



# 2021 Annual Report

BUILDING A SMARTER FUTURE  
THROUGH FOOD FORTIFICATION



**Food Fortification Initiative**  
Enhancing Grains for Healthier Lives



Photo: A family shares a meal of fish, cabbage, potato, and rice, Taflankwasa village, Malaita Province, Solomon Islands. Filip Milovac/WorldFish

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**The Food Fortification Initiative (FFI) champions effective grain fortification so people have the nutrition they need to be smarter, stronger, and healthier.**

FFI provides unique expertise, rigor, and focus to help country leaders plan, implement, and monitor fortification of industrially milled wheat flour, maize flour, and rice. Established in 2002, we are a public, private, and civic partnership based at Emory University.

**What is fortification?**

Food fortification—sometimes referred to as food enrichment—is when food producers add essential vitamins and minerals missing in a population’s diet to food that people eat every day.

Humans need vitamins and minerals, called micronutrients, in small amounts to function

Visit our website [FFInetwork.org](http://FFInetwork.org)

optimally. The consequences of micronutrient deficiencies can be extensive, including devastating birth defects for babies, maternal death, impaired brain development in young children, and reduced work capacity among adults.

**Large-scale food fortification is a proven, cost-effective way to prevent micronutrient deficiencies, save lives, and build a better future.**

**“We champion effective grain fortification so people have the nutrition they need to be smarter, stronger, and healthier.”**

*Photo: David Brazier/IWMI*

# FFI Around the World

In 2021, FFI provided technical assistance for grain fortification in 32 countries across four regions: Africa, Asia-Pacific, Europe, and India.

This report highlights a snapshot of FFI's work globally. Though they may not be included in the report, many of the other countries that FFI supported in 2021 made strides towards building a smarter, stronger, and healthier future through grain fortification.

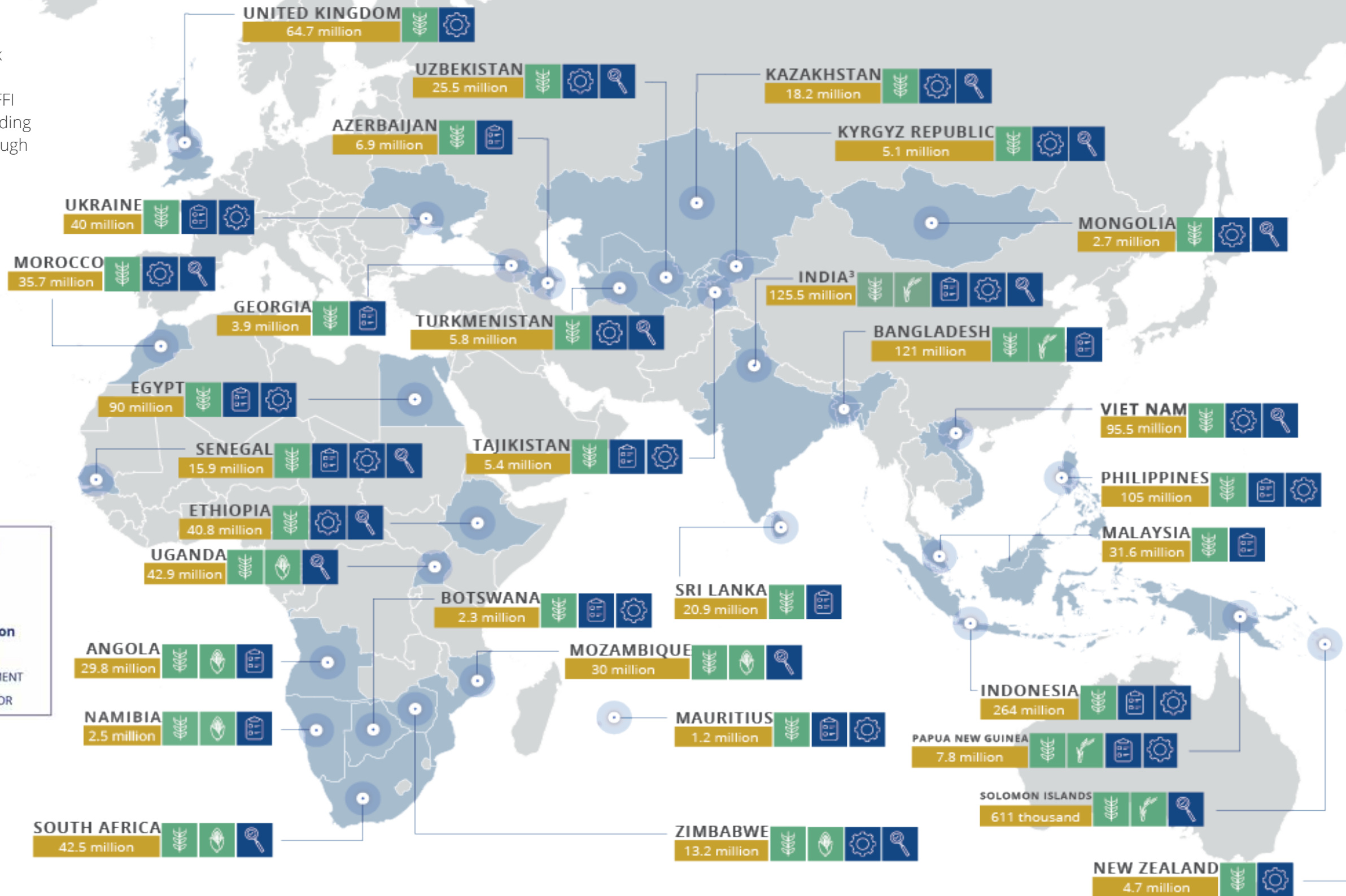
Working closely with our partners, we contributed to reducing the risk of micronutrient deficiencies for nearly 1.3 billion people.<sup>1</sup>

- Total estimate only includes countries that FFI supported in 2021. Estimate calculated by multiplying total population by the coverage rate of the industrially milled grain. Coverage rate is the percentage of population that consumes an industrially milled grain multiplied by the percentage of the grain that is industrially milled.
- Potential reach calculated by multiplying total population by the coverage rate of the industrially milled grain.
- FFI works in the following Indian states: Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Rajasthan, and West Bengal.

## Where We Work: 2021

### HOW TO READ THE MAP

<b>Potential Reach<sup>2</sup></b> in millions of people	<b>Industrially Milled Grain</b>	<b>FFI in Action</b>
	WHEAT	PLAN
	MAIZE	IMPLEMENT
	RICE	MONITOR



## AFRICA

# The Final Sprint to Fortify Africa's Future

From 2007-2021, [Smarter Futures](#), the program under which FFI carries out the majority of its work in Africa,

helped make fortification of wheat flour, maize flour, and rice a reality in dozens of countries across the continent.

A unique public-private-civic partnership, Smarter Futures contributed to reducing the risk of micronutrient malnutrition for millions. Over 15 years, Smarter Futures convened key stakeholders through 27 meetings or trainings and provided specialized technical support to grain millers, governments, vitamin and mineral suppliers, international organizations, and academic institutions in 26 countries. The partnership helped create robust fortification programs and provided resources that will continue to prevent the debilitating health consequences of micronutrient deficiencies for years to come. To celebrate the program's impact, FFI and partners developed a [summary report of high-level achievements](#).

Partners of Smarter Futures include the Global Alliance for Improved Nutrition and the International Federation for Spina Bifida and Hydrocephalus as project holders, the Food Fortification Initiative as the main implementing partner, and steering team members: Buhler, Helen Keller International, Mühlenchemie, Nouryon, Nutrition International,

and the World Food Programme. Funded by the Ministry of Foreign Affairs of the Netherlands, Smarter Futures did not itself invest large program resources but instead supported and strengthened the efforts of its network partners.

