



RESILIENT GRAIN MARKETS: **UNLOCKING AFRICA'S FOOD SECURITY POTENTIAL**

2ND-4TH, OCTOBER 2025 | ZANZIBAR, TANZANIA

Main Session 6

From research to market:

**Aligning research, academia, policy, and industry to
drive innovation and market growth**

**Session
Sponsors:**



**David
Kamau**

Managing Director
Fortified Whole Grain
Alliance (FWGA)

*Bridging Science and Practice:
Enhancing Affordability and
Access to Whole Grain Foods
for Healthier Diets*

DAVID KAMAU
MANAGING DIRECTOR

AFRICAN GRAIN TRADE SUMMIT



**FORTIFIED
WHOLE GRAIN
ALLIANCE**

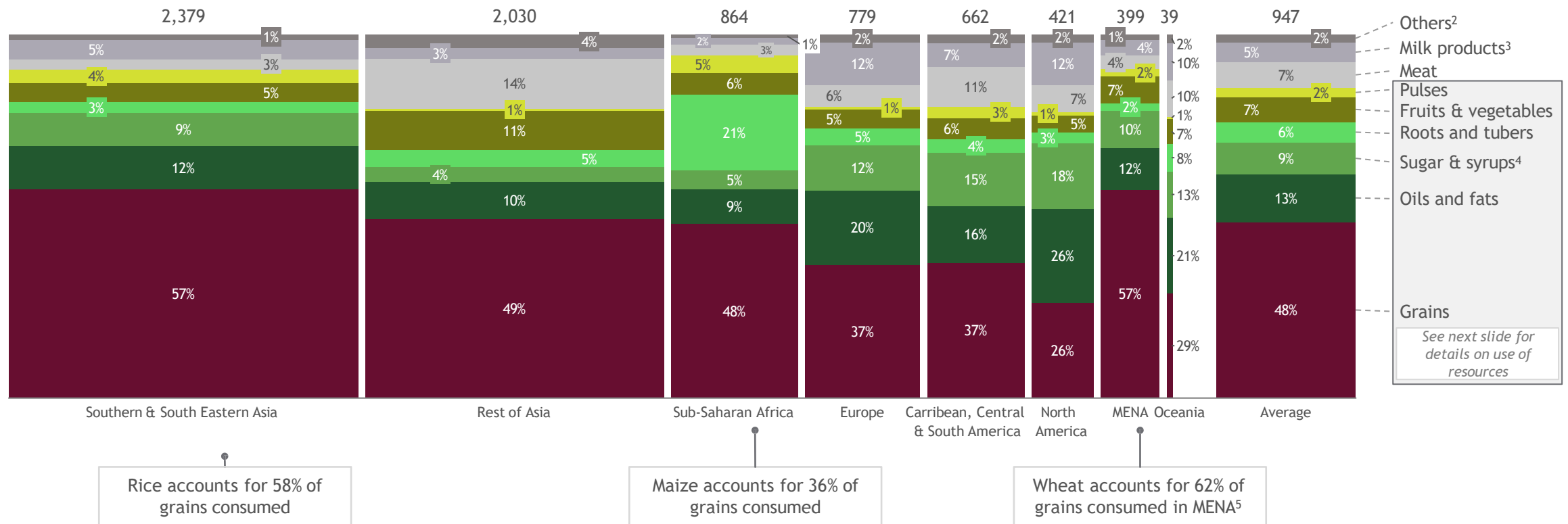
Agenda

- **Why Fortified Whole Grains?**
- Bridging Science and Practice
 - Nutrition
 - Cost Neutrality
 - Environmental Benefits
 - Shelf Stability
 - SBCC informed by consumer research
- Case studies of Whole Grain Initiatives

Grains have been at the heart of food systems since antiquity

Grains account for ~50% of calories and more than 40% of proteins consumed in LMICs

