied Nutrition
National Agency for Food and Drug
Administration and Control (NAFDAC). Nigeria

John Uruakpa
Director and Head, Nutrition Special Programme
Federal Ministry of Health, Nigeria

Nduka Chito Nelson
Deputy Director/Head
Food & Nutrition Division, Federal Ministry of
Budget and Economic Planning. Nigeria

Edward Kutondo
Information Management Officer
UNICEF Nigeria

Saskia de Pee
Chief Analytics & Science for Food & Nutrition
WFP HQ Nutrition

Frances Knight
Team Lead- MIMI
WFP HQ Nutrition

Manita Jangid
Nutrition Data & Policy Specialist
WFP HQ Nutrition

Kevin Tang
Researcher
WFP HQ Nutrition

Gabriel Battcock
Data Scientist
WFP HQ Nutrition

Duccio Piovani
Team Lead
WFP HQ Analysis, Planning and Performance

Vasiliki Voukelatou
Data Scientist
WFP HQ Analysis, Planning and Performance

Rashan Smith
Frontend Developer
WFP HQ Analysis, Planning and Performance

Melas Adoko
Fortification Expert
WFP HQ Nutrition

Louise Ander
Lead-MAPS Project
University of Nottingham

Liberty Mlambo
Spatial Data Scientist
University of Nottingham

Gareth Osman
Project Support Officer
Lilongwe University of Agriculture and Natural
Resources

Sherwin Gabriel
Scientist
IFPRI South Africa

Edward Joy
Associate Professor
LSHTM

Rupinder Sahota
Research Assistant
LSHTM

Fanny Sandalinas
Research Fellow
LSHTM

Sean Walsh
LSFF Project Manager
Fraym

Katie Adams
Researcher
Institute for Global Nutrition, UC Davis

Victoria Padula de Quadros
Nutrition and Food Systems Officer
FAO HQ

Agnieszka Balcerzak
Nutrition and Food Systems Officer
FAO HQ

Keith Lividini
Senior Technical Specialist
Micronutrient Forum (DInA project)

Jonathan Gorstein
Senior Program Officer
Bill & Melinda Gates Foundation

Folake Samuel (online)
Professor
University of Ibadan

Tolu Emma Eyinla (online)
MAPS project
University of Ibadan

Annex 3. Select common terms

Select common terms, acronyms, and definitions relevant to the Policy-driven analysis of food consumption and access data to improve micronutrient intakes can be found here.

Annex 4. Evaluation

Following the workshop, participants were invited via email to complete an [evaluation survey](#). 16 participants replied and responses were recorded anonymously. Findings are collated below.

1. **Workshop expectations**

Participants expected to gain a clearer understanding of various micronutrient data projects, policy-oriented discussions, and evidence-based policy development specific to Nigeria's needs. *"I expected the workshop to be policy oriented and driven by Nigeria policy requirements."* There was a strong emphasis on collaboration, with participants looking forward to engaging in policy dialogues, improving their grasp of technical aspects of nutrition modeling, and exploring ways to effectively communicate data to support policy decisions. *"My expectations were to jointly analyse the data, define policy gaps, and propose evidence-based policy options."* Many spoke about bridging the *gap* between data producers and policymakers, ensuring that data is used effectively to inform policy and answer key policy questions. *"To engage in policy dialogue with Nigerian policy specialists and respond to their key policy questions by suggesting relevant outputs from various data sources as evidence."*

2. **Whether expectations were met**

The responses overwhelmingly suggested that the workshop met participant expectations, primarily through the focus on policy-oriented discussions, evidence generation, and collaborative work environments.