## Smarter Futures by the Numbers

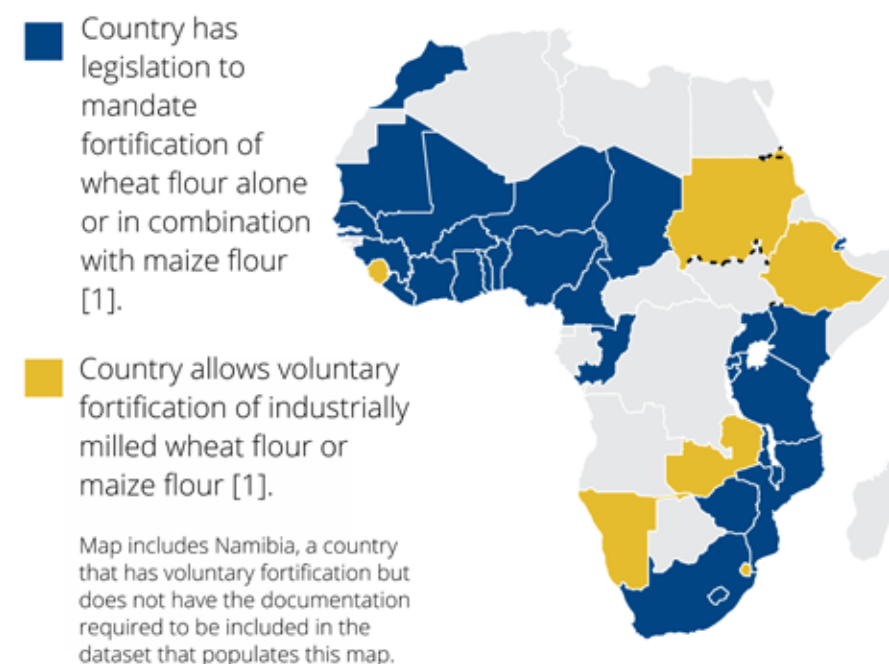


\*Food Fortification Initiative. [Potential anemia and neural tube defects averted through fortification of wheat flour, maize flour, and rice](#). Unpublished estimates. 2021.

## The legacy of Smarter Futures

Tremendous progress was made across Africa since Smarter Futures began. In 2007, only [seven countries](#) on the continent had legislation for mandatory or voluntary fortification of a grain. As of December 2021, [29 countries](#) have legislation to mandate the fortification of wheat flour alone or in combination with maize flour, [six countries](#) allow the voluntary fortification of either flour, and—though no country in Africa mandates the fortification of rice yet—Smarter Futures has mapped [opportunities for rice fortification](#) on the continent. Although this progress cannot be attributed to the impact of Smarter Futures alone, the program's meetings, workshops, trainings, and other events have been attended by stakeholders from 41 countries. Thirty-six of these 41 countries are

## Mandatory and Voluntary Fortification of Wheat Flour and Maize Flour in Africa, 2021



[1] Global Fortification Data Exchange. [Fortification Legislation](#). Accessed 1 January 2022.

now planning, implementing, or monitoring a national fortification program.

## Sprinting toward a healthier Africa

With Smarter Futures' funding ending, FFI is making plans to apply lessons learned and take large-scale fortification programming on the continent across the finish line.

In countries that demonstrate high feasibility for fortification and high potential for impact, FFI proposes the "[Final Sprint](#)," a bold, focused approach that engages FFI expertise and local experts. These individuals will serve to guide government, private sector, and civil society entities over a sustained four-year period through a process that ensures quality programs are put in place using innovative business

models and sustainability plans that position each country with the ability to own, operate, and shape the program long into the future.

At scale, 21 million cases of anemia among women of reproductive age and 43,000 debilitating neural tube birth defects in Africa can be prevented every year by making quality fortified wheat flour, maize flour, and/or rice available to the most vulnerable through country-led fortification programs. By engaging FFI's unique model of hiring on-the-ground staff solely dedicated to working alongside the government, private sector, and civic groups, FFI hopes to build upon the achievements of Smarter Futures and ensure millions more people have access to the micronutrients that can help them thrive.

EGYPT 90 million potential reach



## In preparation for launching wheat flour fortification in Egypt, FFI and partners held a flour fortification advocacy workshop for millers.

The workshop, which sought to refresh millers on their important role in fortification and to connect millers from the private and public sectors with other fortification stakeholders, was held on 1 April 2021 and attended by a large number of millers and key stakeholders. Using training modules crafted to specifically engage milling industry professionals, the workshop demonstrated how wheat flour fortification can have a tremendously positive impact on the health of millers, their families, their communities, and the country as a whole.

Topics covered in discussion included the effectiveness of flour fortification as a vehicle in the reduction of anemia; the impact of folic acid on the reduction of folate deficiency and neural tube defects; and the significance of regulatory and internal monitoring, quality management systems, and solid data to ensure the success of fortification projects. All discussions and presentations highlighted the role of millers and their significance to the success of flour fortification.

The workshop brought together stakeholders critical to restarting Egypt's wheat flour fortification program including the Ministry of Supply and Internal Trade (MOSIT), Ministry of Health, National Nutrition Institute,

National Food Safety Authority, millers from the public and private sectors, the Food Holding Company, the American Chamber of Commerce, as well as development organizations. Experts in fortification and nutrition from MOSIT, FFI, UNICEF, and the International Federation for Spina Bifida and Hydrocephalus presented. The Global Alliance for Improved Nutrition and USAID provided additional support for the workshop.

## Egypt's big opportunity

Fortification of flour with iron and folic acid is an ideal intervention as Egypt consumes approximately 17 million tons of wheat annually, making it one of the largest consumers worldwide. Traditional *baladi* bread, a staple food made of wheat flour that is consumed by the majority of Egyptians, is subsidized and available to nearly all Egyptians through the government's social safety net system. Fortifying the flour that is used to make *baladi* bread and mandating the fortification of flour sold through the open market are two effective strategies to address two pressing public health problems: anemia



Photo: Quizzes were held after each module to test participants' knowledge. (4PR)

and neural tube defects. Flour fortification with iron can significantly reduce levels of anemia in Egypt. According to the latest Demographic and Health Survey, over 20% of women and 27% of children under five are considered anemic. Fortification with folic acid can also reduce the prevalence of neural tube defects, which is three times higher than the global average. Mandatory fortification of flour available through Egypt's social safety net system and the open market will enable 90% of the Egyptian population—approximately 90 million people—to receive the vitamins and minerals they need to lead a more productive and healthier life.

The initial flour fortification program that took place in Egypt was launched in 2008 and continued until 2014, where flour was fortified with iron and folic acid through the subsidy system and reached approximately 50 million Egyptians. In 2019, the Government of Egypt engaged FFI's expertise to restart the fortification program.

To date, FFI and partners like the Global Alliance for Improved Nutrition have worked together to conduct an assessment that maps opportunities and challenges, develop a coalition of stakeholders to implement large-scale fortification, and provide technical assistance to build and sustain a fortification program that will reach the majority of Egypt's population.

## Looking forward

As a result of the success of the April 2021 flour fortification workshop, MOSIT approved efforts to hold an additional workshop. The workshop, which took place in February 2022, offered more millers in Egypt the opportunity to learn about food fortification and their critical role in saving lives. By bringing public, private, and civic partners together through such workshops, FFI helps Egypt build the foundation for a robust mandatory flour fortification program that can improve the country's health at minimal cost.

## UGANDA

42.9 million  
potential reach

## Despite an unprecedented global health crisis, many Ugandan food producers continue to fortify foods in line with national standards and save lives.

To better understand how the COVID-19 pandemic had—and continues to—affect food producers and country commitments to fortify, FFI conducted a fortification assessment in Uganda in early 2021. FFI staff based in Uganda visited wheat flour, maize flour, and oil producers in the country to ascertain the status of fortification and update FFI's fortified food producer inventory.

After a year of COVID-19-induced lockdowns, staffing shortages, and supply chain issues, the assessment revealed that nearly all wheat flour, 90% of oil, and 6% of locally produced maize flour continued to be fortified based on national standards. Although producers experienced a myriad of operational challenges due to the pandemic such as a reduced workforce, physical distancing requirements, and sluggish supply chains, these challenges did not significantly affect wheat flour or oil fortification. Most producers continued to produce fortified wheat flour and oil that complied with national standards.

One key strategy that producers adopted to cope with COVID-19 challenges and ensure compliance to national fortification standards was to implement daily premix reconciliation,

a method to determine the amount of pre-measured vitamins and minerals—premix—added during processing to fortify food.

Premix reconciliation is based on the quantity of premix used and the quantity of food produced over the same time to determine compliance. Without using additional resources, producers can use premix reconciliation to determine compliance to fortification standards.

Yet the assessment also revealed challenges, many of which were exacerbated by COVID-19, related to data collection and fortification compliance monitoring that producers and regulatory inspectors faced. These challenges were most acutely felt by maize flour producers. Producers reported that the pandemic had damaged the country's economy and consumers' demand, decreased the overall supply of food, and hampered access to fortified foods.

In May 2021, FFI presented [key findings of the assessment](#) and resulting recommendations with Uganda's National Working Group on Food Fortification, which includes national fortification stakeholders

and development partners. With COVID-19 a continued reality in 2021, the assessment's findings and recommendations sought to enhance compliance during and after the pandemic. Key findings and recommendations include:

- Due to low demand for flour from school closures and the economic downturn, industries operated at very low capacity, thus enabling physical distancing, and reducing pressure on staff shortages.
- Despite the country's strict lockdown and closed borders, premix was airlifted into Uganda rather than shipped to ports.
- Continuous social marketing and public awareness on the importance of fortified

foods was vital to remind consumers of the health benefits of consuming fortified foods.