2019 Total annual food consumption (million mkcal¹)

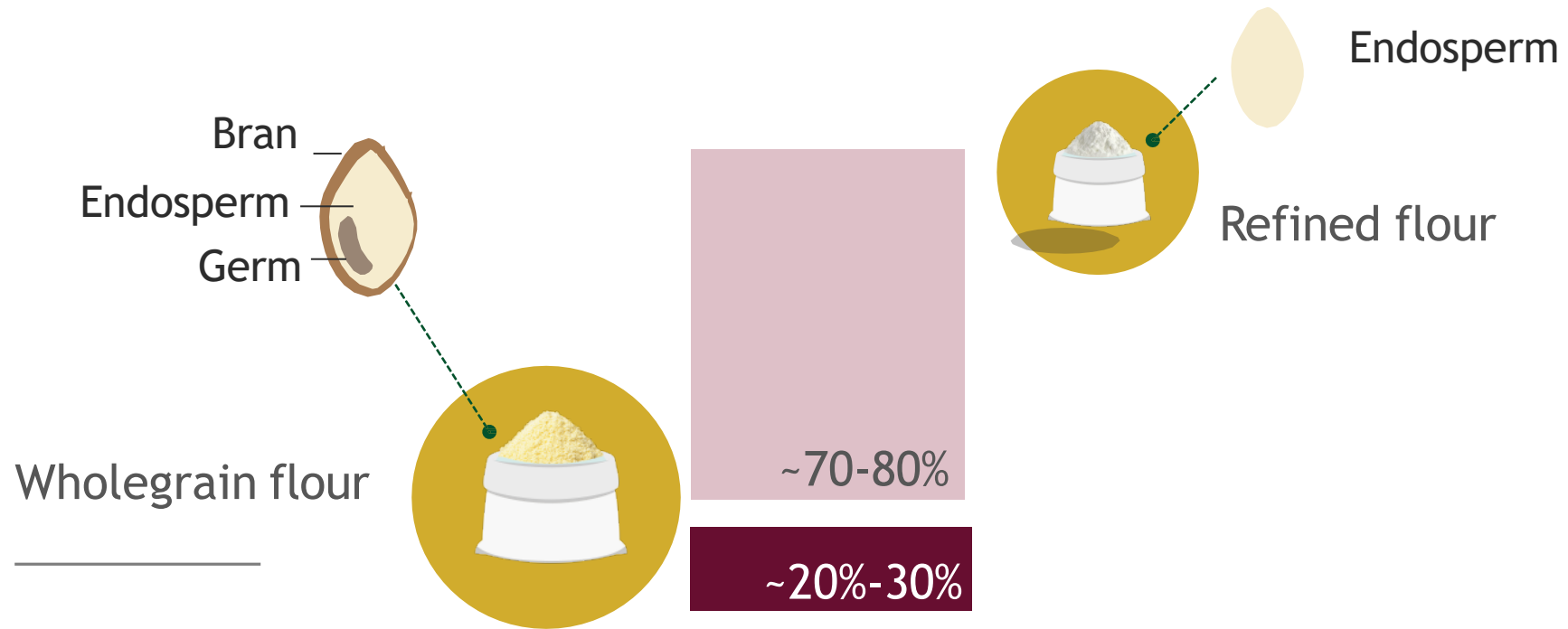


1. mkcal - million kilocalorie 2. Others includes eggs, oil crops, edible offals and tree nuts; 3. Milk products include whole milk and milk derivatives excluding butter 4. Sugar & syrups includes sugar-crops, manufactured sugar, syrups and honey 5. MENA includes Algeria, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Saudi Arabia, Sudan (excluded from Sub-Saharan Africa), Tunisia, United Arab Emirates and Yemen
Source: FAOSTAT Supply Utilization Accounts (2019)

The dominance of refined grain foods in diets contributes to the double burden of malnutrition

