IFPRI Discussion Paper 02251

May 2024

The Enabling Environment for Large-Scale Food Fortification in Madagascar

Danielle Resnick

Development Strategies and Governance Unit

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI), a CGIAR Research Center established in 1975, provides research-based policy solutions to sustainably reduce poverty and end hunger and malnutrition. IFPRI's strategic research aims to foster a climate-resilient and sustainable food supply; promote healthy diets and nutrition for all; build inclusive and efficient markets, trade systems, and food industries; transform agricultural and rural economies; and strengthen institutions and governance. Gender is integrated in all the Institute's work. Partnerships, communications, capacity strengthening, and data and knowledge management are essential components to translate IFPRI's research from action to impact. The Institute's regional and country programs play a critical role in responding to demand for food policy research and in delivering holistic support for country-led development. IFPRI collaborates with partners around the world.

AUTHORS

Danielle Resnick (d.resnick@cgiar.org) is a Senior Research Fellow in the Development Strategies and Governance Unit at the International Food Policy Research Institute, Washington, DC.

Table of Contents

ABSTRACT

Why is there high variability—both across countries and across different food staples—in the adoption and implementation of large-scale food fortification (LSFF)? A systematic diagnostic of the enabling environment for LSFF can identify key bottlenecks and help to calibrate policy interventions appropriately. This paper delineates the components of such a tool by focusing on two core elements of the enabling environment—political will and implementation capacity—and applies the framework to Madagascar. With more than 75 percent of its population living below the poverty line and almost 40 percent of children under five who are stunted, Madagascar faces major hurdles to addressing malnutrition, including weak consumer purchasing power, recurrent political crises, and frequent climate shocks that undermine agricultural productivity. LSFF has been identified in several national nutrition plans as an option for addressing malnutrition. Yet, thus far, only salt has been fortified at a national scale.

Drawing on semi-structured interviews with 31 knowledgeable stakeholders in Madagascar in the areas of mandatory fortification of salt, voluntary targeted fortification of infant flour, and fortification of foods for humanitarian assistance, the framework reveals several key priorities. First, weak governance overall affects several dimensions of nutrition and fortification policy, including policy momentum, commitment, and communication. Nutrition interventions therefore need to be calibrated to the country's broader political risks, incentive structures, and capacities of relevant civil servants. To this end, fortification advocates should go beyond drawing on the expertise of nutrition professionals alone and also engage public sector governance experts as partners in fortification efforts. Second, major priorities for investment include a large-scale micronutrient and consumption survey to update information on micronutrient deficiencies and identify viable food vehicles for mass fortification. Third, an accredited laboratory to test micronutrients is sorely needed in the country to help reduce costs faced by companies who currently send their products overseas for testing and who face competition from counterfeit products. Fourth, financial and technical partners must pursue a multi-pronged lobby approach to overcome high government taxes on imported premix. Fifth, the National Food Fortification Alliance, which serves as a multi-stakeholder platform, requires a sustainable financing model to attract committed leadership and ensure consistent coordination activities. These and other lessons hold policy relevance for other low-income and fragile settings where LSFF is being considered as an option to address micronutrient deficiencies.

Keywords: enabling environment, fragile states, large-scale food fortification, governance**,** Madagascar, micronutrient deficiencies, political will

ACKNOWLEDGMENTS

The author thanks GIZ for technical assistance and facilitating the fieldwork for this study and the Bill and Melinda Gates Foundation for financial support of the study. She is also grateful to Rojo Arisoa Mahaimanana, Jessika Loeser, Joanne Walsh, John Syllie Noela Randriarivony, and Aishani Gupta for input on the analysis and to the participants from the Madagascar fortification community for providing feedback on an earlier draft of the study during a March 2024 validation workshop. All errors are her own.

Acronyms

ACF	*Action contre Faim* (Action against Hunger)
ACSQDA	*L'Agence de Contrôle de la Sécurité Sanitaire et de la Qualité des Denrées Alimentaires* (Food Safety and Quality Control Agency)
AFFORD	Advancing Food Fortification Opportunities to Reinforce Diets
ANFA	*Alliance Nationale de la Fortification Alimentaire* (National Food Fortification Alliance)
AOI	*Aide Odontologique International* (International Dental Aid)
APMSAN	*Alliance Parlementaire pour la Sécurité Alimentaire et la Nutrition* (Parliamentary Network for Food Security and Nutrition)
APSM	*Association Producteur Sel du Morondava* (Morondava Salt Producers' Association)
AVSF	*Agronomes et Vétérinaires sans Frontières* (Agronomists and Veterinarians without Borders)
BMGF	Bill and Melinda Gates Foundation
BNM	*Bureau de Normes de Madagascar* (Madagascar Standards Bureau)
CNLEGIS	*Centre National d'Information et de Documentation Législative et Juridique*
CNN	*Conseil National de Nutrition* (National Nutrition Council)
CNRE	*Centre National de Recherches sur L'Environnement* (National Center of Research on the Environment)
CNS	*Comité National de Sel* (National Salt Committee)
CRS	*Comité Regional de Sel* (Regional Salt Committee)
COSIM	*Comptoire de Sel Iode de Morondava* (Iodized Salt Counter of Morondava)
CSM	*Compagnie Salinière Madagascar* (Salt Company of Madagascar)
DLCMNT	*Direction de lutte contre les maladies non transmissibles* (Department of Non-Communicable Diseases)
DPC	*Direction de la protection des consommateurs* (Department of Consumer Protection)
DSFA	*Direction de la Santé Familiale* (Department of Family Health)
ENISM	*l'Enquête Nationale sur l'Iode et le Sel* (National Survey on Iodine and Salt)
FAO	Food and Agriculture Organization
GAIN	Global Alliance for Improved Nutrition
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit* (German Society for International Cooperation)
GRET	*Groupe de recherche et d'échange technologique*
GSM	*Nouvelle Société d'Exploitation des Grands Salins du Menabe*
HINA	Harmonized Initiative for Nutrition Action
HITA	*Huilerie Industrielle de Tamatave* (Industrial Oil of Tamatave)
IFNA	Initiative for Food and Nutrition Security in Africa
IGN	Iodine Global Network
IPM	*Institut Pasteur de Madagascar* (Pasteur Institute of Madagascar)
IRD	*Institut de Recherche pour le Développement* (Research Institute for Development)
KI03	Potassium Iodate
KII	Key informant interviews
LSFF	Large-scale food fortification
MEF	*Ministère de l'Economie et des Finances*
MeSupReS	*Ministère de l'Enseignement Supérieur et de la Recherche Scientifique*

MICC	*Ministère de l'Industrialisation, du Commerce et de la Consommation* (Ministry of Industrialization, Commerce, and Consumption)
MINAE	*Ministère de l'Agriculture et de l'Elevage* (Ministry of Agriculture and Livestock)
MSANP	*Ministère de la Santé Publique* (Ministry of Public Health)
ONN	*Office National de Nutrition* (National Nutrition Office)
ORN	*Office Régional de Nutrition* (Regional Nutrition Office)
PFOA	*Projet de Fortification Alimentaire* (Food Fortification Project)
PNAN	*Plan National d'Action pour la Nutrition* (National Action Plan for Nutrition)
PROSAR	*Projet de Sécurité Alimentaire, Nutrition et Renforcement de la Résilience* (Food Security, Nutrition, and Reinforcement of Resilience Project)
PTF	*Partenaires Techniques et Financière* (Technical and Financial Partners)
QA/QC	Quality Assurance/Quality Control
RUSF	Ready to Use Supplementary (RUSF) foods
RUTF	Ready to Use Therapeutic Foods
SBN	SUN Business Network
SIM	*Syndicat des Industries de Madagascar* (Union of Madagascar Industries)
SNFOA	*Stratégie Nationale pour la Fortification Alimentaire à Madagascar* (National Strategy for the Food Fortification in Madagascar)
SNUT	*Service de la Nutrition* (Nutrition Service)
SQC	*Le Service de la Qualité et du Conditionnement* (Quality and Packaging Department)
SUN	Scaling Up Nutrition
TAF	Taloumis Group
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USI	Universal Salt Iodization
WFP	World Food Program

Introduction

Why is there high variability—both across countries and across different food staples—in the adoption and implementation of large-scale food fortification (LSFF)? LSFF, which involves adding essential minerals and vitamins to widely consumed foods, long has been considered one of the most cost-effective ways of addressing micronutrient deficiencies in low- and middle-income countries (Horton 2006). The World Bank stated that "probably no other technology available today offers as large an opportunity to improve lives and accelerate development at such a low cost and in such short a time" (cited in Mannar and Hurrell 2018). In both 2008 and 2012, the Copenhagen Consensus project identified LSFF as a one of the most cost-effective development priorities (Olson et al. 2021). Besides cost, LSFF requires minimal changes to consumption patterns while relying on existing food delivery systems (Osendarp et al. 2018).

Nevertheless, there is a high level of variability across countries in the adoption of mandatory and voluntary LSFF standards, i.e. government legislation stipulating which foods should be fortified with which levels of vitamins and minerals and the consequences for non-compliance. For instance, Mkambula et al. (2020) identify 84 countries with widespread micronutrient deficiencies where a mandatory standard has not been adopted for a food vehicle that is widely consumed. Moreover, there are several cases where adopted standards could not be financially sustained over the years, or where subsequent tests reveal that food vehicles lacked the stipulated micronutrients (Mildon et al. 2015; Resnick et al. 2018).

An assessment of the enabling environment for LSFF ex-ante can be an effective tool for better calibrating policy interventions. This enabling environment consists of both political will and implementation capacity. While the role of politics is acknowledged to be an important factor underlying the success of LSFF (Mkambula et al. 2020; Wadman 2021), many studies on LSFF explicitly note that the politics is beyond the scope of their analysis (e.g. Berry, Mukherjee, and Shastry 2012; Fiedler et al. 2013). However, by reducing LSFF to a purely technical intervention, bottlenecks to policy traction can fester and derail uptake. By combining assessments of political will and implementation capacity into a coherent framework, the enabling environment can be assessed across countries and food vehicles over time.

The framework is then applied to Madagascar to identify features of the underlying policy enabling environment that constrain uptake and implementation of LSFF. Madagascar represents a useful case to examine the enabling environment for LSFF for two key reasons. First, high levels of poverty, estimated at 75.2 percent as of 2022 (World Bank 2023), necessitate a cost-effective solution to tackle the country's sizeable malnutrition challenge. In fact, approximately 39.8 percent of children under five are stunted, exceeding the Africa regional average (30.7%) and higher than countries that have been affected by civil conflict, including Burkina Faso, Mali, Somalia, and South Sudan (Development Initiatives 2022). No progress has occurred in the area of anemia among women of reproductive age, which stands at 37.8 percent of women between 15 to 49 years of age (Development Initiatives 2022). Chronic food insecurity and inadequate feeding practices mean that childhood stunting and undernourishment haunt many Malagasy beyond their school age years (Aiga et al. 2019). There are also major regional disparities, with stunting exceeding 40 percent in 11 of the country's 22 regions (INSTAT & DHS 2022). Most notably, the drought in 2021 in the southern part of the country resulted in more than two million people in the Great South and Great South-East regions experiencing emergency levels of food insecurity (Fayad 2023).

Second, these lackluster malnutrition and food insecurity dynamics have occurred despite a longstanding set of programs and alliances aimed at addressing nutrition and micronutrient deficiencies. In 1995, the government adopted a Universal Salt Iodization (USI) policy that made salt iodization

mandatory in the country. In 1999, the government initiated the National Community Nutrition Program, which was ultimately institutionalized within the National Office of Nutrition (ONN) in 2004 (Weber, Galasso, and Fernald 2019). Also in 2004, Madagascar adopted a National Nutrition Policy, which subsequently has been supplemented by four National Plans of Action, including most recently the PNAN IV (2022-2026). In 2012, the country also joined the Scaling Up Nutrition (SUN) nutrition movement with ONN as the lead agency. In 2021, a National Strategy for the Food Fortification in Madagascar (SNFOA) was launched, and food fortification was highlighted in the country's national food system pathway submission to the 2021 UN Food System Summit (UN 2022).

Despite both the opportunity for LSFF to address micronutrient deficiencies and several national strategies intending to scale up this policy intervention, progress at LSFF remains stalled and even further behind than many other African countries.[1] Besides salt, to which mandatory fluoride was also added in 2014, no other vehicles have been targeted for mandatory fortification. There are though several other voluntary standards in place, including for infant flour, and fortified cereal bars for preschool children as well as muesli for school-age children (Republic of Madagascar 2021). The identification of additional food vehicles for mass fortification is emphasized as a key goal in the most recent PNAN IV (ONN 2022), and improving bottlenecks to current fortification efforts is of utmost importance to many within Madagascar's nutrition community.

To better understand the enabling environment for, and the priority constraints to, expanding food fortification in Madagascar, this study draws on secondary materials and key informant interviews (KII) conducted with 31 individuals from 17 different entities working in the domain of food fortification in Madagascar and belonging to the government, private sector, civil society, and donor communities. The interviews took place in person or virtually between October 2023-January 2024. For purposes of confidentiality, respondents will be referred to in the report by a KII number and not by name. The institutional affiliations of respondents are included in Appendix 1 of this paper.