Whether in Uganda or globally, conducting monitoring assessments during the pandemic, as are feasible, is critical to addressing operational challenges from COVID-19 and ensuring food producers continue to fortify. FFI's assessment enabled both industry partners and regulatory agencies to understand the impact that COVID-19 had on fortified food producers, yet highlighted the resilience of food producers equipped with tools and resources that help them comply with standards.



Photo: USAID

## ASIA-PACIFIC

## NEW ZEALAND

4.7 million  
potential reach

## After years of advocacy, New Zealand joins a growing list of countries with mandatory wheat flour fortification.

In July 2021, [New Zealand mandated](#) that all non-organic wheat flour be fortified with folic acid within the next two years. They join [nearly 70 countries](#) that already require folic acid in fortified wheat flour. As a result of the mandate, nearly 5 million people will have access to a vitamin that is essential at every stage of life and critical during pregnancy, when it can prevent hundreds of neural tube birth defects (NTDs).

For nearly two decades, through ongoing consultations and meetings, FFI has worked with key stakeholders in New Zealand to increase awareness on the importance of folic acid fortification. FFI has been instrumental in growing political support to develop fortification mandates. Beginning in 2004, FFI established a communication program with New Zealand and Australia to connect public and private industry leaders in both countries and to support major food industry meetings and

fortification summits.

The new fortification regulation will align New Zealand with Australia's wheat flour fortification program, which resulted in a [14.4% decline in NTDs](#) since 2009, when the country introduced mandatory fortification of flour with folic acid.

Increased folic acid intake before and during pregnancy helps prevent more than half of all NTDs and provides other health benefits. One type of NTD, spina bifida, occurs when a baby's spine does not fully close by the end of the fourth week of pregnancy. As that is before many women even know they are pregnant, it is crucial to have high enough folate levels well before pregnancy to benefit from the nutrient's preventative effect. According to New Zealand's Health Minister, [more than half of pregnancies in New Zealand are unplanned](#), making fortification an ideal strategy for preventing NTDs in the country and creating a healthier future.

## SOLOMON ISLANDS

611,000  
potential reach

## The Solomon Islands celebrates strong compliance to fortification standards.

Since [fortification efforts began in 2015](#), FFI technical experts have been key to building a robust wheat flour and rice fortification program for the Solomon Islands. FFI's support, funded by the Australian Department of Foreign Affairs (DFAT), ended in June 2021. Yet the program continues to demonstrate the value of FFI's mission to create sustainable, high-impact, and well-monitored fortification programs.

Key successes during the project include training and supporting the Solomon Islands Ministry of Health and Medical Services (MHMS) to implement audit and inspection requirements for wheat flour fortification and promoting, justifying, and facilitating changes to legislation to introduce fortification of rice. The success of the project can be seen by the high compliance rate of both producers and importers to the standards. In many countries, compliance to national fortification standards can be challenging to achieve and maintain. However, throughout its work in the Solomon Islands, FFI provided millers with the tools and

resources to ensure compliance and helped create a easy-to-use import monitoring protocol for the country's regulatory agencies.

Despite challenges from COVID-19, border control agencies in the Solomon Islands have successfully maintained the import monitoring protocol for rice fortification throughout the pandemic, which ensured that all imported rice was fortified. In coordination with Customs and Biosecurity, the Environmental Health Unit of MHMS implemented a compliance and enforcement framework for importing fortified rice that was developed in partnership with FFI. The framework requires each shipment of rice to provide certificates of compliance and testing.

According to MHMS quarterly reports, certificate checks and spot testing at ports show 100% compliance. With these impressive findings, MHMS committed long-term inspection resources to oversee fortification compliance and to continue building a healthier future for Solomon Islanders.



“According to MHMS quarterly reports, certificate checks and spot testing at ports show 100% compliance.”



Photo: Asian Development Bank



The project has been so successful that it has inspired other countries (e.g., Vanuatu) and importers in the region to consider or endorse fortification of rice. Though FFI and DFAT's work in the country came to a close in 2021, efforts to strengthen local capacity and sustainability have ensured that the Solomon Islands' fortification program will continue to build a smarter, stronger, and healthier future.

To learn more about key achievements and lessons learned through FFI's work in the Solomon Islands, read the project's [final report](#).



Photos: (above) Asian Development Bank, (bottom row) FFI trains Solomon Islands regulators to test fortified wheat flour.



## EUROPE

## UKRAINE

40 million  
potential reach

## FFI strengthens Ukraine by laying the foundation for a future fortification program.

Thanks to advocacy efforts by in-country stakeholders, particularly the OMNI-Net Ukrainian Birth Defects Monitoring Program, a deputy in the Ukrainian Parliament submitted a draft law for wheat flour fortification on 16 June 2021. The draft was promptly adopted, endorsed by a diverse group of deputies who represent various political parties and all regions of Ukraine, and sent for review by an appropriate committee.

FFI received a draft of the law and gave substantial feedback to Dr. Wladimir Wertelecki, founder of the OMNI-Net Ukrainian Birth Defects Monitoring Program and vocal advocate for folic acid fortification. The law was drafted to suggest that only folic acid be added to wheat flour. FFI suggested that the government take a holistic approach to vitamin and mineral deficiency and consider a much broader ingredient coverage in the fortification standard.

To raise support for fortification among high-level government stakeholders, FFI sent letters to the Prime Minister of Ukraine, Denys Shmyhal, and Chairman of the Parliament, Dmytro Razumkov,

that endorsed mandatory wheat flour fortification and offered FFI's technical assistance. Technical assistance would include helping the country set fortification standards and the overall planning, implementation, and monitoring of a fortification program.

FFI partnered with two in-country advocates for wheat flour fortification to help move the legislation forward: Ivan Mirashnichenko, a former Ukrainian Government official who works as a grain trader and flour miller, and Olga Trigub, leader of Business-Guard, a nongovernmental and inter-industrial association that specializes in working with the Parliament of Ukraine. FFI is also conducting a thorough supply chain analysis for several Central Asian countries, including Ukraine. The learnings from the analysis will inform FFI's approach to fortification programming in the country.

Unfortunately, due to increasing political instability in 2021, FFI put on hold its work with local experts, the milling industry and the Ukrainian Government to further develop a fortification program.

## UNITED KINGDOM

64.7 million  
potential reach

## United Kingdom announces that it will require folic acid to be included in fortified flour.

Though the United Kingdom (UK) Government [mandated the fortification of non-whole meal wheat flour in 1940](#), regulations did not require fortified flour to include folic acid. That changed in 2021 when the UK updated the legislation to include folic acid in its mandatory wheat flour fortification standards. With the stroke of a pen, the new legislation will prevent hundreds of devastating neural tube defects each year.

The change comes in the wake of tireless advocacy from committed public, private, and civic sector advocates including FFI, The Queen's Nursing Institute - Scotland, International Federation for Spina Bifida and Hydrocephalus, and Shine, a UK organization that provides support for families and children with spina bifida and hydrocephalus.

Since 2013, FFI has provided expert advice to the UK Government and partnered with in-country civic groups to advocate for folic acid to be included in the country's fortification mandate. During the UK's [Red Tape Challenge](#), an effort designed to remove unnecessary government regulations, FFI and partners successfully convinced

decision makers of the importance and necessity of mandatory flour fortification. FFI also participated in a [2019 public consultation](#) with industry leaders and key stakeholders. As a result of the consultation, policy makers found overwhelming support in favor of adding folic acid to mandatory wheat flour fortification to improve public health outcomes, leading them to ultimately add folic acid to the fortification legislation.

With measurable success in countries around the world, wheat flour fortification with folic acid provides important health benefits for all. Additionally, it is important for babies' healthy development in early pregnancy. The risk of giving birth to babies with neural tube defects, such as spina bifida and anencephaly, increases exponentially if women do not have sufficient levels of folic acid before and during their first trimester.

The mandatory addition of folic acid to fortified wheat flour is a major public health victory that will create a stronger future for the UK and may encourage other European countries to mandate fortification.

## INDIA



INDIA

125.5 million  
potential reach

## FFI partners with local voices to advocate for revising India's national wheat flour fortification standards and fight misinformation

In 2021, FFI led efforts in India to engage multi-sector fortification partners, fight misinformation, and identify champions who can encourage the Food Safety and Standards Authority of India (FSSAI) to reconsider the country's current cereal grain standards.

To ensure fortification efforts in India are locally-led, FFI helped form and contributed to the India Birth Defect Prevention Task Force (BDPTF). The task force is comprised of researchers, clinicians, public health professionals, members of national and international organizations, spina bifida survivors, and former Indian Administrative Services officers. This multi-sectoral group of collaborators aims to prevent birth defects by providing science-based evidence to align the country's wheat flour fortification standards with World Health Organization (WHO) recommendations. Established under the Indian Spina Bifida Foundation, the task force includes leaders

from FFI, Center for Spina Bifida Prevention, Birth Defects and Childhood Disability Research Centre, International Federation for Spina Bifida and Hydrocephalus, Emory University, and WHO Southeast Asia Regional Office, among others.