Only 20-30% of grains are consumed as whole

2019 Global grain flour available for consumption (million MT)



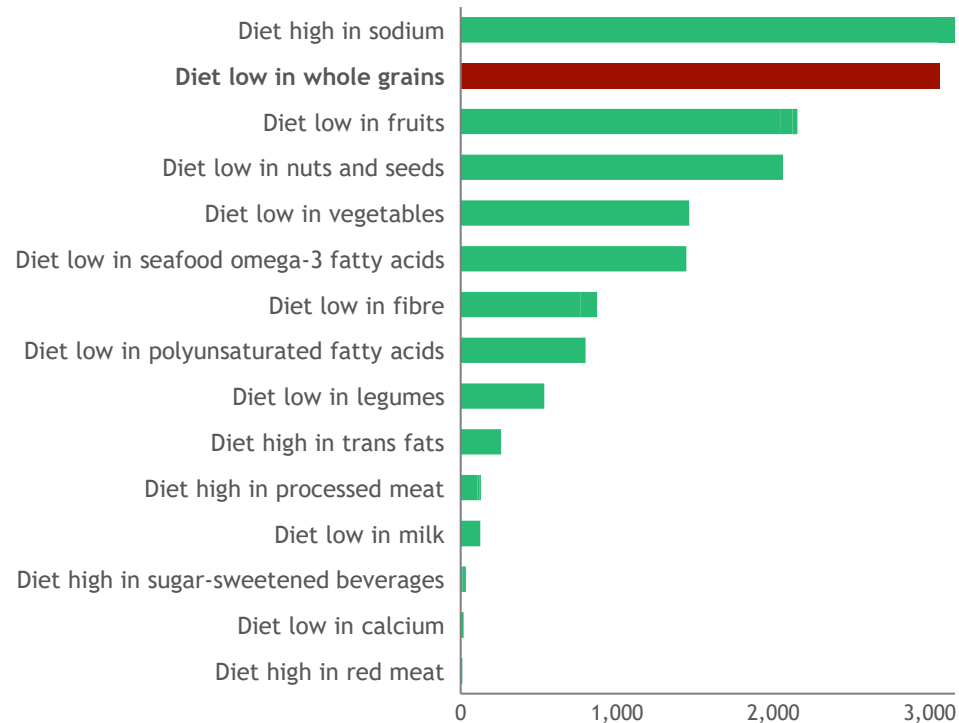
Total grain flour available

Note: Amount of flour available for consumption is calculated by multiplying grain available (FAO) by extraction rate in the region; For maize flour regional extraction rates of 67.5% for Africa and 72.5% for South/Central America and the Caribbean; 70% extraction rate is used for regions where there is no regional data)
Source: [Fortified Food Initiative 2021 Annual Report](#), 21st Century Processing Innovations for Africa (2022)

Low consumption of whole grains is the 2nd highest dietary risk factor contributing to the most annual deaths after high intake of sodium

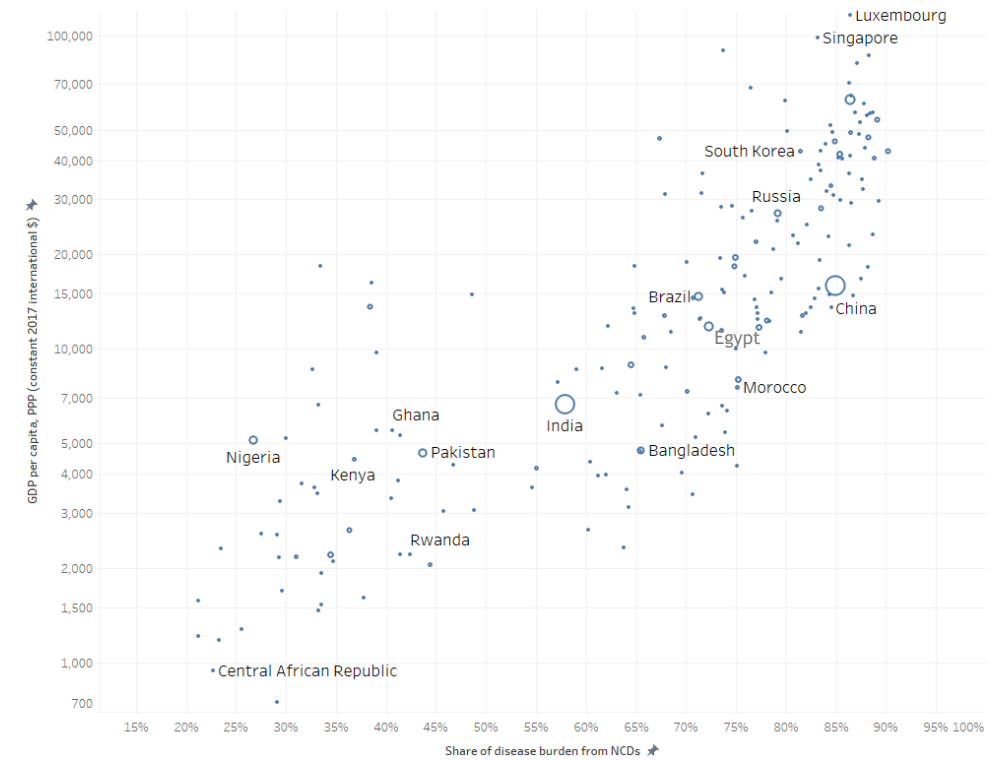
Illness from poor diets contributes significantly to premature deaths