Several key findings and recommendations emerge from an application of the enabling environment diagnostic. First, weak governance overall affects several dimensions of nutrition and fortification policy, including policy momentum, commitment, and communication. Nutrition interventions therefore need to be calibrated to the country's broader political risks, incentive structures, and capacities of relevant civil servants. To this end, fortification advocates should go beyond drawing on the expertise of nutrition professionals alone and also engage public sector governance experts as partners in fortification efforts. Second, major priorities for investment include a large-scale micronutrient and consumption survey to update information on micronutrient deficiencies and identify viable food vehicles for mass fortification.[2] Third, an accredited laboratory to test micronutrients is sorely needed in the country and would help reduce costs faced by companies who currently send their products overseas for testing and face competition from counterfeit products. Fourth, a multi-pronged lobbying approach by financial and technical partners is needed to overcome a major disincentive to fortification for the private sector: high government taxes on imported premix. Fifth, a sustainable financing model for the National Food Fortification Alliance (ANFA) is needed to attract committed leadership and ensure consistent coordination activities. Finally, given the number of fortification projects ongoing in the country and a lack of transparency or awareness about these activities, the paper discusses the opportunity to create a

[1] According to the Global Fortification Data Exchange (https://fortificationdata.org/), many African countries also fortify edible oil and flour (either wheat or maize) in addition to salt.
[2] As noted later in this paper, such a survey will be launched in 2024.

dashboard housed by the ONN that explains the process, costs, and responsible entities for businesses interested in voluntary fortification.

These and other findings follow from the details elaborated on in the subsequent sections. The next section elaborates on the enabling environment framework. This is followed then by a landscape assessment of the key public, private, and civil society actors who play a key role in Madagascar's policy sphere. Subsequently, there is a discussion of opportunities, constraints and lessons learned from mandatory fortification of salt and voluntary targeted fortification of infant flour and biscuits, and fortification of foods for humanitarian assistance. Future fortification opportunities for other vehicles, such as rice, subsequently are discussed. In turn, a discussion of cross-cutting challenges for all food vehicles is provided and major binding constraints are identified and aligned to the framework that encompasses both political will and institutional capacity.

Enabling environment diagnostic for LSFF

The enabling environment for policy change is often shaped by the combination of political will to adopt needed reforms and the capacity of relevant stakeholders to implement such reforms. Yet, political will, whose absence is frequently blamed for policy failures, is oft-dismissed as too vague a concept (Post, Raile, and Raile 2010). To make it more concrete, this paper highlights the importance of interests, ideas, and leverage of the public, private, and civil society actors. The public sector refers to government ministries, agencies, executives, legislators, and bureaucrats. The private sector encompasses food producers, processors, and retailers. Civil society actors include consumers, research institutes, universities, journalists, and non-governmental organizations, inclusive of both domestic and international partners. Implementation capacities for LSFF in turn reflect the extant institutional architecture and requisite technical skills among these actors. Each of these dimensions are delineated in Figure 1 below and then described in more detail in the subsequent sub-sections.

Figure 1: Identifying Key Drivers of Political Will and Implementation Capacity for LSFF

		Public Sector	**Private Sector**	**Civil Society**
Political Will	*Interests*	Minimize budgetary outlays	Maximize profit margins	Minimize food costs
		Minimize backlash from important constituencies	Minimize changes to organoleptic properties	Maximize nutrition
		Maximize citizen well-being	Maximize reputational branding	Minimize health risks
	Ideas	Protectionism vs. globalism	State vs. market	Techno-fix vs. natural foods
		Externally driven vs. locally owned	Protectionism vs. globalism	State vs. market
	Leverage	Policymaker cohesion	Industry coordination	Coalition alignment
		Sanctions	Strike potential	Consumer awareness campaigns
		Incentives	Lobbying power	Buying power
Implementation Capacit	*Institutional architecture*	Modalities for coordinating multi-sectoral policies affecting LSFF	Modalities for coordinating across industries	Modalities for coordinating across CSOs

		Horizontal and vertical regulatory coordination	Modalities for coordinating across segments of the value chain	Geographical reach of civil society organizations/networks
		Fora for issue articulation with the private sector and civil society	Fora for issue articulation with the public sector and civil society	Fora for issue articulation with the public and private sector
	Technical capacity	Data for tracking consumption	Spectrophotometer devices to confirm internal compliance	Capacity to assist with M&E
		Laboratories for monitoring compliance	Training on dosifier usage	Capacity to train private sector
		Trained and incentivized bureaucrats to monitor compliance	Training on storage of micronutrients and/or proper retailing of fortified foods	Capacity to train public administration

Source: Author

Political Will

Political will can be collectively assessed by considering the confluence of *interests*, *ideas*, and *leverage*. Interests often predominate in many policy decisions because individuals and groups seek to maximize some source of utility—whether profits, costs, votes, prestige, visibility—based on their position in the economy, society, or political arena (Hall 1997). For LSFF, there are several different interests that stakeholders prioritize. The public sector, for instance, will want to pursue an option that can simultaneously minimize government budget outlays and political backlash from important consumer or business groups while still maximizing citizen well-being. In addition, governments may have different risk tolerances, with some concerned about population overexposure to certain nutrients or potential job loses if inputs are not affordable to small-scale industry actors (Fiedler et al. 2013; Wadman 2021). The private sector foremost aims to maximize profit margins, which requires minimizing costs around input access as well as for equipment and storage. In addition, it wants to maximize consumer demand for its products by ensuring minimal changes in organoleptic properties of fortified foods and maximize reputational branding if there are benefits to cultivating a niche as a "nutritious foods" supplier (Akhtar, Anjum, and Anjum 2011; Bishai and Nalubola 2002; Fiedler et al. 2013; Kimura 2013; Lalani, Ndegwa, and Bennett 2020; Luthringer et al. 2015). Consumers foremost care about minimizing food costs and health risks while still maximizing nutrition while being assured of their food safety (Begley and Coveney 2010; Dijkhuizen et al. 2013; Dixon and Shackley 2003; Fiedler et al. 2013; Milani et al. 2016; Wadman 2021).

Ideational views emphasize that preferences often rely on inter-subjective understandings about how the world works that derive from historical experience, cultural norms, and societal expectations (Abdelal 2009; Blyth 1997). Several different types of ideas are key for understanding support for or resistance to LSFF. First, there is a trade-off in ideas about globalism versus protectionism. Fortification may promote domestic industry but increase non-tariff barriers or may require dependence on fortified imports and thereby undermine agricultural self-sufficiency goals and create vulnerability to international price volatility (Sirdey and Moisa 2020). Second, there may also be different levels of acceptance of state intervention versus market capitalism within the food industry; both industry actors and consumers may

either welcome or resent intervention by the state in a way that alters market competition or infringes upon individuals' rights to choose what they consume (Begley and Coveney 2010; Lawrence 2013). This, in turn, may derive from varying levels of trust in the government's intentions and abilities to regulate LSFF (Bishai and Nalubola 2002; Lalani, Ndegwa, and Bennett 2020; Tonkin et al. 2021). Third, there can be divisions over what some call "techno-fix" approaches (Nestle 2013), including whether the optimal approach to improved nutrient intake is through dietary diversification or fortified foods (Biltekoff 2016). In some cases, stakeholders may view LSFF as a donor-driven or multinational corporate agenda that has minimal domestic interest or demand (Kimura 2013).

Leverage refers to an actor's power to negotiate and bargain, which may derive from their size and organizational power, veto power within the policy arena, monetary influence, and/or voting size. There are several ways in which leverage in the LSFF policy process can manifest across different stakeholders. In the public sector, greater cohesion on LSFF by powerful decision-making actors provides more leverage when engaging with the private and civil society sectors. Cohesion can be weakened when fortification focuses on foods such as sugar and salt, which can create tensions between ministries of health and standards agencies. Similarly, ministries of trade, industry and agriculture may come into conflict when trade agreements with external partners undermine support for domestic agribusiness and producers who may bear the burden of fortification. Discordance among public decisionmakers can also emerge when different policy actors accord different weights to universal exposure to fortificants, such as via LSFF, than to targeted exposure through supplements to only vulnerable groups (Lawrence 2013). The public sector can also exert leverage through the judicious use of sanctions and incentives. Sanctions may include fines, suspension of operating licenses, and factory closures while incentives include subsidies for premixes or tax breaks for equipment (Luthringer et al. 2015). Their efficacy depends on consistent enforcement, clear definition of what constitutes non-compliance, and fines that are sufficiently high to serve as a deterrent (Dijkhuizen et al. 2013). There are equally a range of potential incentive instruments, including subsidies for premixes or tax breaks for equipment (Luthringer et al. 2015).

Private industry actors can likewise exert leverage over the design of LSFF mandates through their strike potential, industrial associations, and levels of coordination (Hendriks et al. 2016; Kimura 2013; Luthringer et al. 2015; Resnick et al. 2018). The efficacy of these different tools of leverage depends on their structural power based on market concentration vis-à-vis the particular food commodity. Civil society's leverage derives from alignment among coalitions of civil society actors, sometimes bolstered through transnational networks. They may employ academic research and data and utilize access to the media to frame advocacy campaigns that either support or oppose LSFF. Moreover, consumers can exert their buying power to demonstrate their positioning, including through boycotts or by shifting to informal market outlets to purchase smaller quantities or cheaper, smuggled staples when fortified foods are too costly.

Implementation Capacities

Implementation capacities encompass *institutional architecture* and *technical capacities*. Institutional architecture refers to the range of coordination mechanisms required to ensure coherent implementation of LSFF policy. This includes, for instance, horizontal coordination across multiple ministries and agencies that may each have different responsibilities, both direct and indirect, along the fortification value chain (Dijkhuizen et al. 2013). In addition, clear mandates across regulatory agencies are essential to avoid confusing industry actors and eroding their trust in the process.

Fora to convey progress and problems with fortification implementation ensure that all affected stakeholders are informed and incorporated in the decision-making progress. To that end, national

fortification alliances that include government, industry, civil society, donors, and nutrition professionals to identify common points of (dis)agreement have been critical components of LSFF in many countries (Lalani, Ndegwa, and Bennett 2020). However, they are often only funded for a short-term period (Mkambula et al. 2020). If responsibilities for LSFF implementation and oversight are divided across different levels of government—such as states, provinces, regions, or cities—then vertical coordination mechanisms are also needed.

Coordinating across industries is particularly critical when a designated food vehicle is produced through many small- or medium-scale processors (Bymolt and D'Anjou 2017). In such cases, to make fortification more viable, opportunities to organize processors into larger groups that can supply to the market makes LSFF more affordable to industry actors as well as enhances monitoring, training, and oversight. Since the sustainability of LSFF and its ultimate impacts on human nutrition depend on having a stable supply of production and inputs, it is equally important for the private sector to have modalities of coordination along the value chain of the targeted food vehicle, particularly between farmers and processors as well as between industrial and retail food suppliers.

Civil society also needs to be coordinated to ensure coherent messages to the government and private sector; such coordination can be facilitated through network modalities such as the Scaling Up Nutrition (SUN) movement. Since monitoring compliance, conveying citizen concerns, or assisting with training requires a presence beyond the capital city, the credibility of such organizations and networks with national governments and the private sector to help with implementation also depends on their subnational geographical reach. Indeed, organizations with more subnational offices tend to be correlated with higher perceptions of policy efficacy (Resnick, Anigo, and Anjorin 2022)

Technical capacities encompass data, equipment, and training. For instance, the public sector requires the latest data about consumption behaviors to ensure that its micronutrient standards and food vehicles are appropriate. Equipment includes proper and sufficient laboratories to assess industry compliance as well as devices, such as iCheck and WYD, that can facilitate quality assurance internally within industries. Training is paramount for both frontline bureaucrats in charge of monitoring LSFF compliance, as well as industry actors that commit to fortification. For the former, this may involve attractive compensation, performance incentives for food control agencies to retain talent, and appropriate travel budgets (Luthringer et al. 2015). This is particularly true for oversight of food vehicles produced by a fragmented industry with many small-scale or informal producers. Technical training among industry actors may be needed about, *inter-alia*, the proper use of a dosifier and appropriate storage to maintain nutrient integrity. Civil society actors, such as domestic and international universities, can provide monitoring, training, and mapping of relevant industry actors in cases where public sector agencies are too weak (Hendriks et al. 2016).