With FFI's assistance, BDPTF sent a letter to the Prime Minister, Health Minister, Minister of Women and Child Development, and Minister of Social Justice and Empowerment highlighting the pressing need for fortification in India and requesting the revision of wheat flour fortification standards.

BDPTF met the Health Minister of India and other key officials in November 2021 to advocate for the revision of India's current fortification standards. Thanks to momentum generated from these meetings, BDPTF was invited to present to a panel of experts at FSSAI that make the ultimate decision to update the standards.

The presentation, which could be pivotal to the future of India's food fortification programming, is planned for early 2022. Additionally, FFI helped the task force develop a position paper for members to use when advocating with potential fortification champions.

In response to a rise in misinformation from pseudo-scientific articles and the press in 2021, FFI and BDPTF drafted a press release that addresses Indians' concerns and the need for a nutrition intervention such as food fortification. BDPTF also has plans to hold a press conference to help the Indian media communicate key advocacy messages for

lay people. In 2022, BDPTF plans to host a media workshop that will feature speakers who know the challenges associated with living with spina bifida intimately—families of spina bifida survivors.

Whether debunking misinformation in the media or engaging champions to revise national fortification standards, FFI and BDPTF's advocacy efforts reaffirm what decades of studies in the country and globally show: large-scale food fortification is a proven, effective, and safe way to help all Indians receive the nutrition they need to thrive, now.



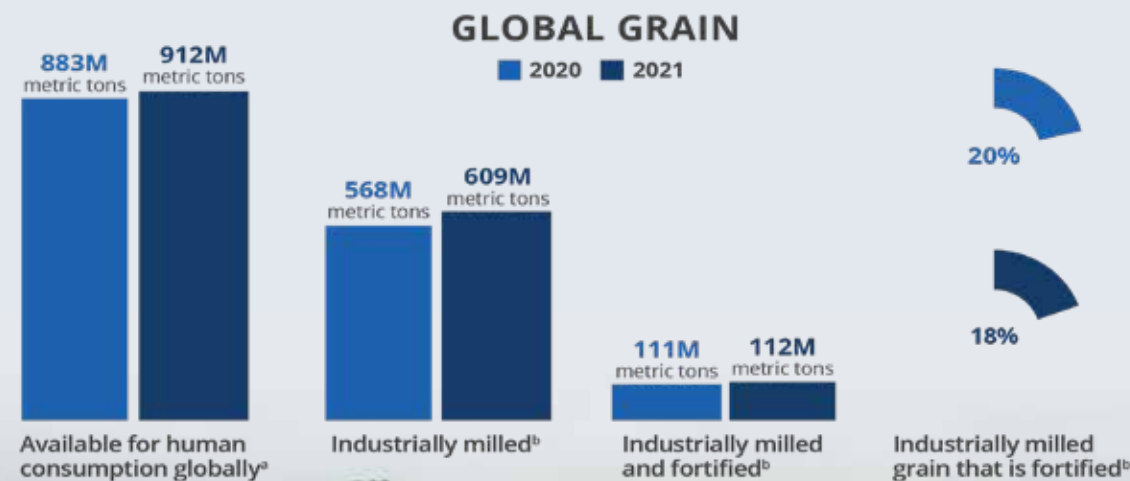
Photo: P. Sudhakaran/United Nations



## The moderate increase in industrially milled grain available for human consumption in 2021 globally presents a tremendous opportunity for fortification.

In parts of Africa, Asia, and India, the overall availability of cereal based grains increased. This is a hopeful development; as a large amount of grain is industrially milled and consumed, more grain can be fortified with essential micronutrients to save more lives. Despite slight increases in food supply and industrial milling, the percentage of industrially milled grain that was fortified decreased slightly in 2021. This indicates that there is a pressing need for FFI's support to better plan, implement, and monitor the fortification of industrially milled grain around

the world. Update on methodology: In 2021, FFI expanded its definition of the flour and rice that it considers fortified. FFI now includes the percentage of all flour and rice fortified in a country, not only the amount of flour that is fortified in compliance with national standards, as data that assesses compliance to national standards is often unavailable or out-of-date. FFI's decision to include all fortified flour and rice, regardless of the presence of compliance data, seeks to capture a more complete picture of global cereal grain fortification.



# How we calculate global estimates

## We measure global progress in grain fortification through an annual survey.

We begin with data from the Food and Agriculture Organization (FAO) of the UN about how much grain is available in the food supply for each country.

## Flour and rice available

To calculate the amount of wheat flour available, we multiply the metric tons of wheat available in each country by the country's average flour extraction rate. We use 75% as the default extraction rate unless we have country-specific data.

reflect industrial production. We assume that 100% of wheat flour is industrially milled, with the exception of countries with a large number of small mills, such as Afghanistan, India, Nepal, and Pakistan. In contrast, we assume that 0% of maize flour and rice are industrially milled unless we have country-specific data to indicate otherwise. The exception is that in countries in FFI's **Europe region**, we assume that 100% of the maize flour and rice is industrially milled.

## Percent fortified

For maize flour, we use regional extraction rates of 67.5% for Africa and 72.5% for South/Central America and the Caribbean. We use an extraction rate of 70% elsewhere for maize.

We ask national partners in governments, milling associations, nongovernmental organizations, and UN agencies to estimate how much of each grain is fortified in their country. We then compile the country figures into global estimates.

No extraction rate adjustment is needed for rice as FAO data represents the "milled rice equivalent."

## Industrially milled

We then adjust the numbers to

<sup>a</sup> 2020 estimates: 2018 FAOSTAT, New Food Balances, Food (element 5142) 2018 Data: <http://www.fao.org/faostat/en/#data/FBS>

2021 estimates: 2019 FAOSTAT, New Food Balances, Food (element 5142) 2019 Data: <http://www.fao.org/faostat/en/#data/FBS>

<sup>b</sup> FFI calculations.



Photo: Xaume Olleros/RTI



Photo: RTI

 **Wheat**

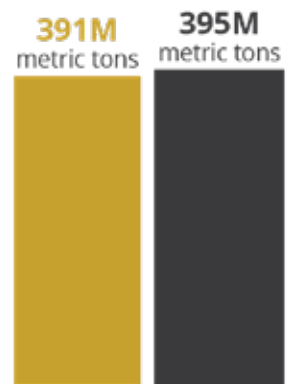
In the past year, there was a marginal increase in overall fortified wheat flour (32,000 metric tons). However, as there was a larger increase in the amount of wheat flour that was industrially milled (6 million metric tons), the total amount of industrially milled flour that was fortified slightly decreased.

One country that experienced a dramatic increase in the amount of industrially milled wheat flour that was fortified was Malaysia. The increase resulted from the country's decision

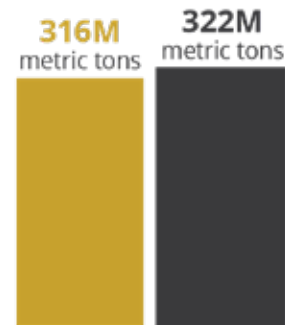
to mandate fortification of government-subsidized wheat flour, which constitutes 25% of the national wheat flour market. In India, the amount of fortified flour also increased, coupled with a large increase of wheat flour available in the food supply. Unfortunately, the amount of industrially milled flour that was fortified in Pakistan dramatically decreased. Fortification of wheat flour is currently voluntary in Pakistan though there are efforts to create legislation for mandatory fortification.