Deaths attributable to dietary risks (in thousands)¹



Rising GDP per capita is associated with an increasing trend in NCDs

GDP per capita by Share of burden from NCDs

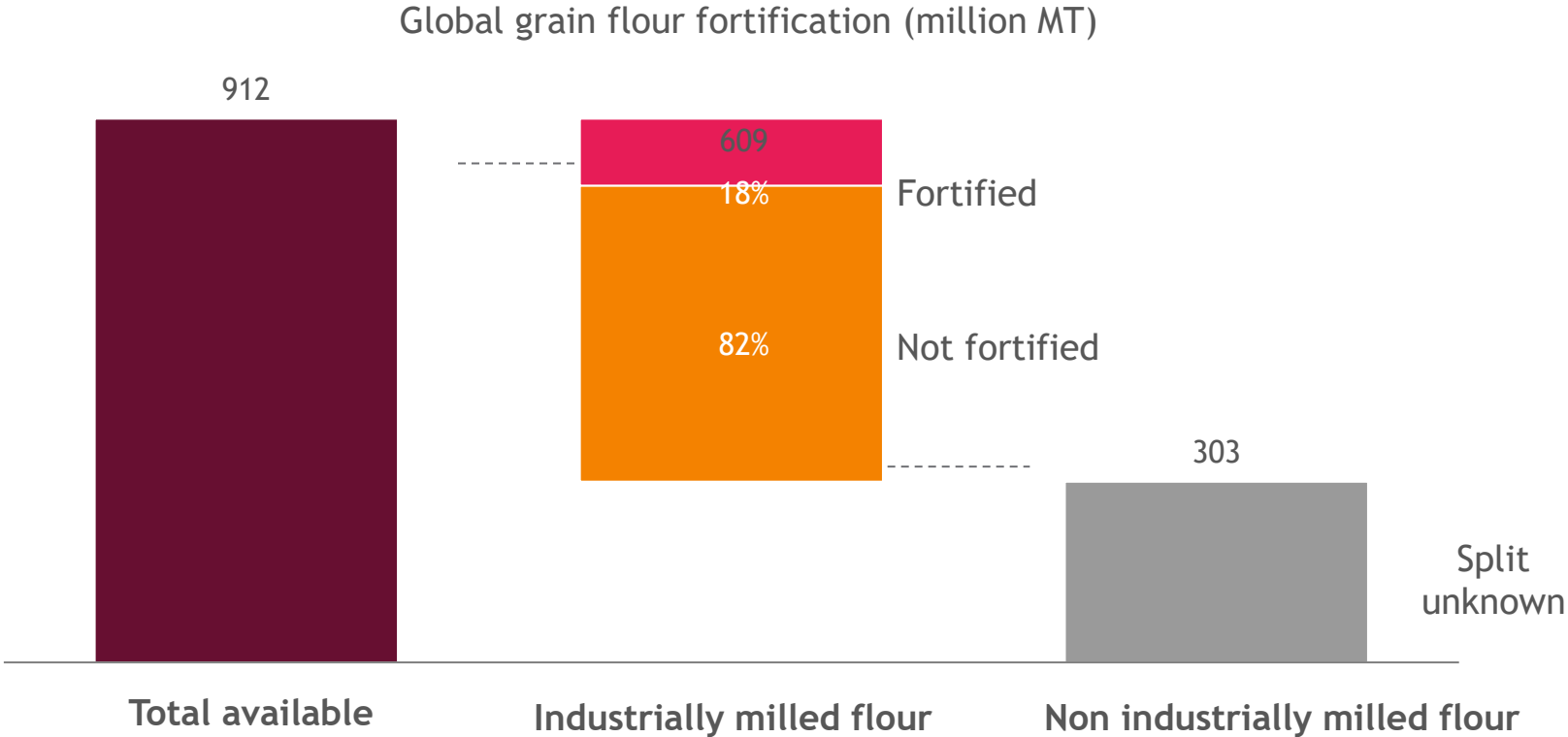


1. +90% of deaths linked to cardiovascular diseases, others are type-2 diabetes, cancer and infectious diseases

Source: IHME, cited in - Health effects of dietary risks in 195 countries, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017; Share of Burden from NCDs: Global Burden of Disease collaborative network - Study from 1990 - 2019

Fortification is an additional means to increase the nutritional value of grain foods

However, only 18% of industrially milled flour is fortified