Key factors highlighted were:

- Policy focus and data utilisation: The workshop was said to have successfully steered discussions towards interpretation for policy, making effective use of relevant data to address specific policy questions through structured sessions. *"The workshop was skillfully steered towards policy discussions, usage of relevant data that answered policy questions."*
- The collaborative approach in analysing data in line with policy priorities was highlighted as a major strength. This process was said to have been consultative and inclusive of varied perspectives.
- Engagement and interactive environment: Participants appreciated the interactive nature of the workshop, which allowed for back-and-forth discussions between analysis and policy specialists. The engagement policy experts from Nigeria was particularly noted for enhancing the collaborative environment. *"Yes, because the policy specialists from Nigeria were at the forefront driving the policy questions."*
- Real-time analysis and co-design: The ability to conduct analysis in *real-time* and answer policy questions through a co-design process was appreciated. This approach enabled participants to follow what was happening together and 'see under the hood' of different analysis teams, which provided a platform for immediate feedback and iterative learning.

3. **Unexpected benefits**

- The collaborative group work, though unexpected by some participants, was highlighted as an effective method for combining diverse skill sets & fostering a dynamic learning environment.

- Policymaker engagement: While there was an initial concern about the small number of policy experts present, however the quality of engagement from those in attendance was noted as being particularly impactful. Their active participation added substantial value to the discussions and helped drive the workshop towards meaningful outcomes.
- The skepticism about completing the ambitious agenda within the planned timeframe was overcome by the attendees' sustained energy and engagement. The participants were surprised by their ability to maintain focus and actively participate throughout the week.

4. Most useful aspects of the workshop

- Demand-driven approach: The workshop underscored the importance of starting with demand-driven questions, particularly on the policy priorities of participating Nigerian officials.
- Showed an example of why involving key stakeholders, including government entities, UN agencies, and other partners should be included throughout any evidence generation and policy development processes. This inclusive approach ensures that policies are well-informed and broadly supported.
- Elevator pitch development: Learning to develop targeted and concise pitches targeted at different audiences, e.g., a government official with limited technical background and time, was seen as particularly beneficial. This skill is crucial for fine-tuning messages and ensuring that results are directly relevant and impactful, and participants enjoyed having a chance to think through what would be needed and practice.
- Understanding data and modelling: Gaining insights into specific projects helped them appreciate how different types of data and modelling efforts can inform and support policy-related decisions. It emphasized the complementarity of individual-level dietary data with broader modelling outputs.
- Interactive engagement: The active and interactive engagement between projects and policymakers was highlighted as a standout feature. This engagement allowed for the practical application of data and insights in crafting draft policy briefs, visualizations, and strategic communications plans, offering a more hands-on experience than other policy engagements.
- Co-design and collaboration: The workshop facilitated a strong co-design component, allowing participants to collaboratively develop narratives and outputs that support policy questions. This method of working together was found to be enlightening and effective in producing meaningful outcomes. It also underscored the efficiency and impact that a true co-design process can have. This collaboration not only enhances the analytical process but also ensures the results are more applicable and impactful.

5. Recommended changes (for any future activities)

- Country-Specific Orientation: A common suggestion was for a more comprehensive introduction to the focus country (in this case, Nigeria) at the workshop's outset to provide participants with a deeper context for the discussions. "*I think maybe on the first day a more thorough background of the country in focus (Nigeria this time) could be presented.*"
- Session structure: Suggestions were made to optimize the workshop's schedule, particularly to break up a presentation-heavy first day. This change could improve the overall energy of the

workshop. *"The first day had lots of presentations. If there was a way to break up the day a bit that would be great."*

- Participants suggested including technical government officials from the case study country who could also participate in the analysis, along with even more in-country policymakers, health personnel, industry members relevant to the case study, and other donor representatives. This inclusion would not only diversify perspectives but also enrich the workshop's outcomes by integrating more comprehensive insights into the policy-making process.
- Addressing data inconsistencies: Finally, there was an acknowledgment of the challenges posed by data inconsistencies across different projects. Participants recommended dedicating time to discuss these issues and explore analytical and practical solutions to inform the policymaking process more effectively. *"It would have been good to include a few technical government officials, to be able to expose them to the different tools available."*