**WHEAT FLOUR**

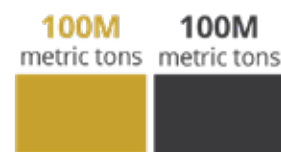
■ 2020 ■ 2021



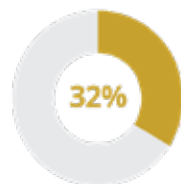
Available for human consumption globally<sup>a</sup>



Industrially milled<sup>b</sup>

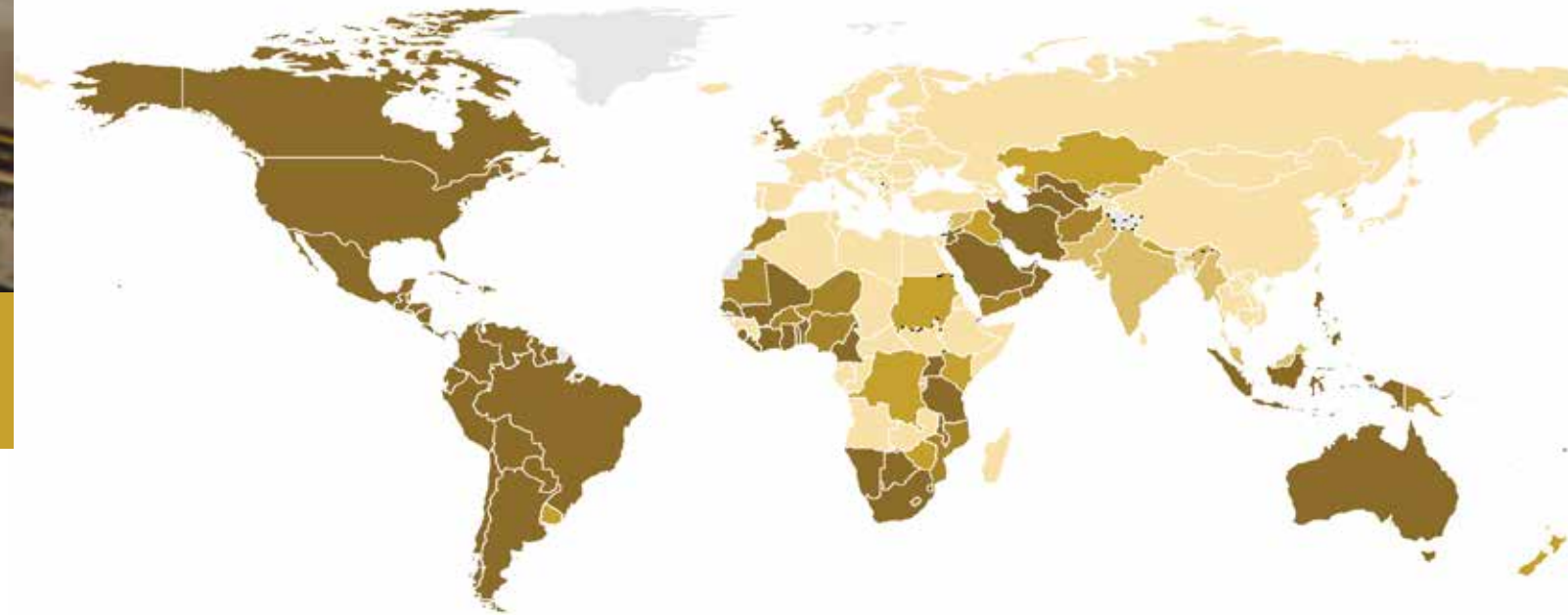


Industrially milled and fortified<sup>b</sup>








Industrially milled grain that is fortified<sup>b</sup>

**Percentage of industrially milled wheat flour that is fortified, 2021**



**LEGEND**

-  75-100%
-  50-74%
-  25-49%
-  1-24%
-  0-<1%

 No data



Photo: RTI

a FAO data with additional sources for American Samoa and Singapore. 2020 estimates: 2018 FAOSTAT, New Food Balances, Food (element 5142) 2018 Data: <http://www.fao.org/faostat/en/#data/FBS> 2021 estimates: 2019 FAOSTAT, New Food Balances, Food (element 5142) 2019 Data: <http://www.fao.org/faostat/en/#data/FBS>

b FFI calculations.



Photo: Xaume Olleros/RTI

## Maize

Although the volume of industrially milled maize flour that was fortified increased by 200,000 metric tons, largely due to increases in Mexico, Mozambique, and Tanzania, the total percentage of maize flour that was fortified slightly decreased in 2021. The world's food supply of maize flour increased by 2 million metric tons. The amount of industrially milled maize flour increased by approximately 4 million metric tons.

As a part of the maize fortification estimate

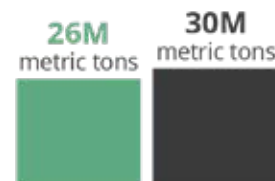
methodology, FFI includes the total food supply but excludes total amount of industrially milled maize flour for countries where the per capita consumption of maize flour is small and another cereal grain would be the preferred vehicle to fortify. In many countries, maize is industrially milled but consumed less than another grain, suggesting that maize is not a priority for large-scale fortification. By limiting the scope, FFI can highlight countries where maize is a staple food, consumed more than wheat or rice, and can be fortified.

### MAIZE FLOUR

■ 2020 ■ 2021



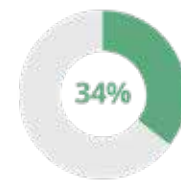
Available for human consumption globally<sup>a</sup>



Industrially milled<sup>b</sup>

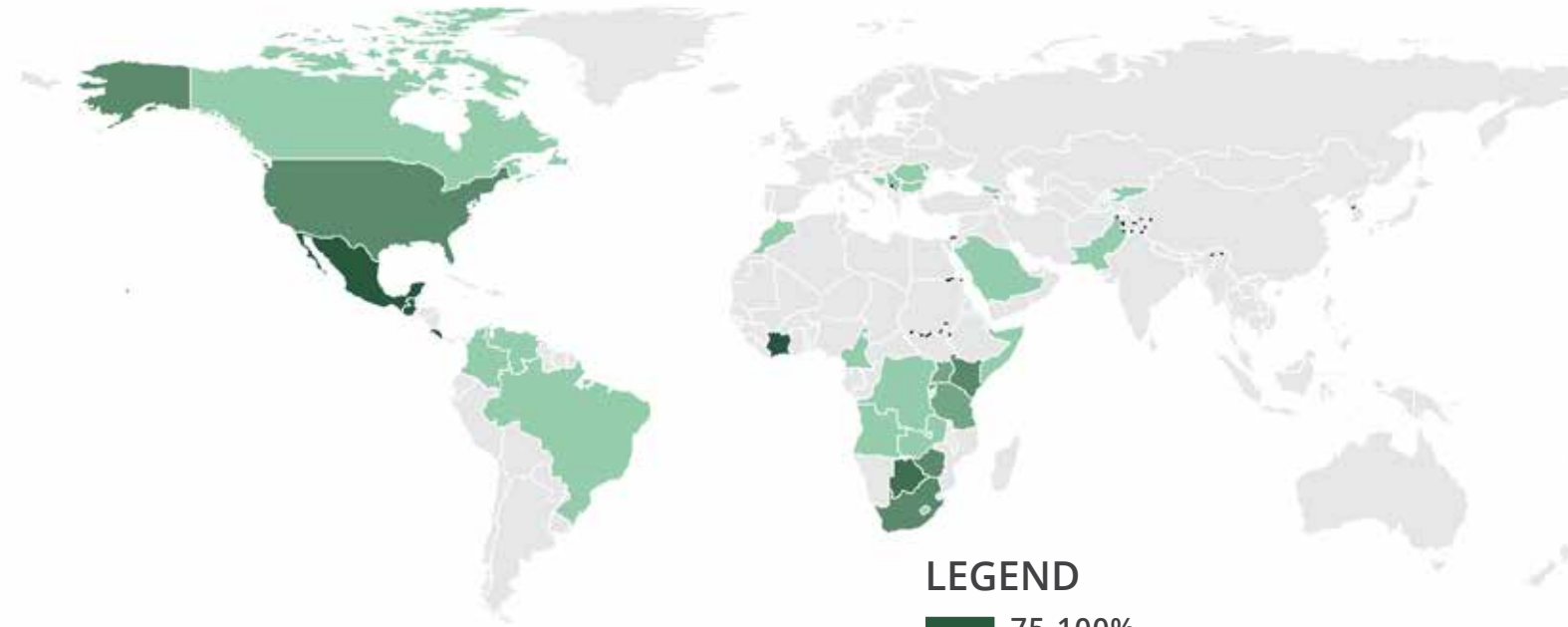


Industrially milled and fortified<sup>b</sup>

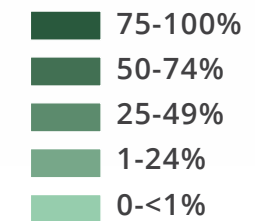


Industrially milled grain that is fortified<sup>b</sup>

## Percentage of industrially milled maize flour that is fortified, 2021



### LEGEND



### Countries have one of the following:

- Less than 37.5 grams per capita per day available for human consumption<sup>c</sup>
- Less than 30% of industrial milling capacity
- Another cereal grain is the preferred vehicle to fortify
- No data

a FAO data with additional sources for American Samoa, Bhutan, Somalia, South Sudan, and Sudan. 2020 estimates: 2018 FAOSTAT, New Food Balances, Food (element 5142) 2018 Data: <http://www.fao.org/faostat/en/#data/FBS> 2021 estimates: 2019 FAOSTAT, New Food Balances, Food (element 5142) 2019 Data: <http://www.fao.org/faostat/en/#data/FBS>

b FFI calculations.

c 2019 FAOSTAT, Supply Utilization Accounts-Crops Processed, Food Supply Quantity (element 665) 2019 Data: <https://www.fao.org/faostat/en/#data/SCL>

Note: Though average consumption of maize flour in Canada and the United States is less than 37.5 grams per capita per day, segments of the population not reached by other cereal grains consume more than 37.5 grams. Learn more about FFI's work to fortify maize flour (masa) in North America: [www.ffinetwork.org/opportunities-to-give-us-masa](http://www.ffinetwork.org/opportunities-to-give-us-masa).