Note: Amount of flour available for consumption is calculated by multiplying grain available (FAO) by extraction rate in the region; For maize flour regional extraction rates of 67.5% for Africa and 72.5% for South/Central America and the Caribbean; 70% extraction rate is used for regions where there is no regional data)
Source: [Fortified Food Initiative 2021 Annual Report](#), 21st Century Processing Innovations for Africa (2022)

Global Context - Three Main Grains dominate cereal diets

Maize, wheat, and rice together account for about **94 %** of total cereal consumption **worldwide** (by volume) (i.e. these three dominate cereal diets).

Globally available for human consumption in 2023:¹

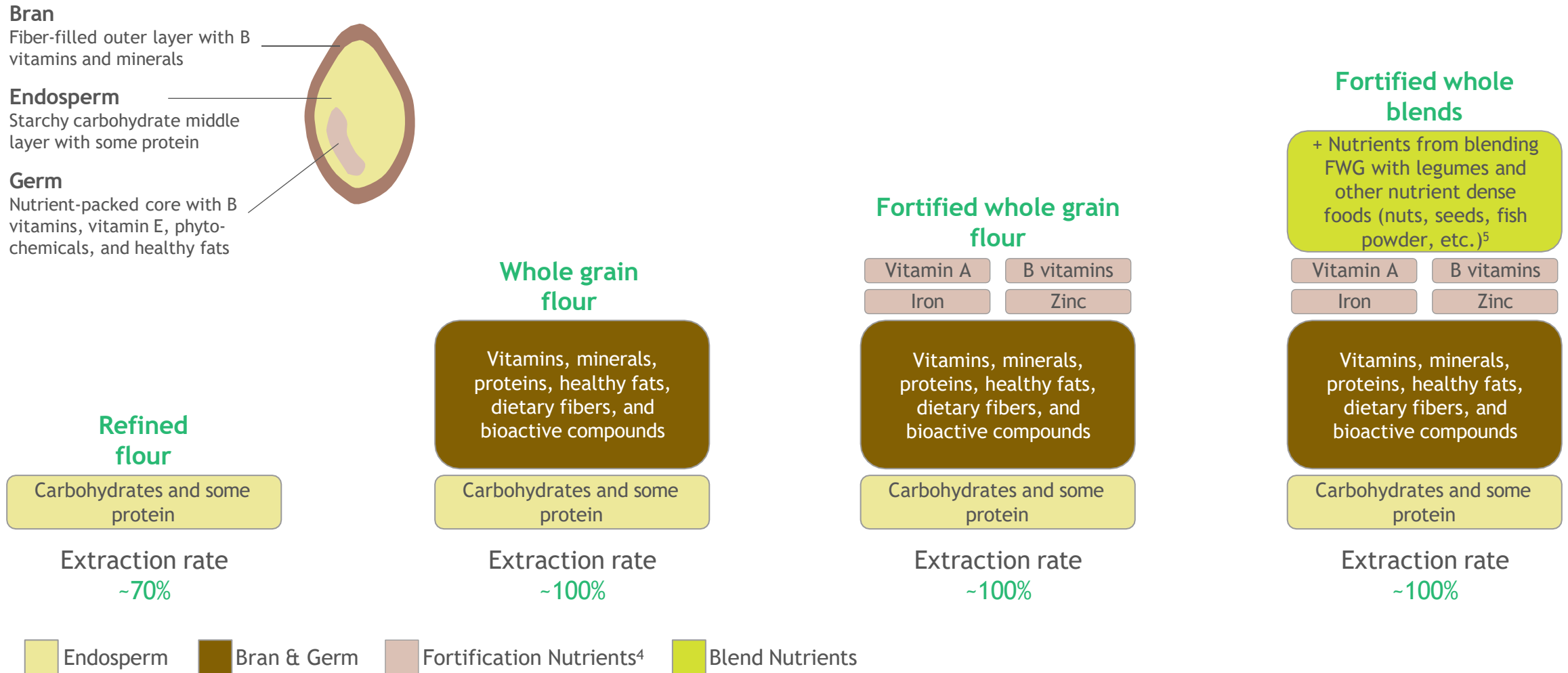
516	446	378
Million tons of wheat	Million tons of rice	Million tons of maize