Landscape assessment of public, private, and civil society actors

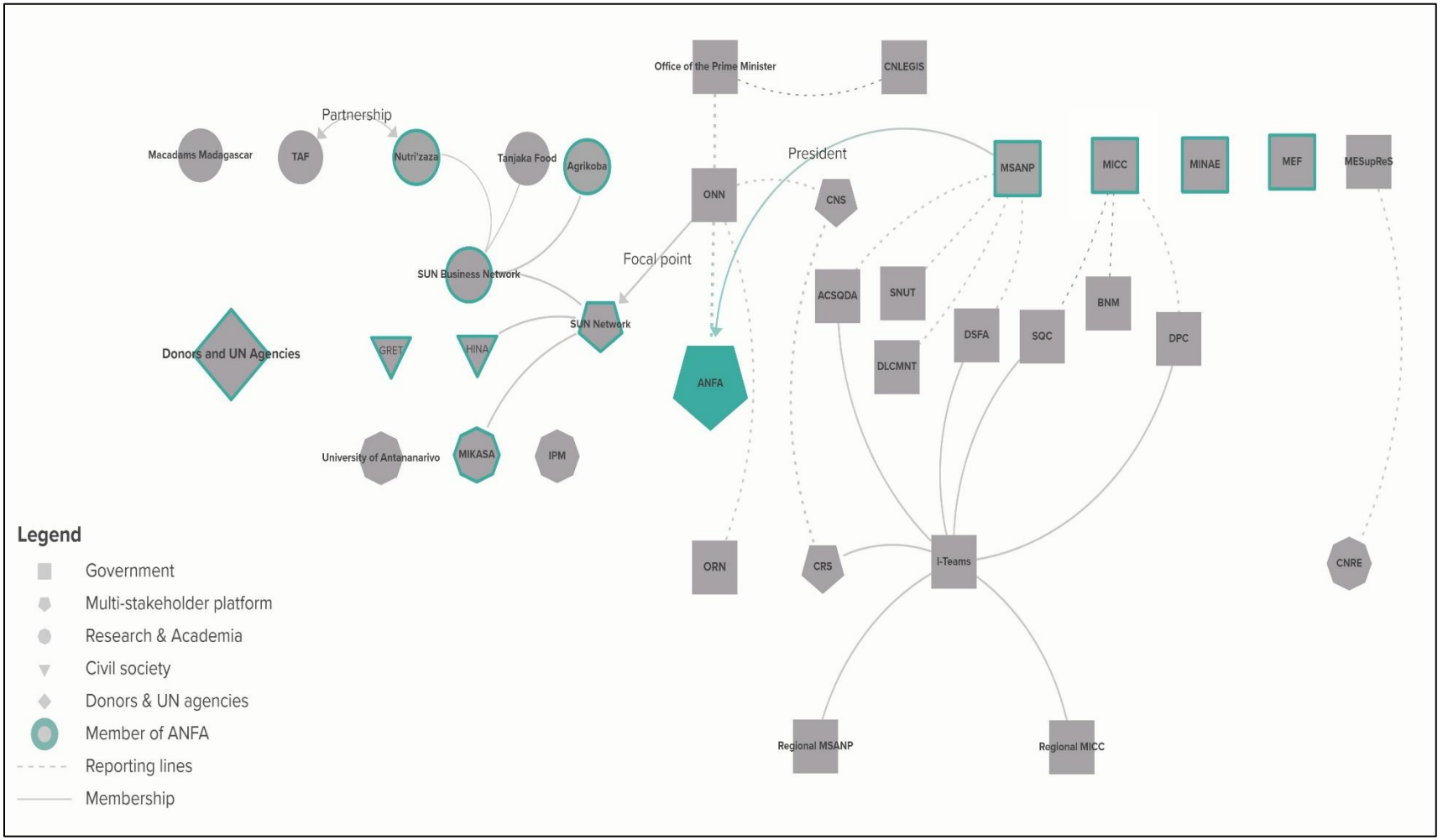
As noted earlier, Madagascar offers useful context to apply the above framework in order to uncover why, despite high levels of malnutrition and several national strategy documents stating the benefits of LSFF, uptake and implementation of LSFF remains quite weak even compared to other African countries. Figure 2 delineates the major stakeholders who have a significant role in LSFF in Madagascar, inclusive of government, private sector, bilateral donors and United Nations agencies, universities and research community, and civil society. For government actors, their primary roles involve reinforcing multi-stakeholder collaboration, as well as a series of quality assurance and quality control (QA/QC) functions, such as formulating, and regulating standards, issuing certificates to businesses, providing surveillance and control, testing food quality, and sanctions for non-compliance. There are also

a range of non-governmental actors that provide necessary financing and in-kind support as well as technical assistance. The responsibilities and roles of each of these actors are discussed in more detail below, along with respondents' assessments of their achievements and weaknesses.

Government

Madagascar is a semi-presidential system with a president who appoints a prime minister who in turn oversees the Council of Ministers. Several organs have been established within the Office of the Prime Minister, including ONN, which is the primary government stakeholder overseeing fortification efforts. Established in 2004, ONN is chaired by a coordinator appointed by the Prime Minister. Among other responsibilities, the ONN is charged with overseeing implementation of the National Nutrition Policy as well as housing the National Food Fortification Alliance (ANFA) and the National Salt Committee (CNS). Due to Madagascar's decentralized structure, ONN also has Regional Nutrition Offices (ORN) in most of the country's 23 regions.

Figure 2: Key institutional stakeholders in Madagascar's food fortification landscape



Source: Derived from key informant interviews and secondary materials.

Originally, the placement of ONN within the Prime Minister's office was intended to ensure high level political will to nutrition and attract a dynamic and capable staff with good salaries. [3] However, during recent public sector reforms overseen by the World Bank, ONN became aligned with the rest of the public service (KII27). As such, they experience similar challenges as other public servants, including salaries arriving four to six months late, therefore creating a demoralized setting. Although it was formerly one of the strongest units in the Prime Minister's office, its influence has declined over the last three year. While it previously received a budget of about 20 billion MGA (about USD 4.6 million) per year, it now only receives 4 billion MGA (about 913,000 USD) (Antilahy et al. 2023). This has led to a lot of staff turnover within the ONN that has also affected the momentum of ANFA (KII27). Moreover, in previous assessments of ONN, stakeholders claimed that the dual role of the ONN as both a multisectoral nutrition coordinator and an implementer creates confusion among stakeholders about its priorities and mandate (SUN 2019b). In evaluations of the implementation of PNANIII, respondents noted that ONN's role as an operational body *and* a coordinating one creates competition with technical partners because ONN has an incentive to keep funding for its operational budgets, which affects its legitimacy as an impartial coordinator (KII27).

Similar to fortification alliances in other countries, ANFA is intended to serve as a multi-stakeholder coordination platform for all those engaged in food fortification. Established in 2008, it has several roles: 1) bring together all sectors and organizations that are important for reducing micronutrient deficiencies, 2) formulate and implement a strategy and national program for sustainably fortifying food, 3) facilitate partnerships among all sectors that are key for reducing micronutrient deficiencies, and 4) assure linkages with technical and financial partners—both domestic and international—who intervene in food fortification. ANFA contains both a lead committee with government representatives highlighted in green in Figure 2, as well as four commissions: technical, communication, monitoring and evaluation, and standards and regulations (GoM 2008). The different commissions may hold monthly or trimester meetings (KII12). Annual general assembly meetings that bring all members together are a key modality for facilitating coordination (KII4). The most recent general assembly meeting was held in early December 2023, with two previous ones since 2019.[4]

ANFA has experienced various ebbs and flows over the last decade. While its impact was weakened during the country's political crisis from 2009-2013, which resulted in sanctions and deprived it of necessary donor resources, it was revitalized with donor support from the European Union (EU) through the Food Fortification Program for Vulnerable Populations in Madagascar (PFOA) from 2017-2021. In fact, interviewed stakeholders highlighted several successes that emerged during that period, including the development of fortification standards for infant flour, gari, and bread fruit, an official certificate of production for conforming to Malagasy standards for fortified goods using the Tovonantsoa label, and the drafting of SNFOA (KII4, KII5).[5]

---

[3] There previously was also a National Nutrition Council (CNN), which acted specifically as an interministerial platform and which included members of Parliament, several government ministries, donors, UN agencies, and civil society representatives. However, after two years, it ceased functioning due to political volatility and high levels of ministerial turnover (SUN 2019b).

[4] During the 2023 ANFA general assembly meeting, members discussed amending the ministerial order that originally established ANFA in 2008 and combining the technical and standards commission, thereby reducing the number of commissions from four to three. Amending a ministerial order does, however, take considerable time so it is unclear when these changes will be operational (KII31).

[5] The infant flour known as Koba Aina and produced by the company Nutri'zaza was the first to receive this certification. See appendix 2 for images of logos.

Yet, in recent years, the entity's momentum has stalled, and interviewees from all sectors—government, private sector, donor, and civil society—conveyed their current disappointment with it (KII4, 5,6,12, 21, 22). One member of the private sector community further noted that the main issues for fortification remain the tax on pre-mix rather than coordination or capacity strengthening for industry, and ANFA has not resolved this issue (KII13). Relatedly, another respondent noted that ANFA's ambition was quite limited, resulting in mostly hosting meetings (KII26). Another respondent noted that there is a lack of clarity about who does what within ANFA, asking, "What is the difference between ANFA and the lead committee?" and noting the absence of a manual of procedures so that people know what to do and the processes to follow (KII21). As with ONN more generally, frequent staff turnover was highlighted as one reason for stalled momentum, the lack of a permanent secretariat, and insufficient financing for the entity (KII14,15,16, 21). Insufficient resources are a longstanding concern for ANFA, which remains entirely funded by donors (KII31). During ANFA's 2023 general assembly meetings, a priority issue for discussion was identifying ways to mobilize more resources for the body such as possibly through a grant submission process (KII31).

Ministerial turnover has been equally problematic for ANFA; during his 2018-2023 term, President Andry Rajoelina shuffled his cabinet five times and merged or split ministries over time, changing their mandates (Mouahidi 2022). This has resulted in rotations of government members of ANFA, leading one respondent to note, "The structure changes and the people that were part of ANFA may also change…It's for this reason that we are constantly talking about [ANFA's] revitalization and re-sensitization of stakeholders, or holding another information session. It's always the same thing. It's necessary that the people don't change" (KII21).

Among government ministries, the key members of ANFA's lead committee include the Ministry of Public Health (MSANP), Ministry Industrialization, Commerce, and Consumption (MICC), and the Ministry of Agriculture and Livestock (MINAE). Within MSANP, two departments are most relevant: the nutrition service (SNUT) and the food safety and quality control agency (ACSQDA). The nutrition service has a lab for testing salt iodization but lacks the capacity to test for other micronutrients (KII7). The ACSQDA likewise has laboratory capabilities to identify pathogenic organisms in food and compliance of food with humidity and acidity requirements (i.e. physical, microbiological, and chemical dimensions), but it also cannot analyze the presence of micronutrients that should be present in fortified foods (KII16). The ACSQDA is responsible for issuing certificates of consumption to all food enterprises in the country, inclusive of those producing fortified foods; any company that wants to produce food has to register with the agency. Moreover, as a member of the ANFA technical committee on standards, ACSQDA works closely with the BNM to develop standards (KII16). Yet, the agency is very weak in terms of human, logistical and financial resources, with only about 10 agents available to oversee health quality across the entire country (WFP 2023).

The Ministry of Commerce houses the BNM as well as the Quality and Packaging Department (SQC). The latter also houses the Secretariat for the national committee of Codex Alimentarius and is part of the National Salt Committee (CNS). Both SQC and BNM are part of ANFA with the former part of the lead committee, and BNM is a key member of the standards and regulations committee (KII12, 21). For developing voluntary fortification standards, BNM undergoes an extensive process that first involves a feasibility study to ensure there are sufficient experts, materials, and resources to support the creation of a technical committee. If so, the technical committee assists with drafting the standard, which then goes through several validation and public comment phases. Once the standard is definitive, it is given a code and published through the proclamation phase and disseminated through various channels, including regional workshops. Starting in 2024, there will also be an approval stage in the process to ensure that the

developed standards do not contradict other rules and regulations and, if a standard will be mandatory, it will identify what accompanying measures need to also be in place (KII12).

The MICC agents are responsible for surveillance and ensuring compliance with fortification and other standards at the market level. This ministry also oversees the issuance of the certificate of commercialization that allows food to be marketed for consumption purposes and the certificate of non-contamination of radiation. For salt, MICC will collect samples in the market that will be tested by the MSANP's nutrition service. If the salt fails to meet the fortification requirements, MICC agents will intervene with sanctions and, in the extreme, close the establishment (KII12).[6] For other foods that are voluntarily fortified, the lack of domestic laboratory capacities means that the certificate of commercialization is issued based on testing of physical, chemical, and radioactive qualities but not actually if the product contains the requisite micronutrients that its producer claims it contains (KII12). For companies that do need micronutrient testing, their products are often sent to laboratories in South Africa or Europe (WFP 2023).

The inability to confirm whether foods advertised by companies are legitimate or counterfeit is a major complaint of private sector operators who have invested in voluntary fortification. As a respondent from MICC noted, "We don't know about the veracity of the food labels out there. We need data on the producers, the importers, the distributors, and the retailers in order protect consumer safety. Right now, we are very far from being there" (KII21). This reflects a broader issue, which is that when ANFA helped push for a fortification voluntary standard, known as order 1076-2012, the standard did not mention the authority responsible for controlling the regulation. According to a report by the WFP, the logo is not systematically used by domestically produced products and not at all for imported products (WFP 2023).

While MINAE and MEF are also members of ANFA, they play a less central role for fortification. MINAE is more explicitly focused on biofortification and dietary diversity than on large-scale food fortification, with key projects involving red beans and orange sweet potato. It works with farmers and along specific value chains to improve the nutritional quality of products that may be transformed into flour or other processed goods (KII11). MEF is responsible for a variety of taxes that affect the fortified food sector, including a tax on imported premix; such premix is necessary for any industrial fortification on the island. As discussed later, this has been a longstanding grievance of the private sector.