Photo: Xaume Olleros/RTI



Photo: Tran Thi Hoa / World Bank

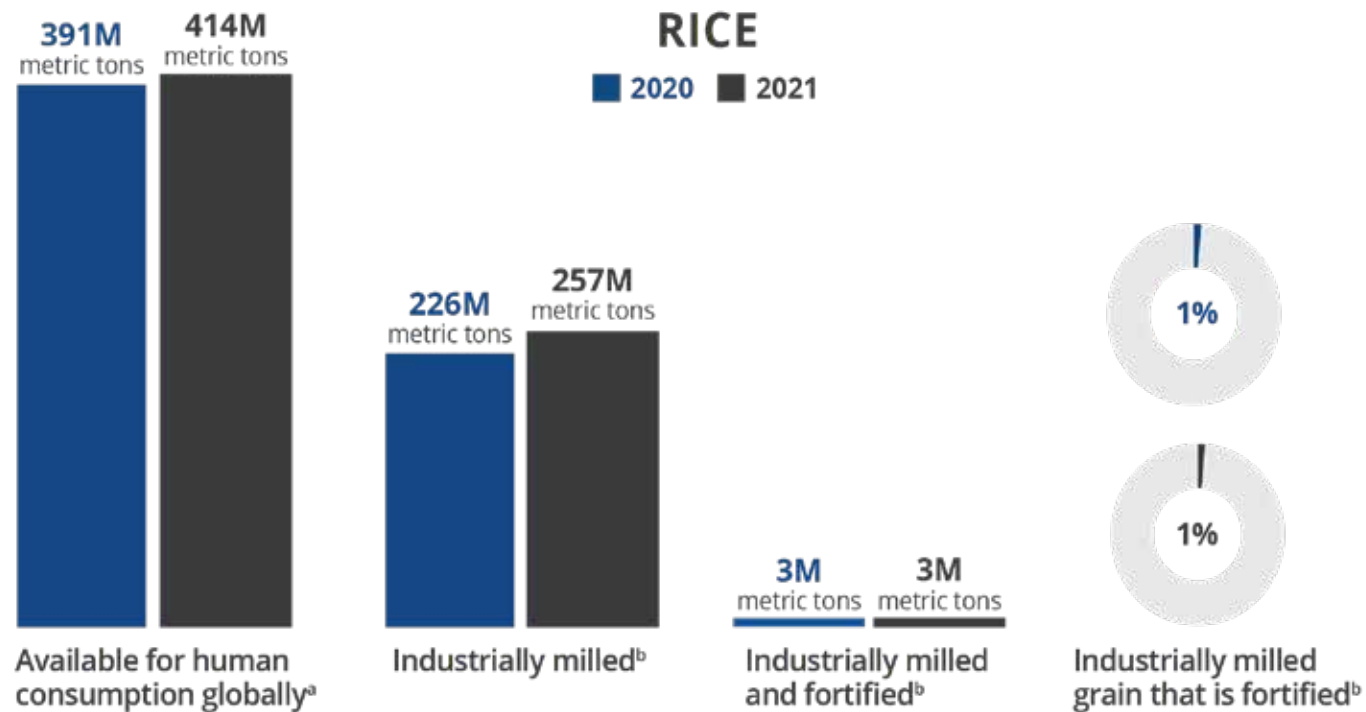
# Rice

Though the estimate of industrially milled rice that was fortified only slightly increased (from 1.1% to 1.2%), the volume of fortified rice available for consumption globally increased by 700,000 metric tons, an increase that is largely driven by rice fortification efforts in India. In 2021, India began to supply fortified rice through its social safety net program, the Public Distribution System.

The total food supply of rice increased by 22 million metric tons, with an increase in the amount of industrially milled rice by 52 million metric tons. After concluding a 2021 supply

chain analysis of rice in Bangladesh, the world's fourth largest producer of rice, FFI found that the percentage of industrially milled rice produced in Bangladesh was much lower than previously reported.

FFI's work with partners in Southeast Asia and West Africa to scale up rice fortification has been, and continues to be, critical to laying the foundation for progress. Rice fortification presents an opportunity to reach hundreds of millions of people in parts of the world where rice is the most commonly consumed grain.



### LEGEND

- 75-100%
- 50-74%
- 25-49%
- 1-24%
- 0-<1%

### Countries have one of the following:

- Less than 37.5 grams per capita per day available for human consumption<sup>c</sup>
- Less than 30% of industrial milling capacity
- No data

<sup>a</sup> FAO data with additional sources for American Samoa and Singapore. 2020 estimates: 2018 FAOSTAT, New Food Balances, Food (element 5142) 2018 Data: <http://www.fao.org/faostat/en/#data/FBS> 2021 estimates: 2019 FAOSTAT, New Food Balances, Food (element 5142) 2019 Data: <http://www.fao.org/faostat/en/#data/FBS>

<sup>b</sup> FFI calculations.

<sup>c</sup> 2019 FAOSTAT, Supply Utilization Accounts-Crops Processed, Food Supply Quantity (element 665) 2019 Data: <https://www.fao.org/faostat/en/#data/SCL>



Photo: Xaume Olleros/RTI



## Legislation Update

## Mandatory Cereal Grain Fortification Legislation, 2021

### LEGEND

- Wheat flour alone - 64 countries
- Rice alone - 1 country (Papua New Guinea)
- Wheat flour and maize flour - 19 countries
- Wheat flour and rice - 5 countries (Nicaragua, Panama, Peru, Philippines, Solomon Islands)
- Wheat flour, maize flour, and rice - 2 countries (Costa Rica and the United States)
- No mandatory fortification legislation or data not available

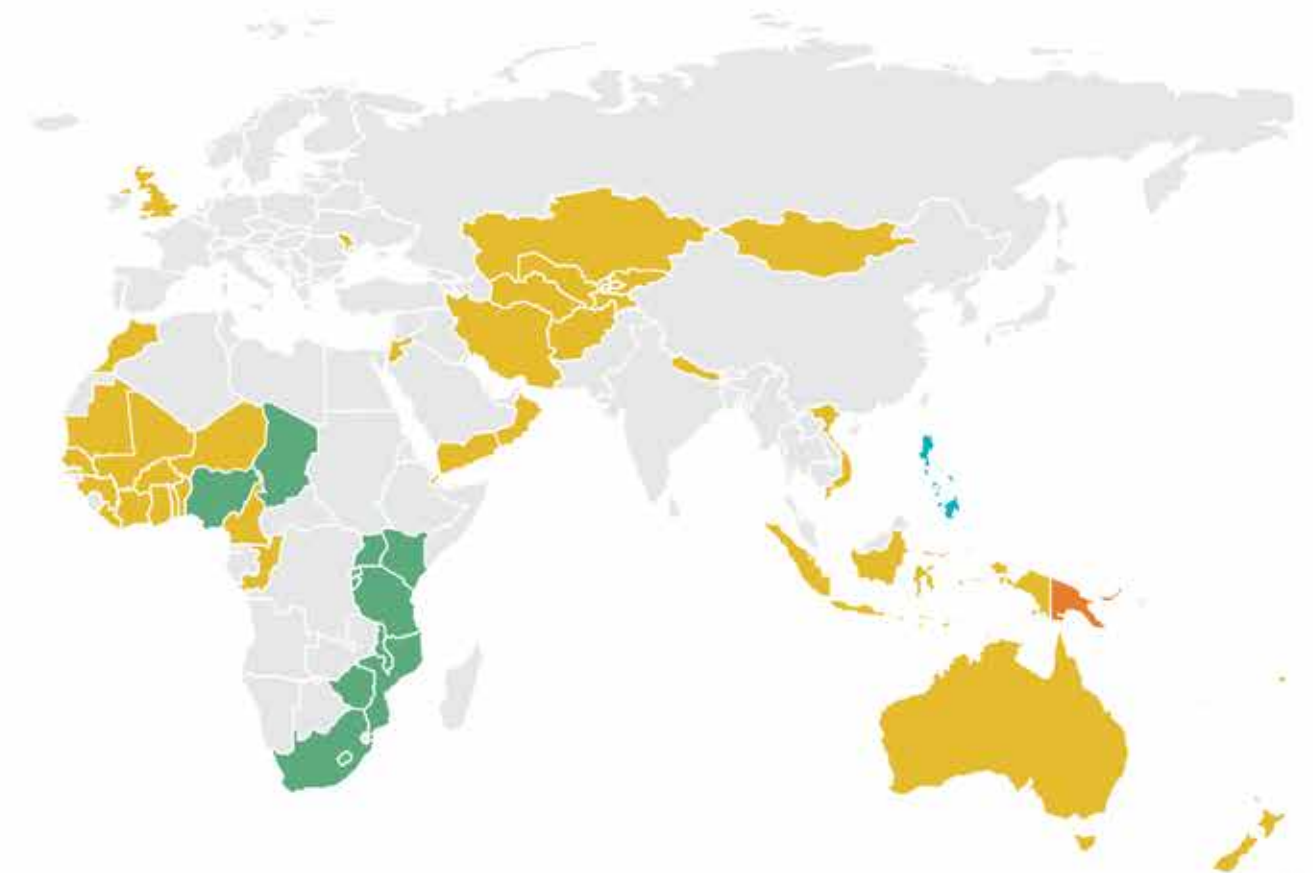
Legislation has effect of mandating grain fortification with at least iron or folic acid.