- 69 countries with mandatory wheat flour fortification²
- 17 countries mandate fortification of wheat + maize flour
- 5 countries mandate fortification of wheat + rice
- 2 countries mandate fortification of wheat + maize + rice (Costa Rica, USA)
- 1 country mandates fortification of rice only (Papua New Guinea)

¹ https://www.fao.org/worldfoodsituation/csdb?utm_source=chatgpt.com

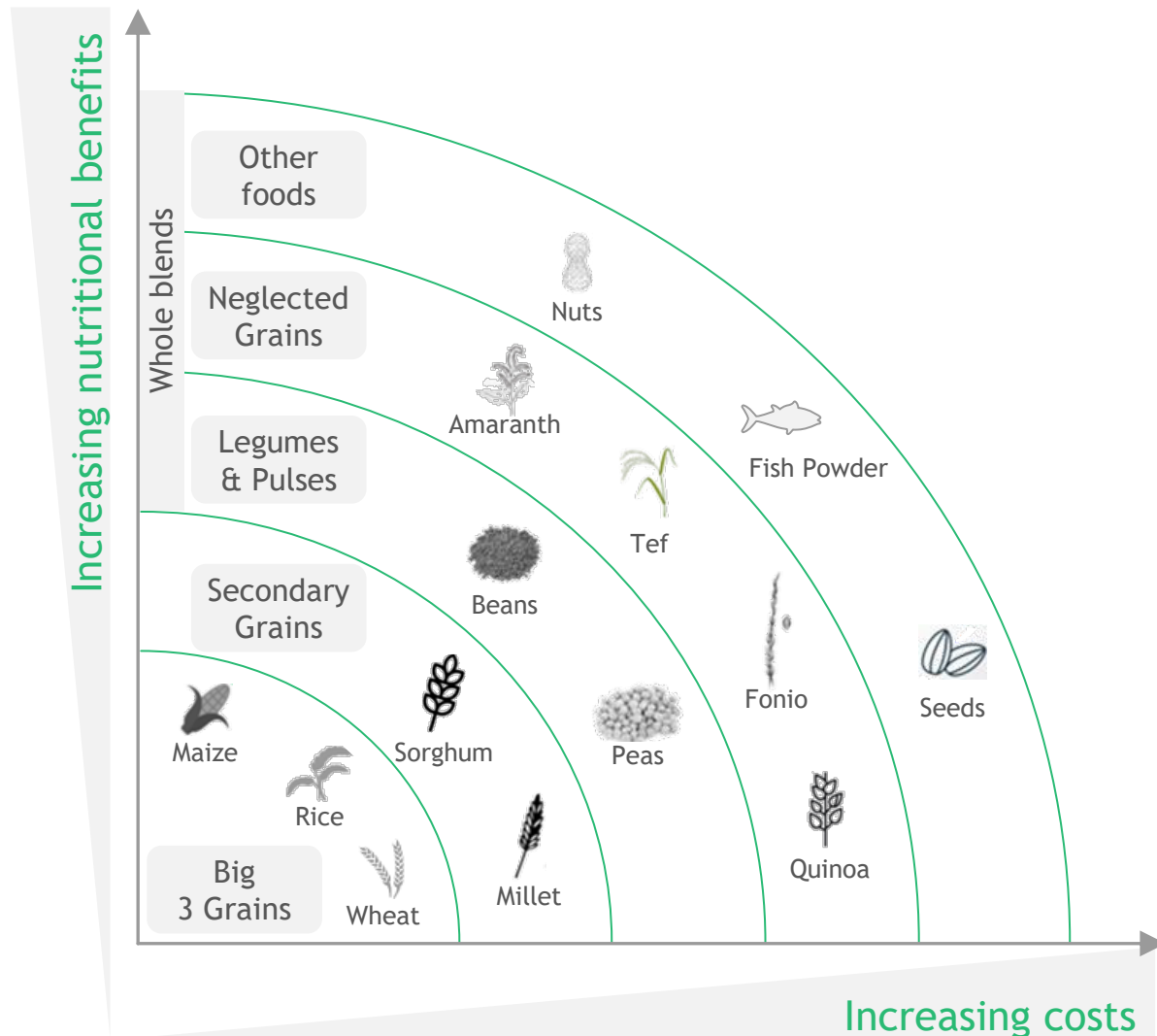
² Food Fortification Initiative database, November 2023