Private sector

The private sector in Madagascar encompasses a diverse range of entities, including large-scale industrial producers, semi-industrial producers, artisanal producers, and social enterprises that work with NGOs. In 2017, the Scaling Up Nutrition Business Network (SBN), known as Anjaramasoandro, was established in Madagascar and currently is coordinated by the World Food Program (WFP). It has grown from about 12 to almost 30 different companies, but momentum in the network has stalled because there is no executive secretariat and while it was initially subsidized, there is currently no money to organize meetings: "We can't recruit more members because there are no funds to do this, it costs a lot. It's a concept for marketing but doesn't have any logistics behind it" (KII13). For at least one high-level participant, the added value of the network compared to the main business union, the Union of Malagasy Industries (SIM), was not clear (KII13).

[6] Respondents claimed though that an establishment has never been closed.

Only a subset of members in the SBN are involved in food fortification (see Figure 2). These include Agrikoba and Nutri'zaza, which distribute targeted fortified products, as well as Tanjaka Food, which produces ready-to-use therapeutic (RUTF) foods and ready-to-use supplementary (RUSF) foods for the WFP's and UNICEF's humanitarian programs in the South of the country. Another major private sector actor that is not involved in the network is the Taloumis Group (TAF), which is the biggest processor and packager of fortified salt in the country and which produces fortified infant flour in collaboration with Nutri'zaza. Neither Tanjaka Food nor TAF are members of ANFA.

Donors and UN agencies

Numerous donors and UN agencies, known locally as technical and financial partners (PTF), have had nutrition and fortification programs in the country. The World Bank funded the large-scale National Community Nutrition Program noted earlier, which strengthens the capacity of community workers to provide nutrition services to households such as counselling to mothers about the importance of breastfeeding, regular weighing of infants until the age of three, the timing for introducing complementary foods, recipes to promote dietary diversity, and approaches for dealing with childhood illness. It also provides vitamin A supplementation to lactating and pregnant woman as well as children under the age of three (Galasso and Umapathi 2009). In 2018, the Bank also announced a ten-year project on Improving Nutrition Outcomes using a Multiphase Programmatic Approach.[7]

The German development agency, GIZ, leads the Food Security, Nutrition, and Reinforcement of Resilience project (ProSAR) in the southeast of the country, which considers fortification as one channel for improving nutritional outcomes. USAID launched its Advancing Food Fortification Opportunities to Reinforce Diets (AFFORD) program in 2021 as part of its Feed the Future Initiative and identified Madagascar as a focus country for its efforts in August 2023. Although Madagascar is not a country of high engagement for the Bill and Melinda Gates Foundation (BMGF), it recently decided to collaborate with UNICEF, GIZ, USAID, and the World Bank to help fund a national survey to be launched in 2024 to identify major micronutrient deficiencies—a key step to finding priority food vehicles for large-scale fortification (see more details later). The French Development Agency (AFD) has been an important funder of infant flour programs through support to an NGO, GRET, while, as noted above, the EU funded the PFOA program.

Among UN agencies, WFP is the main provider of humanitarian assistance, including RUTF and RUSF, in the southern part of the country that has been hit by recurrent drought in recent years. In addition, WFP has been exploring the viability of vitamin A rice fortification, including with a focus on school cafeterias. UNICEF, along with the Japan Iodine Industries Association, Japan, are major supporters of the salt fortification program. Japan's JICA also has partnered with the Food and Agriculture Organization (FAO) to help implement the Initiative for Food and Nutrition Security in Africa (IFNA), which is intended to support ten African countries with accelerating the implementation of their nutrition policies.

Several of these donors and agencies, including GIZ, USAID, and BMGF, have pooled their resources to launch such a micronutrient deficiency survey in 2024. The survey will be overseen by UNICEF and implemented by a consortium of partners: Groundwork Health, Institute for Research and Development (IRD), and a Malagasy company called Caetic Développement with the Ministry of Public Health and the ONN as the main government partners. The survey will include a sample size of 3,680

[7] See: https://www.worldbank.org/en/results/2020/12/14/supporting-madagascars-investment-in-human-capital-a-transformative-10-year-program-to-reduce-child-stunting

households and will be fielded in all 23 regions of the country.[8] In addition to identifying micronutrient deficiencies, there will several modules that also track consumption behavior among children and women. The implementers hope the survey will be completed, inclusive of data analysis, by April 2025 (KII30).

Universities and research community

There is a vibrant academic and research network in Madagascar that plays an important role in supporting fortification activities. SUN's academic network, known as MIKASA, was established in 2016 to support the private sector with applied research and as a forum for disseminating research results on nutrition. There currently are about 100 researchers who are part of the network, including professors, students, and professionals at various research centers in the country. Many of these researchers are focused on non-industrial fortification, including transformation of insects, moringa, avocado nuts, and shrimp heads into flour or powders to provide foods with greater protein and other nutrients (KII14). However, the efforts of MIKASA are limited by the lack of financing for the network.

There are also several laboratories in the country that are important for agro-industrialization and food safety. These include the Labasan laboratory at the University of Antananarivo, which can test for macronutrients, such as protein, lipids, and glycerides. There is also the Pasteur Institute (IPM) and the National Center for Research on the Environment (CNRE) under the Ministry of Education. These both can focus on physical, chemical, and microbiological analyses (KII15). Yet, as noted earlier, there are no laboratories that explicitly focus on testing for micronutrients.

Civil society

A civil society alliance, known as the Harmonized Initiative for Nutrition Action (HINA), was established through SUN in 2013. There are approximately 600 members of the platform today throughout the country who focus on different aspects of nutrition. These organizations provide important insights into the challenges on the ground with convincing consumers to purchase fortified foods. One of these challenges includes a perception that there is not sufficient proof to demonstrate the positive effects of fortification over the long term. Another is the fact that either due to access or price, fortified foods currently are not accessible to the most vulnerable and poor populations. A concern by these organizations is that local populations may begin to believe that industrially processed foods that are fortified are better than their traditional diets, which contain fresh and unprocessed foods (KII29), and they expressed the need to ensure messages on fortification are carefully conveyed to avoid this interpretation.

Existing Fortified Foods in Madagascar

While the above section illustrates some of the large-scale issues relevant to LSFF in Madagascar, this section delves into the specific lessons and opportunities for several sets of fortified foods. Given that the mandatory salt program has been in place for almost 30 years, there is scope for learning about what has worked for this value chain and whether there are transferable lessons for scaling up other food vehicles. Targeted, voluntary mandates are much more recent and primarily focused on several cereals-based products. RUTF and RUSF producers have some different experiences given that they often need to meet international standards and work almost exclusively with UN agencies, but they share similar frustrations their counterparts involved in targeted and mass fortification with respect to the enabling environment.

Salt fortification

[8] Specifically, the survey will include 10 households per district and 16 districts per region.

Historical background

Madagascar is among several countries where there is a weak level of iodine in soil because of the country's vulnerability to natural disasters, especially cyclones and flooding (Republic of Madagascar 2017). As such, there is a much lower level of naturally occurring iodine in cultivated products, which in turn means less iodine is consumed through local foods.

In September 1995, the government of Madagascar passed a mandatory standard for iodized salt fortification under decreet No.95-587 specifying that salt sold in bulk packaging should have a minimum of 50 parts per million (ppm) iodine and that salt sold in 250 gram consumer packs contain 30 ppm iodine concentration (Randremanana et al. 2019). An interministerial decree (No. 0409/96) launched the following year specified how the mandate would be implemented and the role of specific bodies. Most notably, it highlighted the creation of the National Salt Committee (CNS) that would be under the mandate of the Ministry of Public Health and be comprised of the Ministries of Commerce, Scientific Research, Justice, Culture and Communication, salt companies and key international partners. The CNS would be supported by regional committees across the country, known as Regional Salt Committees (CRS), that would follow production and distribution, engage in testing, engage in social mobilization, and follow the impacts of the program (Republic of Madagascar 1996).

A mandate for salt made sense from the perspective of economic organization and consumer demand. Approximately 90 percent of households consume salt, and Madagascar can sufficiently produce enough salt to meet domestic demand (WHO 2015). Moreover, there is relatively concentrated production: about 50 percent of salt is produced by a large-scale producer in the North (Diana region) with eight medium scale enterprises in Menabe region in the West of the country providing another 30 percent of supply. In the south of the country, including Atsio-Andrefana in the southwest and Androy in the Grand Sud, there are over 100 small-scale producers who provide the remaining share (KII26; Randremanana et al. 2019).

With large-scale donor support, the iodization program initially was very successful. Studies in 2009 showed that about 56 percent of salt was adequately iodized and, the prevalence of goiter—a common sign of iodine deficiency—had dropped from 45 percent to 6 percent between 1992 and 2001 and to 3.4 percent by 2004 (GAIN & UNICEF 2018). Yet, the military coup in 2009 and the ensuing political crisis, which lasted until the 2013 elections, required donors (especially the World Bank and UNICEF) to suspend their development assistance, causing the program to flounder as quality control mechanisms collapsed (Kavishe et al. 2021). Moreover, producers were told to source their fortificants from the Salama Centralized Drug Purchasing Center, but the services there were really for the Ministry of Health and public hospitals so, supplies were limited for private salt producers (KII26). The impacts of these dynamics become evident through the National Survey on Iodine and Salt (ENISM); conducted in 2014, the ENISM revealed that only about 21 percent of households were using salt fortified with iodine at an adequate level (Republic of Madagascar 2017). Other studies showed that women, especially poorer women, had among the lowest levels of intake (Randremanana et al. 2019). In a global review of iodine deficiency in 2020, Madagascar was ranked as having the lowest iodine intake, which was blamed on the collapse of the program linked to the country's political instability (Zimmermann and Andersson 2021).[9]

Recent developments with salt fortification

[9] This is especially notable given that the same review indicated that household coverage of iodized salt remained adequate or consistent in countries such as Afghanistan and Yemen that have been devastated by decades of civil war and conflict (Zimmermann and Andersson 2021).

In recent years, there has been a resurgence in support for salt fortification. In 2014, the government issued Decree no.2014-1771 that mandates double fortification of salt with both iodine as well as potassium fluoride at 250 ppm.[10] According to one report, Madagascar is the only country in the world that has an enforceable decree mandating both iodization and fluoride for salt (Locatelli-Rossi 2017), although many countries have voluntary fluoride fortification of salt. This was supported by the WHO, and there was intense lobbying from a French NGO known as (International Dental Aid (AOI) (KII26). The lack of fluoride in Madagascar's drinking water and the high cost of fluoride toothpaste, combine with the high rates of tooth decay, which can have detrimental effects on the rest of the human body, were key reasons cited by AOI for supporting the fluoride mandate.[11]

In 2017, UNICEF and USAID proposed to reinvigorate the iodization program under the Revitalization of Salt Program, with a planned re-launch in 2019 (KII26). In PNANIII published in the same year, there were aspirations to increase 90 percent of the population's median urinary iodine level from 46 micrograms/liter to at least 250 micrograms/liter by 2021 (Republic of Madagascar 2017). One of the challenges to revamping the program was that potassium iodate was considered a mineral by the Malagasy government. UNICEF, along with the Iodine Global Network (IGN), engaged in prolonged and ultimately successful lobbying with the government to reclassify KIO3 as an essential health commodity and therefore exempt from import taxes (Kavishe et al. 2021).

Today, oversight and quality control for all types of salt producers is provided by the CNS, CRS, and I-teams. I-teams, which is short for "integrated teams," provide quality control and assurance.[12] There are currently eight I-teams located in the major producer areas as well as in major distribution and marketing hubs (KII26). The I-teams include technicians from both the MSANP and MICC and are funded by UNICEF. The I-teams are equipped with the WYD apparatus (spectrophotometer) that allows for testing the level of iodine in salt within about 3-4 minutes. They also have four laboratories located in Antananarivo (within SNUT), Diana, Menabe, and Atsimo-Andrefana. Producers who properly certify receive the certificate of consumption from MSANP, which allows them to distribute their salt. MICC oversees sampling from the packaging companies and any problems in the distribution chain (KII26). The sanctions regime is contingent upon the amount of salt found not to be iodized. In many cases, the sanctions are pecuniary. Seizures of larger quantities will be either destroyed or returned to the producer. The intention is to foster education and influence rather than to push for punitive sanctions (KII26).

Given the diversity in production channels of salt in the country, the modalities for supporting fortification are somewhat different. The two large-scale producers are the Madagascar Salt Company (CSM) in Diego and Nouvelle Société d'Exploitation des Grands Salins du Menabe (GSM) in Morondava. They supply iodized salt to TAF, which is the country's single largest distributor of packed iodized salt (Locatelli-Rossi 2017). These large-scale producers and distributors note at least two challenges with fortifying salt. First, the iodine needs to be imported, and availability can be volatile because iodine is classified as a dangerous product, and it can take time to find a ship to import it into the country (KII28). Second, it costs about 284,000 MGA per kilogram of iodine when it arrives in Antananarivo. Then there are additional costs to transport it to the production areas. While fluoride is less expensive—estimated at about 23,300 MGA per kilogram—it also must be imported (KII28). Yet, due their size and capacity, these large-scale producers are not eligible for support by UNICEF or to receive

[10] The Ministry of Health had already initiated a salt fluoridization program back in 2005, but it remained voluntary until 2014.

[11] See: https://blog.aoi-fr.org/sel-iode-et-fluore-a-madagascar-questions-reponses-septembre-2018/

[12] Originally, the "I" stood for "iodine" but when fluoride was added to the standard, it was shifted to mean "integrated" teams (KII26).

any incentives from the government. A representative from TAF noted that the costs of the double fortification adds about 7 percent to the sales price of their packaged salt (KII28).