Legislation status from the Food Fortification Initiative ([www.FFInetwork.org](http://www.FFInetwork.org)) October 2021.

In 2021, mandatory legislation was created in Chad to fortify wheat and maize flour, New Zealand to fortify wheat flour, and Peru to fortify rice. Though the UK has mandated fortification of wheat flour with iron, calcium, and other nutrients since the 1940s, the UK mandated the addition of folic acid to fortified flour in 2021.

Globally, 91 countries have legislation to mandate fortification of at least one industrially milled cereal grain. Of these, 90 countries mandate fortification of wheat flour alone or in combination with other grains. One country—Papua New Guinea—has a mandate only for rice fortification.

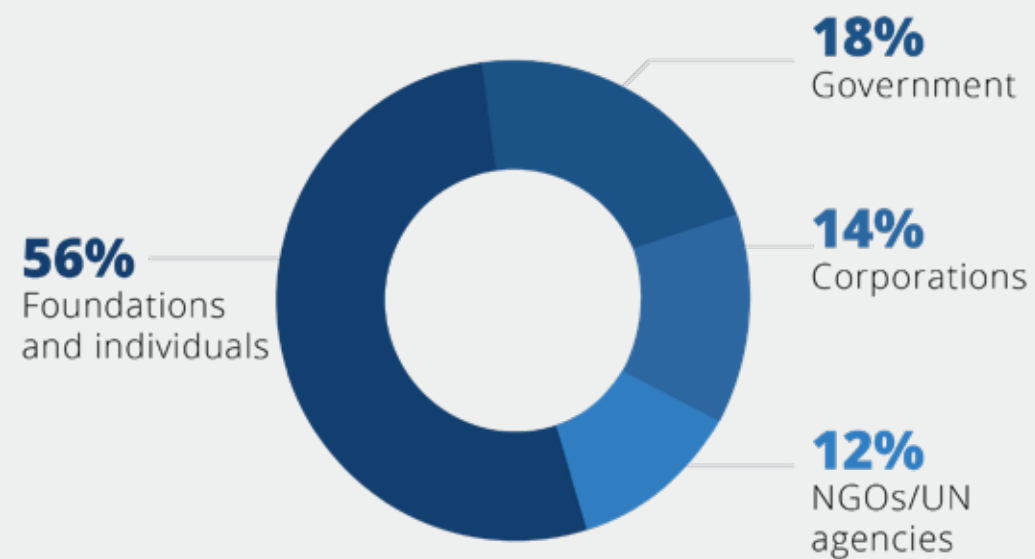
When FFI was founded in 2002, only 37 countries mandated fortification of wheat flour, maize flour, or rice.





# Gift Profile

We are grateful to the public, private, and civic partners who support our work. Contributions for 2021 were US \$1.8 million.



## How to contribute

Your gift will make a difference by reducing the debilitating effects of anemia, preventing thousands of serious birth defects a year, and strengthening immune systems to prevent premature death in children and adults alike. Join us and [donate to FFI](#).



Photo: Working a rice field. Xaume Olleros/RTI

# Executive Management Team

An Executive Management Team (EMT) representing global leaders in the public, private, and civic sectors provides FFI's strategic direction.

### Markus Lotsch

*President, Health and Wellness*  
Archer-Daniels-Midland Company

### Jane E. Friedrich

*Leader, Global Core Research and Development*  
Cargill, Inc.

### Reynaldo Martorell

*Woodruff Professor of International Nutrition; Senior Advisor, Global Health Institute*  
Emory University

### Penjani Mkambula

*Lead, Food Fortification*  
Global Alliance for Improved Nutrition

### Melinda Farris

*Executive Vice President*  
International Association of Operative Millers

### Sylvia Roozen

*Secretary General*  
International Federation for Spina Bifida and Hydrocephalus (IF)

### Manpreet Chadha

*Senior Technical Adviser, Fortification*  
Nutrition International

### Vilma Tyler

*Senior Advisor, Nutrition - School Age Children, Adolescents, and Women*  
United Nations Children's Fund (UNICEF)



Photo: Mina Guli

In addition to the eight members listed above, leaders from the CDC and WHO are EMT observers, including:

**Jennifer Williams**

*Health Scientist, Division of Reproductive Health - National Center on Birth Defects and Developmental Disabilities*  
Centers for Disease Control and Prevention

**Luz María De-Regil**

*Unit Head, Multisectoral Action in Food Systems*  
World Health Organization

**Ruth Petersen**

*Director, Division of Nutrition, Physical Activity, and Obesity - National Center for Chronic Disease Prevention and Health Promotion*  
Centers for Disease Control and Prevention

## New member spotlight

In 2021, the FFI EMT welcomed a new member: Markus (Mark) Lotsch. With more than 20 years in executive roles in the flavor industry, he is currently the President of Global Health & Wellness at ADM, a multinational nutrition and food processing corporation. Under his guidance and support in Health & Wellness, ADM won the NutraIngredients Editors Award for Functional Food Innovation and the Ingredient of the Year Award for Beauty from Within in 2021 for advancements in science-backed microbiome solutions. Previously, Mark was a Managing Director at Wild Flavors, which is headquartered near Heidelberg, Germany.

Mark received a Master's degree in Business Administration from the University of Kiel and a diploma from the University Mannheim in Germany. He is currently based in Cincinnati, Ohio, USA.



# Staff Updates

## Sandra King joins FFI as new Program Coordinator

Sandra King joined FFI in summer 2021 as FFI's new Program Coordinator. She brings experience from various financial and administrative roles in higher education, as well as the non-profit sector. In her most recent position, she was a Budget Analyst for Academic Affairs at Middlebury College providing financial oversight and analysis primarily for faculty research. She joins FFI having completed coursework through Harvard Business School online, graduate coursework in Legal Studies from Champlain College, and a Bachelor of Arts from the University of Vermont.

Sandra will use her extensive operations and financial knowledge to manage the FFI Global Secretariat, support FFI's global projects, and facilitate semi-annual Executive Management Team meetings. She will also oversee FFI's annual operating budget and fiscal objectives to ensure programmatic growth and success. Sandra is currently based in Atlanta, Georgia, USA.



## Farewell, Anna

### Celebrating the life of FFI Senior Advisor, Anna Verster

With a heavy heart, we share that our colleague Anna Verster passed away on 18 June 2021 surrounded by her family at home in the Netherlands. For nearly 20 years, Anna provided invaluable insight and expertise as Senior Advisor to FFI. A lifelong advocate for food fortification, Anna's work in Africa, the Middle East, and Europe has left an indelible imprint on the lives of millions.

Anna was founding mother of **Smarter Futures**, a multi-sector partnership working to advance grain fortification in Africa, and worked closely together with FFI in public-private-civic partnerships to improve health in Africa through food fortification. Today at least **29 countries** in Africa have mandatory wheat and maize flour fortification.

Friends and colleagues of Anna will remember her for being a determined and knowledgeable leader in the field of food fortification and nutrition. As Director of Health Promotion for the World Health Organization (WHO) Eastern Mediterranean Region Office, Anna was responsible for the

introduction of fortification of salt, wheat flour, and vegetable oil in the region. Following her retirement, she worked as WHO Senior Advisor for the Global Alliance for Improved Nutrition before founding Smarter Futures with FFI and the International Federation for Spina Bifida and Hydrocephalus (IF) in 2004.

A mentor and inspiration, countless nutrition advocates around the world credit Anna for their passion for food fortification. To many, Anna was known as *Mama Lishe*, Swahili for Mother Fortification. One FFI staff member who had worked closely with Anna through Smarter Futures noted, "Anna was full of life, no matter the circumstances. She encouraged us to trust in life." We will miss her dearly.

Before Anna passed away, she received a special IF Award of Excellence on behalf of FFI, IF, and the partners of Smarter Futures. A scholarship memorial fund in her name has been created to honor Anna's legacy and encourage young academics to make fortification with folic acid a reality in countries worldwide.