Fortified whole grain & whole blend foods increase diet nutrient-density



1. Flour.com: Anatomy of a Wheat Kernel 2. Rockefeller: whole grain Manifesto 3rd April 2022 3. Pristinepremixes.com: Flour fortification process and components 3. whole grain Manifesto: Note - extraction rates vary and can go as high as 82% for refined flour 4. Standards of Fortification vary across countries and can include a combination, subset or additions to the ones mentioned on this page 5. Some water weight, up to 1.4% per kg, may be lost in the drying process

Promoting a transition towards fortified whole grains and whole blends is a multi-step journey with increasing food systems benefits



- **Short term** - The transition to FWG and FWB should start by making affordable whole meals of the “Big 3” grains, with gradual incorporation of secondary grains such as sorghum and millet
- **Medium to long term** - Create products blending the “Big 3”, sorghum and millet with legumes and pulses, as a start, and neglected grains and other nutrient-dense foods at a later stage

Agenda

- Why Fortified Whole Grains?
- **Bridging Science and Practice**
 - **Nutrition**
 - **Cost Neutrality**
 - **Environmental Benefits**
 - **Shelf Stability**
 - **SBCC informed by consumer research**
- Case studies of Whole Grain Initiatives

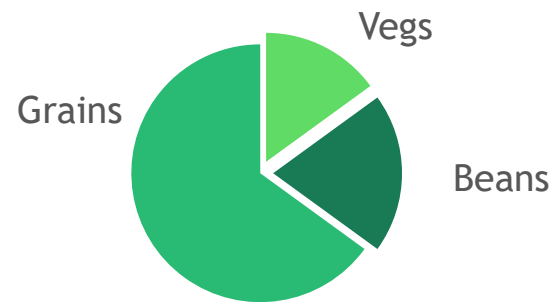
1. Fortified whole grain Maize Meal flour provides 5-6X more nutritious school meals than refined flour

FWG is 5-6X more nutritious

Comparative macro and micronutrient gain when switching from refined to fortified whole maize meal



With grains being ~60% of a typical school meal plate in LMICs, changing to FWG makes meals significantly more nutrient-dense