The medium and smaller producers have avoided these extra costs due to donations of KIO3 from UNICEF, which sources from its central supplier in Denmark, and from Japan's Iodine Industries Association. Both UNICEF and Japan have provided donations every year of approximately 850 kg each, which can iodize about 10,000 tons of salt (KII26). Due to concerns about the sustainability of this model, a revolving fund has been established. In this model, the Ministry of Health originally distributed the KIO3 to an association of medium and small salt producers, known as the Iodine Salt Counter (COSIM), which then sold it at subsidized prices to other producers in the Menabe region who have iodization machines. The revenue from these sales enabled COSIM to afford regular expenses, such as maintenance of equipment and quality control. COSIM has now been registered as a UNICEF partner to benefit from wholesale purchases from Denmark at low prices (Kavishe et al. 2021). Distribution though is now done through the CRS in Menabe (KII26).

UNICEF also provided iodization dosing equipment produced in South Africa to the medium-scale members of the Salt Producers Association of Morondava (APSM) (KII26). However, since there are only a few machines, the producers have to wait for their opportunity to use the machine, and the time delay affects their costs. Moreover, there are transport costs for bringing their salt to the iodization center, and no transport subsidies to do so (KII3, KII28).

Common challenges

- **Incongruence with the mandates**: Despite the mandate to also include fluoride, this remains de-prioritized by producers and donors alike. Most salt is woefully below the fluoride standard, especially that produced by the medium and smaller producers who cannot afford to add fluoride as well to their salt. Both UNICEF and its main donor, USAID, only support iodine since it most directly impacts children's growth (KII26). Moreover, there are no surveys on fluoride deficiency to confirm the need for, or impact of, the program (Locatelli-Rossi 2017). Nonetheless, all the salt that is fortified is sold under the SIF logo, which misleadingly suggests to consumers that it contains both iodine and fluoride. If the mandatory standard will not be fully enforced for both nutrients and not financed by key donors, it is questionable whether the fluoride component should be retained.

- **Counterfeit fortified salt**: Many of the artisanal and small producers, especially in Toliara in the South, do not fortify their salt but still package it with the SIF logo. This obviously creates a disincentive for the producers that are expending resources to meet the mandate (KII28). As a representative from TAF noted, "Sometimes we worry that controls are not always applied appropriately to the producers and then what happens? For us in industry, it's necessary that the controls are applied systematically. Our worry is whether the same level of control is being applied to other producers" (KII28). The presence of criminal groups among some of these smaller producers in the South makes it difficult for CNS to properly enforce the mandates (KII3).

- **Humidity:** Due to humidity, iodized salt from producers may evaporate during transport through the chain of distribution, especially if it is not handled appropriately. A similar issue exists in the informal markets where retailers may not store it correctly (KII3).

- **Rumors:** Under the initial phase of salt fortification, there were rumors that consuming iodized salt would lead to hypertension and other cardio-vascular issues. In some instances, these rumors

originated from artisanal producers who did not want to fortify (KII26). In others, they were issued by the medical community and led to increased demand for non-iodized salt by more educated and urban consumers. Several ministries signed a consensus statement in 2014 on the need to concurrently promote iodized salt but also convey the need to limit sodium intake (GAIN & UNICEF 2018). In relaunching the program in 2019, UNICEF made important efforts to use popular singers to explain the complex balance between consuming in moderation iodized salt to improve children's brain development but avoiding overconsumption of salt (Kavishe et al. 2021).

- **Lack of incentives at the wholesale level:** There are some influential actors who control some of Madagascar's wholesale markets and who do not understand the importance of fortifying. Legally, wholesalers have to return the salt to the producers if it is identified by the I-teams as not fortified, but sometimes the transport cost to do that is higher than the cost of the salt so, they resist complying (KII3). At the very least, the I-teams try and find out who the supplier was to try and visit the salt producers (KII26).

Targeted fortification

While salt is the only food mandated to be fortified at the national level, there have been several efforts in recent years to enhance the fortification of foods targeted at children and women. While UNICEF has been the main leader for the salt fortification efforts, ANFA has played a more central role in supporting targeted fortification ever since the body was revitalized in the post-political crisis period (KII4). Other key players in this domain have been those that already had ongoing complementary child feeding programs in the country, such as the NGO GRET. Since 2002, GRET partnered with TAF to produce an infant flour known as Koba Aina ("flour of life"), which is intended to be a complement to breast milk and targeted at children over six months of age (Caclin, Boulle Martinaud, and Razakandrainy 2021). The flour is made from rice, soya, maize, spinach, banana, strawberry, iodized salt, calcium, and vitamins A, B3, B12, B9, C, D, and E.[13] The product was distributed by GRET's social project, known as Nutrimed. In 2013, Nutrimed became a social enterprise and renamed Nutri'zaza. It continues to distribute the product at a low price—around 400 MGA per bag (KII23). Support from the French Development Agency (AFD) and GRET has facilitated its ability to sell at a low price (KII13).

Besides Koba Aina, Nutri'zaza sells several other fortified products, including muesli and several products targeted at school children. In order to maximize its distribution coverage, Nutri'zaza uses three types of networks. The first are wholesalers and grocery stores. The second is to supply NGOs, including those focused on the South. And the third is through the *Hotelin-jazakely,* or "restaurants for babies" located in vulnerable urban communities. TAF continues to be Nutri'zaza's supplier. Another company, Agrikoba (under the INVISO group), also produces two infant flours, Koba Fenosoa and Nutrifood, which are a raw and instant flour, respectively. Koba Fenosoa consists of iodine, iron, zinc, and vitamins A, D, E, K, B, and C and is also intended for children between 6 to 24 months of age (Rakotobe 2021).

In 2019, both companies benefitted from the launch of Madagascar's first standard by the BNM for infant flour, NMG 103-5, which allows the companies' fortified infant flours to carry the Tovonantsoa logo (see Appendix 2). Some members of ANFA would like to see the standard become mandatory and want this to received priority attention in one of ANFA's future general assembly meetings (KII5). In 2022, another voluntary standard was issued, NMG 191-2, for fortified biscuits and one company,

[13] See https://sunbusinessnetwork.org/stories/1057/

Macadams, is in the process of trying to get its biscuits (Nutriforce) certified under this standard (WFP 2023).[14] In addition to those products produced under the Tovonantsoa logo, there are several other fortified products on the market, including cereal bars, muesli, and dough.

Common challenges

- **Costs of inputs:** The cost of vitamin premix for targeted fortification must be imported into Madagascar from places like Germany, India, and South Africa. The costs of these premixes add between 6 to 20 percent to the cost of production, depending on how many vitamins and minerals that the industry needs and the volume purchased (KII5). More of this cost comes from the import taxes levied by the government on the pre-mix. Then, there is an additional 20 percent value-added tax on the final product (KII13), which can be a deterrent to consumers. The outcome is that it is not attractive to many in the private sector because the profit margins are so small (KII5). One respondent noted that along with the import taxes and the cost of electricity and the mixing machines, they make less than 5 percent profit on fortified products (KII13). There is also the cost of distribution and importing packaging; Nutri'zaza, for instance, needs to import packaging from Mauritius (KII22). Price inflation over the last two years for other inputs into fortified products, such as rice or sorghum, are also a concern (KII22).

  For three years, there have been discussions by ANFA members with MEF and the customs duties on the taxation issue, and some lobbying by the SUN Business network, but it has not led to any resolution. One government representative even noted that all the ministries agreed this was a problem but concluded that a lack of "political will" exists to address it (KII21). Another interviewee highlighted that political volatility, rather than will, was perhaps the binding constraint: "We recently tried to lobby for getting rid of all the taxes on inputs for fortification. We are waiting for a response. Right now, there are elections so there are a lot of changes right now. Another problem is the turnover of decisionmakers. We will have a meeting and tell them about the problems with taxation and the importance of fortification and they'll agree but then, the following day, those people are no longer there. And then they have to re-sensitize different people." (KII3). Similarly, another respondent claimed, "We were almost 90 percent there with convincing the Ministry of Finance on reducing the tax for the premix on infant flour but following a change in personnel in the Ministry, we are really back to the beginning again" (KII31). Still yet another member of the private sector noted that the bureaucratic process is also cumbersome because the decision to remove the taxes has to be approved by several different ministers so there needs to be interlinked lobbying. "It cannot be something that we take directly to the Minister of Finance. For him, he will just see that it implies less revenue for the country and doesn't understand that it's for the beneficiaries to deal with malnutrition, etc. It has to be a compound effort between all the different ministries… And when we advocate as suppliers, they think we are doing this advocacy because they think we want to get more profit margins and not necessarily to ensure that the prices are dropped if the taxes are dropped as well" (KII17).

- **Testing and quality control:** Companies like Nutri'zaza and Agrikoba have internal labs to test for quality and safety control of their products (KII13, 23). Yet, as mentioned previously, there are no labs in Madagascar to test for micronutrients. This results in an extra cost as businesses might need to send their products overseas for testing and also creates the opportunity for counterfeit sales by other companies. For instance, other companies may falsely advertise that their goods contain certain vitamins and minerals and consumers would not know. More generally, the quality control system

[14] These biscuits are fortified with moringa and spirulina.

that has been established for salt does not yet exist for voluntary fortification, which can act as a disincentive to the private sector that is genuinely fortifying. As one interviewee noted, "We also have a problem because those who fortify have to import at a high price and try to keep the price low so consumers can afford it. But then there are those that don't fortify and sell at the same price and then have larger profit margins. *Where are the incentives to fortify?* We fortify because it's good to do, and we have a good heart… we really want to have an impact on the population, that's our philosophy. But we are not really obligated to do so. I'm sorry to say it… no one helps us" (KII13, emphasis added).

- **Limits on advertising:** Relatedly, all food products must adhere to Codex Alimentarius standards and those of the WHO, and commercial production of food for children must respect the international code on the commercialization of breastmilk substitutes. At the national level, the government has a decree restricting the promotion and marketing of infant and young child nutrition products, including for fortified infant flour. This appears linked to concern on the part of the MSANP that if complementary fortified foods for children are widely advertised, the public may interpret that such products are actually breastmilk substitutes (KII4, 31). This code is strictly enforced even though it has not actually arrived at the *décret d'application* stage. While several nutrition professionals and UNICEF with international consultants have been trying for several years to amend the decree to exclude fortified products, it has not resulted in any changes. In the view of one respondent, "This code blocks communication. It is contradictory to fighting malnutrition. We have tried to do a lot of work on this, but it hasn't resulted in any changes" (KII4). Another noted that "If you can't even advertise your fortified foods, what's the point?" and noted that this approach had deterred investment into several other products, such as cereal flakes and snacks, that they had considered fortifying (KII13). Another noted, "This is a problem for the private sector because even if they are interested in supporting nutrition, they are also interested in making profit, and if they can't do the advertising, they can't sell" (KII31).

Humanitarian RUTF and RUSF

Fortified foods for humanitarian needs occupy a unique position in the fortification landscape but nonetheless encounter some of the same policy challenges that have been detailed for the other food vehicles. Only one company in Madagascar, Tanjaka Foods, plays this role. They are a franchise of Nutriset, which is a French company that produces RUTF and RUSF foods, such as Plumpynut and Plumpydox, to prevent or address both acute and chronic malnutrition. These products have a peanut-based paste that helps to encapsulate the vitamin pre-mix. Nutriset supplies UN agencies such as UNICEF and WFP in humanitarian situations and in 2009, chose Tanjaka as their local partner to produce these products in Madagascar for distribution mostly to the South of the country (KII17, 18).

Tanjaka sells to UNICEF or WFP based on their needs and those UN agencies distribute the products on the ground. However, it is not a guaranteed market because these agencies are dependent on funding that fluctuates from year to year. While Tanjaka has the capacity to produce 6,000 tons, the highest volume they have ever sold in one particular year has been 4,000 tons. This overproduction is then exported to other parts of Africa where there are humanitarian needs or sold to other NGOs in Madagascar (KII17).

All the materials for these products need to be imported because such food needs to adhere to very high international standards that local suppliers cannot meet. As such, in addition to buying the premix from Nutriset, they import peanuts from India and Argentina, dairy products from Europe, and

some other raw materials from Asia. They also have to import the packaging because there is no company in Madagascar that can create the film for the plastic packaging around the product, which is a requirement of the UN agencies. Due to the stringent requirements, Tanjaka also has strong control measures, including testing internally the levels of aflatoxins on the peanut base at each step of the production process. They need to also check various micronutrient components on both the premix and the final products, which requires sending every batch of the product to a European laboratory since there is no accredited local laboratory. The dependence on imports and overseas testing obviously adds huge costs for the company, which is part of the reason why its leadership is reluctant to go into other types of fortification even though they have access to the technology to do so within the larger Basan Group in which they are situated (KII17).

Common challenges:

- **Multiple levels of taxation:** They are taxed at multiple points, and the taxes are collectively estimated to make up 20 percent of the costs of production. Specifically, like their counterparts engaged in targeted fortification, Tanjaka faces taxes on its premix as well as on the stabilizer it uses to ensure a 24-month shelf-life. They also encounter an excise tax on the raw materials they use and then have to levy a VAT on the products when they sell to NGOs (the UN agencies are exempt from VAT). Collectively, all of these taxes make the final product very expensive and consequently, many purchasers in the NGO sector prefer to go with less expensive fortified flour. As a representative for the company noted, "So, we can't supply really the local market because we are viewed as too expensive. To me, that's nonsense because it's just taxes that could be dropped or could be considered in a different way" (KII17). This situation is seen as particularly nonsensical since the premix is dedicated for supplementary food to address malnutrition and cannot be used "as is" or mixed with other foods for preparation so, it cannot really be abused for other purposes besides for nutritional needs (KII18).