Photo: Julien Harnais



Photo: Abbas Farzami/Rumi Consultancy/WorldBank

# FFI's Unique Contributions

to Global Grain Fortification



## Expertise

FFI's in-house leadership and technical expertise enable us to apply a data-driven approach to program planning, implementation, and monitoring.



## Rigor

FFI operates through a unique model, bringing together voices from the public, private, and civic sectors through our Executive Management Team and our technical assistance to make sustainable change.

FFI conducts supply chain analyses for any given grain to discover and act on opportunities to advance fortification.

FFI documents and publishes up to 196 countries' annual potential and progress toward successful cereal grain fortification.



## Focus

FFI is the only global group that focuses exclusively on large-scale fortification of the three most consumed grains: wheat flour, maize flour, and rice.

*Inspired by the Good to Great model by Jim Collins*

# How We Work

FFI's strategic approach to scaling grain fortification, which is based on two decades of experience conducting research and providing on-the-ground assistance, offers a replicable method to building and strengthening fortification programs.

FFI chooses countries, regions, states, and

provinces through rigorous research. We take a holistic, objective approach with the goal to help eliminate micronutrient deficiencies in every country in the world where industrially milled cereal grain is commonly consumed. FFI does not have a predetermined set of countries it will support; instead, it relies on data to identify where the needs and opportunities are greatest.



Photo: Neil Palmer/CIAT

Before FFI begins working in a country, we use data to determine two essential requirements: demonstrated need for fortification and the potential to make a positive impact on health through fortified food. Our data comes from several sources and through varied methods that include consumption and milling analyses, nutrition needs assessments, market analyses, political readiness assessments, systematic reviews, and partner interviews. Once an opportunity for fortification is determined, FFI uses a four-stage phased approach to help countries plan, implement, and monitor a fortification program that can generate and sustain large-scale impact.

## Plan

### PHASE 1: EXPLORE AND ENGAGE

- Engage private sector
- Engage birth defects groups, neurosurgeons, and consumer associations
- Identify key challenges and opportunities
- Identify fortification champion(s) within government
- Determine what it will take to move forward

#### MILESTONE

Once the government expresses permission and willingness to move forward, FFI will move to the next phase of planning: map the context.

### PHASE 2: MAP THE CONTEXT

- Conduct a thorough supply chain analysis
- Assess industry structure including readiness and reach of mills
- Assess monitoring structure and needs
- Map the legislative process
- Assess budgetary needs (initial investment by sector and annual recurring costs) to ensure commitment and sustainability
- If necessary, conduct a cost-benefit analysis making the case for fortification's impact on national health and economic indicators

#### MILESTONE

At this stage, FFI gives a formal presentation to government to recommend effective staples and market channels based on diagnostic results. Once the government expresses permission and support of the plan, FFI will move to the next phase: implement - design and develop.

## Implement

### PHASE 3: DESIGN AND DEVELOP

- Draft recommended standards
- Identify miller, regulatory inspector, and laboratory training needs
- Support premix procurement process
- Engage the legislative process
- Develop a communication and education strategy
- Integrate realistic fortification monitoring into existing framework

#### MILESTONE

Clear budget and implementation plan.

- Train millers on quality assurance/quality control practices
- Train regulatory monitoring inspectors and lab staff; map agency responsibilities
- Facilitate the passage of legislation
- Develop a National Guideline for Fortification document and national logo, as necessary

#### MILESTONE

Fortification program is implemented and ready to scale.

## Monitor

### PHASE 4: MONITOR FOR COMPLIANCE AND IMPACT

- Support collection of monitoring data
- Ensure monitoring data is shared with relevant stakeholders
- Augment government monitoring partnerships with civic entities
- Ensure action is taken to improve program performance based upon monitoring data

#### MILESTONE

Ensure program reaches intended population

- When applicable, partner with stakeholders to measure impact

# Why Fortify?

**Nutrition can be a matter of life and death. An estimated 2 billion people globally suffer from vitamin and mineral deficiencies.<sup>1</sup>**

Fortifying grains to improve nutrition has tremendous implications for individuals, entire populations, and a country's economy.

Iron, riboflavin, folic acid, zinc, vitamin A, and vitamin B12 prevent specific types of anemia, which in pregnancy is dangerous for both the mother and the baby. Pregnant women with severe anemia are twice as likely to die during or shortly after pregnancy than non-anemic women.<sup>2</sup>

Anemia affects an estimated:<sup>3</sup>

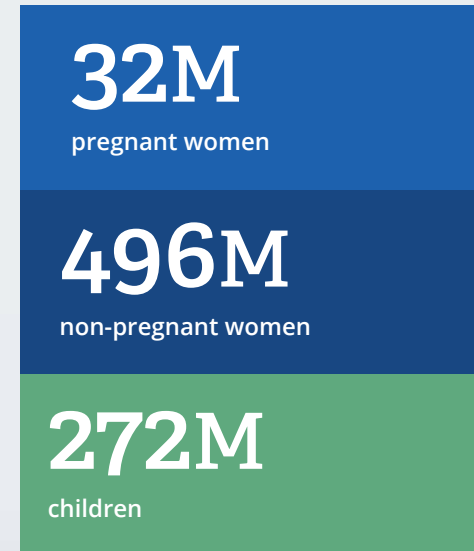


Photo: Xaime Olleros/RTI

Iron deficiency in childhood stunts cognitive development which hinders academic performance and future earnings potential as adults.<sup>4</sup>

Zinc deficiency adversely affects children and adults by weakening immune systems, increasing rates of childhood diarrhea and pneumonia, and contributing to increased rates of childhood stunting. Globally, zinc deficiency contributes to 116,000 child deaths per year—a number that would be much higher if researchers were able to count the number of deaths caused by preterm births in zinc-depleted mothers.<sup>5</sup>

Anencephaly and spina bifida are birth defects of the brain and spine that can be prevented by consuming enough folic acid, also known as vitamin B9.

About 75% of children born with brain and spinal birth defects die before their fifth birthday.<sup>6</sup> Though spina bifida has varying degrees of severity, it often leads to life-long disability and enormous costs for healthcare systems. Anencephaly is always fatal.

Vitamin B12 benefits children, adults, and the elderly by maintaining functions of the brain and nervous system.<sup>7</sup> Consuming adequate amounts of vitamin B12 can reduce the risk of developing chronic diseases including heart disease, stroke, dementia, Alzheimer's disease, and Parkinson's disease.<sup>7</sup>

Fortification with micronutrients including iron, zinc, folic acid, and other B vitamins benefits individuals at every point in life—from conception to aging.



Photo: Dominic Chavez/World Bank

# A call to action

Research published using FFI data credited fortification with preventing 65,380 brain and spinal birth defects globally

in one year for an average of 179 healthier babies a day.<sup>8</sup> Yet according to estimates, an additional 82% of birth defects of the brain and spine<sup>8</sup> and 34% of anemia<sup>9</sup> could still be prevented globally through adequate intake of folic acid

and iron, respectively. That's why FFI's mission to build high-impact, self-sustaining fortification programs is so important. **By improving nutrition, we can create a smarter, stronger, and healthier world.**



“We can create a smarter, stronger, healthier world.”

Photo: Dominic Chavez/World Bank



Photo: Yamanaka Tamaki

- 1 von Grebmer, K., et al. 2014. [Global health index: the challenge of hidden hunger](#). Welthungerhilfe, International Food Policy Research Institute, and Concern Worldwide. 2014.
- 2 Daru, J., et al. [Risk of maternal mortality in women with severe anemia during pregnancy and postpartum: a multilevel analysis](#). The Lancet Global Health. 2018.
- 3 World Health Organization. [The global prevalence of anemia in 2011](#). 2015.
- 4 Horton, S. and J. Ross. [The economics of iron deficiency](#). Food Policy. 2003.
- 5 Black, R., et al. [Maternal and child undernutrition and overweight in low-income and middle-income countries](#). The Lancet. 2013.
- 6 Blencowe, H., et al. [Estimates of global and regional prevalence of neural tube defects for 2015: a systematic analysis](#). Annals of the New York Academy of Sciences. 2018.
- 7 Beckett, E., et al. [Reduced plasma homocysteine levels in elderly Australians following mandatory folic acid fortification: a comparison of two cross-sectional cohorts](#). Journal of Nutrition and Intermediary Metabolism. 2017.
- 8 Kancharla, V., et al. [A 2019 global update on folic acid-preventable spina bifida and anencephaly](#). Birth Defects Research. 2020; 1– 13.
- 9 Keats, E., et al. [Improved micronutrient status and health outcomes in low- and middle-income countries following large-scale fortification: evidence from a systematic review and meta-analysis](#). American Journal of Clinical Nutrition. 2019.

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THE NEED FOR  
FORTIFICATION IS  
GREAT, BUT ITS  
POTENTIAL TO  
DRAMATICALLY  
IMPROVE  
NUTRITION IS  
EVEN GREATER.