6. Ideas or expectations on engagement in Nigeria

- Accessibility and usability of outputs: Ensuring that policy outputs are not only relevant but also revised as needed and made available to policymakers in a usable form is crucial. Despite the workshop being done as an exercise for a case study county, participants felt the outputs were useful and relevant for presentation, in draft form, to a wider group of stakeholders from Nigeria. *"It is very important to ensure that the outputs are used."*
- Dissemination and review of workshop report: Sharing the workshop report with the government and drafting policies for review are seen as essential steps. Strengthening policies based on additional analysis and organizing country workshops could enhance the uptake of these policies.
- Capacity building and relationship development: There's a strong call for follow-up with national authorities (e.g., the NFA) to present results and build relationships centered around capacity building. This includes facilitating in-country fortification modeling.
- Support for capacity strengthening and further analyses: Participants were keen to understand how to progress and fund capacity strengthening efforts requested during the workshop, alongside supporting further analyses to address strategic questions.
- Monitoring and continuation of engagement: The importance of follow-up meetings to gauge the use of workshop outputs and engagement with relevant working groups was emphasized.
- Comprehensive storytelling and data triangulation: Compiling different outputs from the workshop to create a compelling narrative about Nigeria's fortification efforts, along with data triangulation to develop a comprehensive understanding of the fortification case, is suggested. The need for early in-country engagement with various stakeholders as a feedback loop is also highlighted.
- Soliciting guidance on data needs: Further guidance from Nigeria on what data are needed but currently unavailable would help tailor future support and interventions.
- Broadening stakeholder engagement: Expanding the co-design process to include a wider array of stakeholders, such as high-level policymakers, health personnel, and industry representatives, is deemed critical. This expansion ensures that all relevant issues and perspectives are considered in the policy development process.

7. Ideas and expectations on involvement at global level

- Coordination by DInA: The involvement of DInA was appreciated, with hopes that they could coordinate similar efforts in response to any possible demand from other countries. "*Was great to involve DInA. Hopefully, they can coordinate other efforts if there is a demand from other countries.*"
- Participants highlighted the importance of keeping the group active beyond the workshop, continuing to explore new areas of analysis and tapping into global expertise. "*Maintain the network until the group work is completed. Explore new areas of analysis and tap into the different expertise at a global level.*"
- Focused Working Groups: The idea of convening focused groups, such as a Nigeria-focused group by DInA, was suggested to enhance understanding and collaboration among stakeholders within specific countries. "*I think the idea that DInA convenes a Nigeria-focused group is an excellent one.*"
- Creating more hands-on, global working groups among different data initiatives to support countries already being worked with or new ones was proposed. Such groups could replicate the workshop model on a broader scale. "*It would be nice to create a sort of working group between the different data initiatives.*"
- Encouraging policymakers to participate in discussions related to analytical projects in global public fora, such as the global micronutrient data group meetings hosted by DInA, was seen as essential. "*Policymakers should be invited and encouraged to attend discussions related to analytical projects that take place in global public fora.*"
- Government officials from other countries could facilitate cross-learning and the exchange of best practices could be helpful in addressing similar challenges and learning from each country's unique experiences. "*Maybe other country representatives (Govt. officials) for cross learning.*"
- To add technical knowledge and access to global data, institutions such as the Institute for Disease Modeling, UNICEF, and FAO could provide expertise and global insights into disease modeling, child nutrition, and food security.
- When data sets like the World Bank Living Standards Measurement Study (WB LSMS) are utilised, involving entities responsible for these datasets can ensure accurate interpretation and application of the data. "*Perhaps WB LSMS when that data is being used.*"
- The Learning Network Nutrition Surveillance (LeNNS) could play a vital role in facilitating regional discussions on key policy questions and identifying regional nutrition surveillance needs.
- Engaging with organisations within the micronutrient data community, such as those in the micronutrient data alliance, could ensure a comprehensive approach to addressing micronutrient malnutrition.
- Representatives from NGOs and the community could ensure that the discussions remain grounded in the needs and realities of the populations most affected by nutrition policies. This inclusion could provide valuable insights into community needs and effective interventions. "*Harder but representant of the community, NGOs that are likely to be closer to the people's needs.*"