- **Side selling:** RUTF and RUSF foods are intended to be distributed for free to the final beneficiaries, but the products are being sold in markets, especially in the South of the country, and also on the internet. In the past, only a small number of products were found on the market, and it was assumed that it was beneficiaries who then sold it on to obtain cash to buy other types of food. But, in 2023, cartons of the food were being sold on the market, suggesting that it is being siphoned off from intermediate warehouses throughout the distribution chain (KII17).

- **Rumors and misuse:** There are rumors that the RUTF and RUSF provide a lot of energy and increase strength so, adults and those who do not have a malnutrition problem have been consuming these products in some cases. In other cases, there have been erroneous reports in the press that healthy children who ate too much of these foods had a high risk of becoming obese or getting cancer (KII17).

Exploring other food vehicles for mass fortification

In parallel to the above activities, there have been ongoing efforts to find food vehicles that could be viable for mass fortification. The specific nature of economic organization of different vehicles, and Madagascar's high import dependency for premix and packaging, are key constraints to this. The lack of a micronutrient deficiency and consumption survey—which will hopefully be rectified in 2024-2025—thus

far has also hindered the identification of which vitamins are needed and therefore which food vehicles are most appropriate (KII6).

Besides salt, below are several food vehicles that have been discussed and featured in the SNFOA and displayed in Table 1. In addition to rice, which is among the most consumed foods in the country, edible oil, sugar, various types of flours, including wheat and cassava, and bouillon, have been considered.

Table 1: Potential vehicles for mass fortification in Madagascar

Food vehicles	Fortificants
Rice	Vitamin A, B1, B12, folic acid, iron and zinc
Edible oil	Vitamins A and D
Sugar	Vitamin A
Wheat flour	Iron, folic acid, zinc and B12
Manioc (Cassava) flour	Iron, folic acid, zinc and Vitamins B1 and B12

Source: Republic of Madagascar (2021)

Rice

The WFP has led several pilot programs focused on rice fortification. Most notable was the Tambatra Project, which was funded by the Government of Monaco and implemented as part of a consortium with several NGOs, including Action against Hunger (ACF), GRET, and Agronomists and Veterinarians Without Borders (AVSF), and it involved supplying primary schools with fortified rice. The project was targeted in three communes in the regions of Amoron'I Mania and Analamanga, which have high levels of chronic malnutrition despite relatively high levels of agricultural productivity for several diverse sets of foods. WFP established several small rice production units where white rice was mixed with fortified kernels imported from Thailand. On the one hand, the fortified rice was well-received by the school students and there was no discernible change in taste or color. In addition, there were no major challenges with logistics or storage since the rice was produced and directly distributed to the participating schools. On the other hand, it took up to three months to import the kernels; this was problematic since the kernels' viability only lasts about 12 months. Moreover, and again due to import taxes, the fortification process added about 20 percent to the cost of the final product, which is not affordable for most Malagasy and not sustainable for most producers (KII29).

The ability to scale rice fortification for mass consumption is currently in doubt for several reasons. First, there is a highly fragmented rice milling industry, and most rice is still milled in small-scale artisanal mills, which makes coordination and oversight infeasible (KII26). Each commune has its own small hulling facility for rice and producers stock the rice patty and only do the hulling in small batches when there is a need for white rice (KII29). While there are several large rice mills that are part of the PRORILAC organization, many have ceased operations since the artisanal huskers have expanded. The latter can sell at lower prices because they produce inferior quality rice and do not have the same magnitude of bank borrowing, storage, or transport costs faced by the larger mills (Dorosh et al. 2022). Second, rice fortification is technically difficult and can sometimes result in changes in organoleptic properties that can deter consumers. This is important in Madagascar where appearance and texture play a major role in consumer preferences (Shiratori, Rafalimanantsoa, and Razafimbelonaina 2023). There would need to be intense investments in capacity building with processors and researchers to do this

properly (KII29). Third, the elevated costs of the premix from taxes and the time to import it are clear deterrents.

There is potential to have a mandate for imported rice to be fortified because much of the rice already imported from India, Pakistan, and Thailand is already fortified (KII29; WFP 2019). However, while imports have been growing, they are still relatively low compared to domestic supply. Specifically, they represented 6 percent of supply in 2010-2012 and grew to 18.3 percent by 2017-2019 (Dorosh et al. 2022). According to the WFP (2019), just under 10 percent of rice consumption is made up of imports, and there is a strong consumer preference for local rather than imported rice, which is often stored for the hungry season and otherwise unaffordable for most of the population. Moreover, while it is among the most consumed cereal good in the country overall, there are important regional disparities; consumption in the South is about half as much as among poor households in the Plateau and Coastal regions (Dorosh et al. 2022). The establishment of the State Procurement of Madagascar (SPM) in 2020, which is a parastatal aimed at stabilizing the prices of rice oil, and sugar, has further deterred the import of milled rice (Dorosh et al. 2022). In addition, a mandatory standard for rice imports requires that the government's quality control capacity be significantly strengthened. Due to the lack of labs capable of analyzing micronutrients, it is difficult to prove that the products provided by importers into the country actually contain the micronutrients that they declare on their customs paperwork (KII29).

Oil, sugar, flour, and bouillon

Several of those in Table 1 have been explored in the past. For instance, with support from WFP, ANFA tried to pursue the fortification of edible oil with vitamin A in 2008, targeting three producers: Tiko Top, Sib, and Indosuma (Rakotoseheno 2008). However, the political crisis in 2009 likely deterred the onset of this initiative since Tiko industries were owned by the ousted former president, Marc Ravalomanana. The option of fortifying oil was revisited a decade later, but this was blocked due to both the onset of COVID-19 and insufficient support from producers (KII4).

Imports of refined palm and soybean oil account for 75 percent of supply because domestic production of oilseeds is quite poor in quality or artisanally produced (USAID, 2013). Yet, even though production is mostly limited to small, artisanal units, there is at least one major refinery, the *Huilerie Industrielle de Tamatave* (HITA) near the port of Toamasina that has industrial capacity and national coverage in terms of distribution and volume of production. Incentivizing oil companies is again a major issue since the cost of fortifying oil may deter consumers and therefore reduce profits (KII29, 31).

Sugar was initially considered in 2009 but was not taken up (KII4). It is not widely consumed (KII28) and could likely face the same challenge with consumer understanding—i.e. avoiding overconsumption—that has faced salt. In several other countries in southern Africa where sugar was mandated with vitamin A, there were also intense divisions about this within the nutrition community and ministries of health (Resnick et al. 2018).

Several types of flour have also been discussed as an option for fortification, including wheat, manioc, and sweet potato flour. Wheat flour is challenged by the fact that domestic wheat production is extremely low, with about 5,000 tons of production in 2018 and, until recently, the closure of almost all major wheat millers.[15] As a result, almost 250,000 tons of wheat flour is imported per year to meet the country's demand.[16] Manioc and sweet potato are generally perceived as a poor food option among

[15] https://www.world-grain.com/articles/12943-lmoi-brings-flour-milling-back-to-madagascar
[16] https://www.presidence.gov.mg/actualites/1087-toamasina-inauguration-de-l-usine-les-minoteries-de-l-ocean-indien-lmoi.html

Malagasy so there is some hope that by fortifying them, this perception could change. On the one hand, the disadvantage is that production of these commodities is as fragmented as rice, and often done at the village or commune level rather than industrially. On the other hand, the government is very interested in agricultural transformation and adding value to these products by expanding flour production (KII29). Consequently, fortification objectives could benefit from being aligned with a policy—agricultural transformation and industrialization—where the government has demonstrated greater interest in expanding.

Although not discussed in the SFOA, bouillon is gaining increasing attention in the country as a possible vehicle for mass fortification because it is widely used and relatively inexpensive at around 200-300 MGA (KII29). While there are imports of bouillon, no domestic company currently produces it. However, GIZ is pursuing a pilot on the regulation of domestic bouillon fortification. The vehicle will be particularly promising if the seasoning's traditional glutamate and excessive sodium can be replaced with other types of healthier spice ingredients that are available locally in Madagascar (KII29, 31).

Synthesis of enabling environment factors in Madagascar

Considering the preceding discussions on the broad institutional landscape, the lessons from salt, targeted, and humanitarian fortification, as well as several exploratory options for mass fortification, the priorities for LSFF in Madagascar can be aligned according to the enabling environment framework that encompasses the dimensions of political will and implementation capacity reviewed earlier. Figure 3 shows the application of the framework to the current circumstances in Madagascar, with a traffic light coloring to highlight priority issues in red, mixed assessments in yellow, and promising factors in green. Grey cells indicate that the issue was not relevant to this case study, or not mentioned by any interviewees.

Figure 3: Enabling Environment Diagnostic for LSFF in Madagascar

		Public Sector	**Private Sector**	**Civil Society**
Political Will	*Interests*	Minimize budgetary outlays	Maximize profit margins	Minimize food costs
		Minimize backlash from important constituencies	Minimize changes to organoleptic properties	Maximize nutrition
		Maximize citizen well-being	Maximize reputational branding	Minimize health risks
	Ideas	Protectionism vs. globalism	State vs. market	Techno-fix vs. natural foods
		Externally driven vs. locally owned	Protectionism vs. globalism	State vs. market
	Leverage	Policymaker cohesion	Industry coordination	Coalition alignment
		Sanctions	Strike potential	Consumer awareness campaigns
		Incentives	Lobbying power	Buying power
Implementation Capacity	*Institutional architecture*	Modalities for coordinating multi-sectoral policies affecting LSFF	Modalities for coordinating across industries	Modalities for coordinating across CSOs
		Horizontal and vertical regulatory coordination	Modalities for coordinating across	Geographical reach of civil society organizations/networks

			segments of the value chain	
		Fora for issue articulation with the private sector and civil society	Fora for issue articulation with the public sector and civil society	Fora for issue articulation with the public and private sector
	Technical capacity	Data for tracking consumption	Spectrophotometer devices to confirm internal compliance	Capacity to assist with M&E
		Laboratories for monitoring compliance	Training on dosifier usage	Capacity to train private sector
		Trained and incentivized bureaucrats to monitor compliance	Training on storage of micronutrients and/or proper retailing of fortified foods	Capacity to train public administration

Source: Author. Notes: Red = challenge for LSFF, yellow = some progress but remaining constraints, green = conducive to LSFF, and grey=factor was not identified in the case study. Under ideas, boldfacing indicates the dominant ideas subscribed to by the corresponding stakeholder group.

One of the clear takeaways from the Figure is that many of the elements in red are with respect to the public sector. In terms of political will, there is a profound sense that the government does not really see this as a priority, even by interviewees who work in government ministries. The outcome is that fortification efforts are really seen as externally-driven by the donor community, with concerns about sustainability over time.

There are no incentives provided by the government to the private sector to fortify, such as graduated subsidies for inputs, and the tax regime was identified as a major impediment by those in both the voluntary and humanitarian fortification sectors. Relatedly, many have the impression that MEF and customs want to minimize budgetary outlays by not relinquishing revenue sources. The broader lack of investment in the needed infrastructure for LSFF, despite it being highlighted as a priority in several government strategy documents and Madagascar's submission to the 2021 UNFSS, further underscores the desire to minimize budgetary outlays. Training with parliamentarians, who have oversight over the budget process, would be one way to help educate high level decision makers about the importance of tackling malnutrition and the role of fortification in this process. This might, for example, involve revitalizing—if appropriate support exists—the Parliamentary Network in Favor of Nutrition (APMSAN) (SUN 2019a).

Policymaker cohesion is moderate with seemingly good cooperation among the main ministries involved, especially MSANP and MICC, and with ONN, but with some areas of confusion and some opposition of these lead ministries to the premix tax policy. Frequent turnover in ministries is an underlying structural factor that weakens cohesion as new policymakers need to be constantly re-sensitized. Sanctions exist for the one mandatory standard—salt—but there is uneven enforcement in the South of the country and a lax attitude towards enforcing fluoride fortification, partially because key donors are not convinced it is important.

Relatedly, and with respect to institutional architecture, there seem to be no modalities for ensuring policy coherence across sectors for fortification. While there had been earlier success in amending the minerals tax policy to allow for imports of potassium iodate, lobbying efforts related to the pre-mix taxes and allowing for advertising of complementary fortified foods for infants and children

have thus far been unsuccessful. There was the suggestion that going forward, the Direction of Legislation within the Office of the Prime Minister (CNLEGIS) could help with at least ensuring coherence across interministerial regulations (KII12). ANFA offers a forum for discussion and engagement with the private sector and civil society, but its efficacy is volatile and dependent on individual leadership and donor funding for meetings.[17] There is also a perception that the body does not offer the private sector the full range of information needed in a coherent way to make investments in fortification. As one respondent noted, "We need to address corruption and need transparency. Right now, you can find all the norms on the BNM website. We need the same transparency for the costs of fortification, for the tests in the labs, etc…Even companies that want to invest in fortification don't know very well what is the process that they should follow or what are national regulations to follow" (KII12).

On the bright side, however, Madagascar does not have dueling food safety and food fortification regulatory bodies, and its structure of deconcentrated regional offices provides a modality for vertical coordination. This is visible in the structure of the I-teams for salt and the relationships between CNS and CRS, and a similar structure would likely be required if mandatory fortification was extended to other food vehicles. The lack of full devolution of functional responsibilities in the health and agriculture domains also means that there is a lower potential for conflict over fortification policy between national and regional or district governments.

With respect to technical capacity, the lack of data for tracking consumption is a major priority but one which will hopefully be addressed in 2024 through the multi-donor efforts to fund a micronutrient deficiency and consumption survey with UNICEF leadership. Accredited laboratories that can test for micronutrients in Madagascar are another priority. Even if there are no other food vehicles chosen for mass fortification, investment in labs—including both materials and human resources—would reduce the burden on the private sector to send samples overseas and prove pivotal in addressing counterfeit products, possibly encouraging even more enterprises to pursue voluntary fortification. ACSQDA noted that there was the possibility of another lab being built with World Bank support but noted that decisions on this had been stalled by pre- and post-electoral activities in the country (KII16). The I-teams are proving to be an innovative approach for monitoring iodine compliance for salt but as noted earlier, the units in charge of compliance overall for food fortification, including MICC and ACSQDA, have very few agents and resources to play this role on a national scale.

The private sector column in Figure 3 is characterized by much more yellow, namely because there are some strong variations across food vehicles and industries. For instance, some of the industries that do not have support, like TAF for salt or Agrikoba and Tanjanka Foods, are more concerned about how fortification affects their profit margins than those that have some donor support from UNICEF or GRET. Voluntary fortifiers mentioned the normative importance and societal benefits of fortification and why it is a distinguishing feature for their companies, but this does not negate concerns over the cost of inputs.

For some of the vehicles, there are modalities for coordinating to enhance scale, as seen with UNICEF's efforts with medium-scale salt producers and the creation of a revolving fund. Given how fragmented other potential food vehicles are in the country, like edible oil, rice, and maize, this modality would need to be explored and lessons learned from other regions of the world (e.g. how small-scale maize millers were aggregated for fortification in Southern Africa). More established salt enterprises have internal compliance tests and spectrophotometer devices but clearly for medium and small-scale

[17] One concern is that focal points for ANFA may have full-time jobs that distract from the amount of time they can dedicate to coordination and organization across fortification actors.

producers, there is a higher reliance on the I-teams to do such tests. Training on storage of micronutrients was not noted as an issue for infant flour or RUTF/RUSF but is clearly a larger concern for salt due to the challenges with humidity.

Finally, civil society offers a bright spot for LSFF in Madagascar. Both HINA and MIKASA provide important platforms for engaging and educating local communities as well as supporting the private sector with some of its capacity training needs. Particularly for those in MIKASA, there are also active efforts to explore other ways of natural fortification using indigenous plants and insects. There is some tension and recognition that LSFF's impacts will be limited if the impacts on food prices are too high; the high level of poverty in Madagascar make the price-demand elasticities much steeper than in other countries. This also means that unlike in some other settings, civil society cannot mobilize boycott campaigns for or against fortified foods. Another potential concern among civil society is that consumers could see LSFF as a techno-fix and discount the importance of local diets based on fresh foods or equate "health" with industrially processed foods. There have also been some efforts by civil society to help address misinformation related to health risks around LSFF, including rumors about excess hypertension caused by iodized salt consumption. While consumer awareness of fortification remains generally low, several member groups belonging to HINA noted their efforts to help sensitize local communities about such foods.

Recommendations

Given the above assessment, there are many needed areas of intervention to advance the fortification agenda in Madagascar. Below are several priority recommendations:

- The launch of a large-scale micronutrient deficiency survey in 2024-2025 will be essential for identifying the best range of food vehicles and micronutrients to prioritize. While there currently is high attention to the design and implementation of the survey, this should be accompanied by equal consideration of how the findings will be communicated and how to best mobilize relevant policymakers to translate the data into action on possible standards and regulations. Otherwise, there could be a long time-lag between the outcome of the survey and any actual fortification activities.

- Given the disincentives created by the pre-mix import taxes, continued lobbying and engagement with policymakers is needed as well as innovative alternatives.
    - Due to the country's high levels of political volatility, such lobbying should be done with multiple ministries and bureaucrats at different levels of seniority, as well as parliamentarians. More broadly, training with parliamentarians, who have oversight over the budget process, would be one way to help educate high level decision makers about the importance of tackling micronutrient malnutrition and the role of fortification in this process. This might, for example, involve revitalizing—if appropriate support exists—the Parliamentary Network in Favor of Nutrition (APMSAN) (SUN 2019a). This multi-pronged targeting of decision-makers can create a higher probability of buy-in even when there is turnover and political disruption.

    - Alternative framings should also be explored to have greater traction with government officials. Namely, if enhancing the value-added of certain agricultural commodities through flour processing is a priority for the government, it may be more strategic to highlight how fortification creates new markets for processed flour production and training opportunities for

producers and millers. For some officials, this angle may have greater weight than solely emphasizing the benefits of fortification on malnutrition alone.

    - Relatedly, and building on WFP's extant efforts, there should be a detailed examination of whether a GAIN pre-mix facility could be established in the country to mitigate the costs of importing pre-mix. While such a facility would ultimately depend on what deficiencies emerged from the planned ESAM and the levels of premix quantity demanded from the private sector (KII29), several projected scenarios could be undertaken in the near-term to assess the conditions under which such a facility would be viable and the procedures for setting one up.

- Accredited laboratories that can test for micronutrients in Madagascar are another priority. Even if there are no other food vehicles chosen for mass fortification, investment in labs—including both materials and human resources—would reduce the burden on the private sector to send samples overseas and prove pivotal in addressing counterfeit products, possibly encouraging even more enterprises to pursue voluntary fortification.

- ANFA's future depends on a sustainable revenue source and investment in a proper secretariat with coverage for full-time leadership. If it does not exist already, ONN should work with the Office of the Prime Minister to gain an earmarked budget line for ANFA in Madagascar's annual budget that could be gradually scaled up over time as donor resources ultimately decline. Given that institutionalization of fortification alliances is a common dilemma in many low- and middle-income countries, this is another opportunity for South-South learning about works or not.
    - Investments in a dashboard on the ONN website about the process, costs, and regulatory requirements for companies to pursue fortification, and the range of financial and technical partners involved in the fortification arena, could further enhance transparency and information sharing among ANFA members and other stakeholders. Virtual meetings and e-consultations on major decisions are other possibilities for saving costs.

- Fortification in Madagascar is hampered by economic structure and the fragmentation of different value chains that nonetheless produce foods that are widely consumed, such as rice and edible oil. This is not, however, unique to the country (e.g. Vosti et al. 2024). An analysis that synthesizes how small-scale producers and processors were effectively aggregated for fortification—or the challenges encountered to do so—could be commissioned. Likewise, rigorous monitoring and evaluation of UNICEF's revolving program with medium-scale salt processors should be undertaken to see if this could be a viable model for other value chains in Madagascar.

Conclusions

Given its high levels of malnutrition, Madagascar clearly would benefit from expanding its current fortification program to additional food vehicles. Yet, it faces several challenges for scaling up fortification, including high dependence on imports, fragmented value chains, and high poverty levels that make even minimal cost additions to food products a concern for businesses worried about losing customers. At a more fundamental level, there are severe governance and political issues that undermine policy coherence, implementation, and support for the private sector, including corruption, ministerial turnover, delayed salary payments to civil servants, and inter-elite conflict over resources and power. As

noted in the World Bank's (2022, 34) country diagnostic, "Weak governance is the overarching constraint to broad-based development in Madagascar." This assessment is equally true in the domain of fortification where, due to the overall lack of political will to really invest in LSFF, it has had to be almost entirely supported by the donor community.

Nonetheless, there are several areas that can help advance the scientific and economic foundations of fortification. This includes implementing the large-scale micronutrient and consumption survey planned in 2024, investing in an accredited lab, a sustainable funding and staffing strategy for ANFA, and establishing a dashboard that aggregates information on fortification costs, processes, and actors in a consolidated manner. Regardless of which additional food vehicles are identified for mass fortification, these underlying conditions seem essential for both scaling up voluntary fortification and successfully enforcing any additional mandatory standards.

More broadly, this paper has emphasized that despite the importance of LSFF for addressing micronutrient deficiencies, convincing relevant stakeholders to adopt and enforce LSFF standards and effectively put into place all the requirements for such programs requires considering drivers of political will and implementation capacity. The framework provided in this paper offers a way to assess such factors in a tractable manner that can be used for comparisons across countries, stakeholder groups, and over time to identify primary binding constraints for LSFF. Technical and development partners can, in turn, decide where to prioritize their interventions. A limitation of the framework is that it can only provide a static snapshot focused on a particular element of the LSFF policy cycle, which can vary across food vehicles. This underscores that the utility of the framework requires continuous updating at regular intervals (i.e. annually) to accurately capture shifts in the policy landscape.

Notwithstanding this caveat, the framework allows for a systematic stocktaking of where weaknesses exist for LSFF and where momentum can be heightened. Importantly, technical and donor partners sometimes play a significant role, both good and bad, in shaping these dynamics through their own behavior and interpretation of the policy process. Therefore, the framework may also offer a mechanism to ensure such partners reflect on their own messaging and coherence to the public, private, and civil society sectors so that the benefits of LSFF can be more effectively realized.

References

Abdelal, Rawi. 2009. “Constructivism as an Approach to International Political Economy.” In *Routledge Handbook of International Political Economy (IPE): IPE as a Global Conversation*, New York, NY: Routledge, 62–76.

Aiga, Hirotsugu, Kanae Abe, Vonjy Nirina Andrianome, Emmanuel Randriamampionona, Angèle Razafitompo Razafinombana, Toshiyasu Murai, and Masahiro Hara. 2019. “Risk Factors for Malnutrition among School-Aged Children: A Cross-Sectional Study in Rural Madagascar.” *BMC Public Health* 19(1): 773. doi:10.1186/s12889-019-7013-9.

Akhtar, Saeed, Faqir M. Anjum, and M. Akbar Anjum. 2011. “Micronutrient Fortification of Wheat Flour: Recent Development and Strategies.” *Food Research International* 44(3): 652–59. doi:10.1016/j.foodres.2010.12.033.

Antilahy, Estelle, Antsa Andriamisaina, Sarah Carson, Matilda Nash, Sarahena Rojas, and Andrew Wyatt. 2023. *Political Economy Analysis of Resilience, Food and Nutrition Security, and Poverty in Madagascar*. West Lafayette, IN: Purdue University, LASER PULSE Consortium. https://www.usaid.gov/sites/default/files/2024-02/Madagascar_Political_Economy_Analysis.pdf .

Begley, Andrea, and John Coveney. 2010. “Wonder Vitamin or Mass Medication? Media and Academic Representation of Folate Fortification as a Policy Problem in Australia and New Zealand.” *Australian and New Zealand Journal of Public Health* 34(5): 466–71. doi:10.1111/j.1753-6405.2010.00591.x.

Berry, James, Priya Mukherjee, and Gauri Kartini Shastry. 2012. “Taken with a Grain of Salt? Micronutrient Fortification in South Asia.” *CESifo Economic Studies* 58(2): 422–49. doi:10.1093/cesifo/ifs011.

Biltekoff, Charlotte. 2016. “The Politics of Food Anti-Politics.” *Gastronomica* 16(4): 44–57. doi:10.2307/26362394.

Bishai, David, and Ritu Nalubola. 2002. “The History of Food Fortification in the United States: Its Relevance for Current Fortification Efforts in Developing Countries.” *Economic Development and Cultural Change* 51(1): 37–53. doi:10.1086/345361.

Blyth, Mark. 1997. “Any More Bright Ideas? The Ideational Turn of Comparative Political Economy.” *Comparative Politics* 29: 229–50.

Bymolt, Roger, and Jesse D’Anjou. 2017. *Lessons on Small and Medium-Scale Maize Flour Fortification in Tanzania*. Amsterdam, The Netherlands: KIT Royal Tropical Institute.

Caclin, Pauline, Clemence Boulle Martinaud, and Andrimampionona Razakandrainy. 2021. *Strengthening Consumption of Fortified Foods to Fight Against Malnutrition: Feedback from the Experiences of the PFOA Project in Madagascar (2017-2021)*. Nogent-sur-Marne: Editions du Gret.

Development Initiatives. 2022. *2022 Global Nutrition Report*. Bristol, UK: Development Initiatives. https://globalnutritionreport.org/reports/2022-global-nutrition-report/ (May 15, 2023).

Dijkhuizen, Marjoleine Amma, Frank Tammo Wieringa, Damayanti Soekarjo, Khan Tran Van, and Arnaud Laillou. 2013. "Legal Framework for Food Fortification: Examples from Vietnam and Indonesia." *Food and Nutrition Bulletin* 32(2): S112–23.

Dixon, Simon, and Phil Shackley. 2003. "The Use of Willingness to Pay to Assess Public Preferences towards the Fortification of Foodstuffs with Folic Acid." *Health Expectations* 6: 140–48.

Dorosh, Paul, Bart Minten, Jean-Claude Randrianarisoa, and David Stifel. 2022. *Recent Developments in Madagascar's Rice Sector and Policy Options*. Washington, DC: IFPRI.

Fayad, Dominique. 2023. "Food Insecurity and Climate Shocks in Madagascar: Republic of Madagascar." *Selected Issues Papers* 2023(037). doi:10.5089/9798400242601.018.A001.

Fiedler, John L., Keith Lividini, Rodah Zulu, Gladys Kabaghe, John Tehinse, and Odilia I. Bermudez. 2013. "Identifying Zambia's Industrial Fortification Options: Toward Overcoming the Food and Nutrition Information Gap-Induced Impasse." *Food and Nutrition Bulletin* 34(4): 480–500. doi:10.1177/156482651303400412.

GAIN & UNICEF. 2018. *GAIN-UNICEF USI Partnership Report*. Geneva, Switzerland: GAIN & UNICEF.

Galasso, Emanuela, and Nithin Umapathi. 2009. "Improving Nutritional Status through Behavioural Change: Lessons from Madagascar." *Journal of Development Effectiveness* 1(1): 60–85. doi:10.1080/19439340902727669.

GoM. 2008. *Portant Création de l'Alliance Nationale Pour La Fortification Alimentaire à Madagascar*. Antananarivo, Madagascar: Office of the Prime Minister.

Hall, Peter A. 1997. "The Role of Interests, Institutions, and Ideas in the Comparative Political Economy of the Industrialized Nations." In *Comparative Politics: Rationality and Structure*, eds. Alan Zuckerman and Mark Irving Lichbach. New York, NY: Cambridge University Press, 174–207.

Hendriks, Sheryl L, Elizabeth Mkandawire, Nicolette Hall, J J Olivier, Hettie C Schönfeldt, Phillip Randall, Stephen Morgan, et al. 2016. *Micronutrient Policy Change in South Africa: Implications for the Kaleidoscope Model for Food Security Policy Change*. Washington, DC: International Food Policy Research Institute, Michigan State University, University of Pretoria. http://www.up.ac.za/en/food-security-policy-innovation-.

Horton, Sue. 2006. "The Economics of Food Fortification." *The Journal of Nutrition* 136(4): 1068–71. doi:10.1093/jn/136.4.1068.

INSTAT & DHS. 2022. *Enquête Démographique et de Santé à Madagascar (EDSMD-V)*. Antananarivo, Madagascar and Rockville, Maryland: Institut National de la Statistique (INSTAT) and the DHS Program.

Kavishe, Festo, Isiye Ndombi, Bodo Rakotomalala, and Marie-Claude Desilets. 2021. *Revitalizing Universal Salt Iodization: A Story of an IGN-UNICEF Partnership*. Geneva, Switerland: IGN and UNICEF.

Kimura, Aya Hirata. 2013. *Hidden Hunger: Gender and the Politics of Smarter Foods*. Ithaca, NY: Cornell University Press.

Lalani, Baqir, Michael Ndegwa, and Ben Bennett. 2020. “Unpacking the ‘Business Model’ for Fortification Initiatives in Low-and Middle-Income Countries: Stakeholder Identified Drivers of Success and Constraints to Progress.” *International Journal of Environmental Research and Public Health* 17(23): 1–15. doi:10.3390/ijerph17238862.

Locatelli-Rossi, Lorenzo. 2017. *Problems and Solutions to Improving the Madagascar Iodized Salt Programme, 2017-2020*. Geneva, Switzerland: UNICEF.

Luthringer, Corey L., Laura A. Rowe, Marieke Vossenaar, and Greg S. Garrett. 2015. “Regulatory Monitoring of Fortified Foods: Identifying Barriers and Good Practices.” *Global Health Science and Practice* 3(3): 446–61. doi:10.9745/GHSP-D-15-00171.

Mannar, M. G. Venkatesh, and Richard Hurrell, eds. 2018. *Food Fortification in a Globalized World*. London, United Kingdom: Academic Press.

Milani, Peiman, Rebecca Spohrer, Greg Garrett, and Katharine Kreis. 2016. “Piloting a Commercial Model for Fortified Rice: Lessons Learned from Brazil.” *Food and Nutrition Bulletin* 37(3): 290–302. doi:10.1177/0379572116648447.

Mildon, Alison, Naomi Klaas, Melani O’Leary, and Miriam Yiannakis. 2015. “Can Fortification Be Implemented in Rural African Communities Where Micronutrient Deficiencies Are Greatest? Lessons from Projects in Malawi, Tanzania, and Senegal.” *Food and Nutrition Bulletin* 36(1): 3–13. doi:10.1177/156482651503600101.

Mkambula, Penjani, Mduduzi N.N. Mbuya, Laura A. Rowe, Mawuli Sablah, Valerie M. Friesen, Manpreet Chadha, Akoto K. Osei, et al. 2020. “The Unfinished Agenda for Food Fortification in Low- and Middle-Income Countries: Quantifying Progress, Gaps and Potential Opportunities.” *Nutrients* 12(2). doi:10.3390/nu12020354.

Mouahidi, Khalid Al. 2022. “Madagascar: Rajoelina Appoints New Government.” *MedAfrica Times*. https://medafricatimes.com/26100-madagascar-rajoelina-appoints-new-government.html (December 13, 2023).

Olson, Rebecca, Breda Gavin-Smith, Chiara Ferraboschi, and Klaus Kraemer. 2021. “Food Fortification: The Advantages, Disadvantages and Lessons from Sight and Life Programs.” *Nutrients* 13(4): 1118. doi:10.3390/nu13041118.

ONN. 2022. “Plan National d’Action Multisectorielle Pour La Nutrition, 2022-2026.”

Osendarp, Saskia J. M., Homero Martinez, Greg S. Garrett, Lynnette M. Neufeld, Luz Maria De-Regil, Marieke Vossenaar, and Ian Darnton-Hill. 2018. “Large-Scale Food Fortification and Biofortification in Low- and Middle-Income Countries: A Review of Programs, Trends, Challenges, and Evidence Gaps.” *Food and Nutrition Bulletin* 39(2): 315–31. doi:10.1177/0379572118774229.

Post, Lori, Amber Raile, and Eric Raile. 2010. “Defining Political Will.” *Politics & Policy* 38(4): 653–76.

Rakotobe, Narindra. 2021. “Lutte Contre La Malnutrition - La Farine Infantile.” *Midi Madagaskara*. http://fr.allafrica.com/stories/202112240301.html.

Rakotoseheno, Noro Haingo. 2008. “Madagasacar: L’huile Vitaminee Obligatoire.” *L’Express de Madagascar*. https://fr.allafrica.com/stories/200811250681.html.

Randremanana, Rindra Vatosoa, Alexandra Bastaraud, Leon Paul Rabarijaona, Patrice Piola, Delphin Rakotonirina, Jean Olivier Razafinimanana, Mamy Hanitra Ramangakoto, et al. 2019. “First National Iodine Survey in Madagascar Demonstrates Iodine Deficiency.” *Maternal & Child Nutrition* 15(2): e12717. doi:10.1111/mcn.12717.

Republic of Madagascar. 1996. “Arrêté Interministeriel No.0409/96: Portant Application Des Dispositions Du Décret Nº 95-587 Du 5 Septembre 1995.”

Republic of Madagascar. 2017. *Plan National d’Action Pour La Nutrition III, 2017-2021*. Antananarivo, Madagascar: ONN.

Republic of Madagascar. 2021. *Strategie Nationale Pour La Fortification Alimentaire a Madagascar*. Antananarivo, Madagascar: Republic of Madagascar.

Resnick, D., S. Haggblade, S. Babu, S.L. Hendriks, and D. Mather. 2018. “The Kaleidoscope Model of Policy Change: Applications to Food Security Policy in Zambia.” *World Development* 109. doi:10.1016/j.worlddev.2018.04.004.

Resnick, Danielle, Kola Anigo, and Olufolakemi Mercy Anjorin. 2022. “Advocacy Organizations and Nutrition Policy in Nigeria: Identifying Metrics for Enhanced Efficacy.” *Health Policy and Planning* 37(8): 963–78. doi:10.1093/heapol/czac037.

Shiratori, Sakiko, Jules Rafalimanantsoa, and Harisoa Sahondra Andriamanana Razafimbelonaina. 2023. “Rice Preference in Rural Madagascar: A Study of Producer and Consumer Preferences.” *Cogent Food & Agriculture* 9(2): 2281092. doi:10.1080/23311932.2023.2281092.

Sirdey, Ninon, and Arlene Alpha Cirad Moisa. 2020. *Food Fortification and Domestic Small-Scale Food Chain Actors: The Case of Burkina Faso*. Montpellier, France: CIRAD.

SUN. 2019a. “2019 Joint Assessment by the Multi-Stakeholder Platform.”

SUN. 2019b. *The Case of Madagascar: Scaling Up Nutrition Movement In-Depth Country Studies*. Geneva, Switerland: Scaling Up Nutrition (SUN) Secretariat. https://scalingupnutrition.org/wp-content/uploads/2019/01/Madagascar_In-depth-Study-draft.pdf.

Tonkin, Emma, Trevor Webb, Julie Henderson, Paul R. Ward, John Coveney, Samantha B. Meyer, Dean McCullum, and Annabelle M. Wilson. 2021. “The Health Implications of Distrust in the Food System: Findings from the Dimensions of Trust in Food Systems Scale (DOTIFS Scale).” *BMC Public Health* 21(1). doi:10.1186/s12889-021-11349-9.

UN. 2022. *Feuille de Route Nationale*. New York and Antananarivo: UN, Republic of Madagascar, and African Union. https://www.unfoodsystemshub.org/docs/unfoodsystemslibraries/national-pathways/madagascar/vf-feuille-de-route-nationale-ssa12--05-2022-vf-new.pdf?sfvrsn=2aee69c8_1.

USAID. 2013. *Madagascar USAID-BEST Analysis.* Washington, DC: USAID. Available at: https://pdf.usaid.gov/pdf_docs/PBAAA950.pdf

Vosti, Stephen, Emily Baker, Denish Moorthy, Mike Mazinga, and Omar Dary. 2024. “Firm-Level and Public-Sector Costs Make Small-Scale Maize Flour Fortification Challenging in Uganda.” *Food and Nutrition Bulletin*: 03795721231223052. doi:10.1177/03795721231223052.

Wadman, Meredith. 2021. “U.K. Will Fortify Flour to Prevent Birth Defects, Joining Long List of Other Countries.” *Science* 374(6567).

Weber, Ann M., Emanuela Galasso, and Lia C.H. Fernald. 2019. “Perils of Scaling up: Effects of Expanding a Nutrition Programme in Madagascar.” *Maternal & Child Nutrition* 15(S1): e12715. doi:10.1111/mcn.12715.

WFP. 2019. *La Filière Riz à Madagascar Face à La Fortification*. Antananarivo, Madagascar: World Food Program (WFP).

WFP. 2023. *Mapping Des Producteurs de Compléments Alimentaires Fortifiés Effectuée*. Antananarivo, Madagascar: World Food Program (WFP).

WHO. 2015. *Madagascar: Evaluation Du Programme de Flouration Du Sel: Phase 1*. Brazzaville, Republic of Congo: World Health Organization (WHO).

World Bank. 2022. *The Urgency of Reforms: Structural Transformation and Better Governance at the Heart of the Strategy to Reduce Poverty*. World Bank: Washington, DC. Systematic Country Diagnostic Update for Madagascar.

World Bank. 2023. *Country Partnership Framework for Republic of Madagascar, FY2023-27*. Washington, DC: World Bank.

Zimmermann, Michael B, and Maria Andersson. 2021. “Global Perspectives in Endocrinology: Coverage of Iodized Salt Programs and Iodine Status in 2020.” *European Journal of Endocrinology* 185(1): R13–21. doi:10.1530/EJE-21-0171.

Appendix 1: List of interviewed stakeholders

Organization (number of respondents)	Date of interview
ONN (2)	18 October, 2023
CNS (1)	18 October, 2023
ANFA (2)	19 October, 2023, 8 January 2024*
GRET (2)	19 October, 2023
Ministry of Public Health (4)	19 October, 2023
Ministry of Agriculture and Livestock (1)	20 October, 2023
BNM (1)	20 October, 2023
Agrikoba (1)	20 October, 2023
MIKASA (2)	20 October, 2023
ACSQDA (1)	23 October, 2023
Basan Group/Tanjaka Food (2)	23 October, 2023
HINA (2)	23 October, 2023
Ministry of Commerce (1)	24 October, 2023
Nutri'zaza (2)	24 October, 2023
UNICEF (5)	25 October, 2023, 30 October 2023,* 13 November 2023,* 5 January 2024*
TAF (1)	25 October, 2023
WFP (1)	3 January, 2024*

*Interviews with asterisks took place virtually rather than in Antananarivo.

Appendix 2: Fortification Logos in Madagascar

Tovonantsoa logo issued by BNM for foods fortified to standard with vitamins and micronutrients

Source: Madagascar Standards Bureau

SIF logo for salt mandatorily fortified with iodine and fluoride

Source: Kibo wholesale and retail market

ALL IFPRI DISCUSSION PAPERS

All discussion papers are available **here**

They can be downloaded free of charge.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
www.ifpri.org

IFPRI HEADQUARTERS

1201 Eye Street, NW
Washington, DC 20005 USA
Tel.: +1-202-862-5600
Fax: +1-202-862-5606
Email: ifpri@cgiar.org