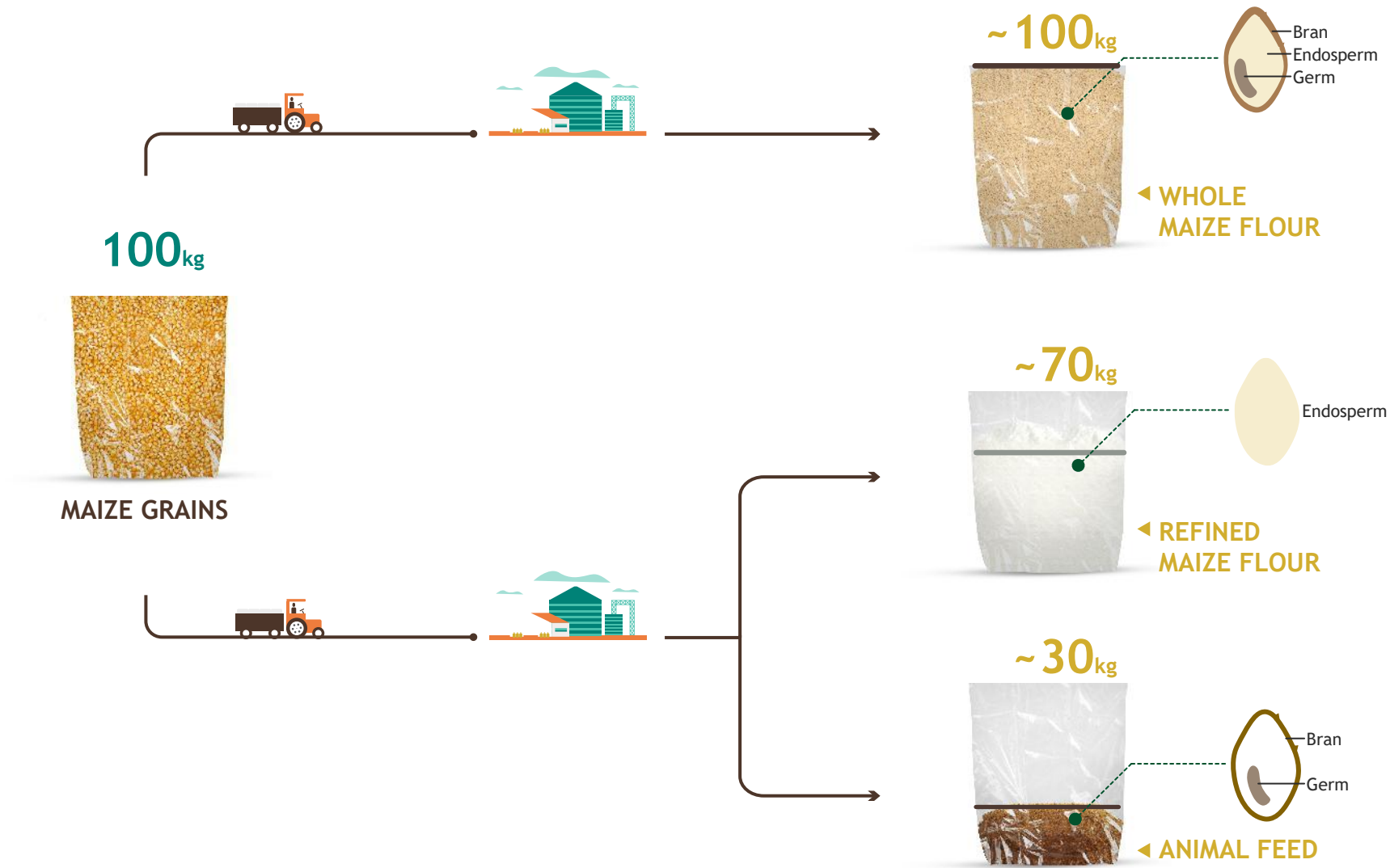


Gain	Nutrient	Multiple
Macronutrients 2.2X	Proteins	1.2
	Lipids	2.8
	Carbohydrates	0.9
	Fiber	3.8
Micronutrients 6.1X	Iron	4.9
	Zinc	13.6
	Vit. A	2.1
	Thiamin	7.4
	Riboflavin	4.7
	Niacin	1.3
	Pantothenic Acid	12.7
	Folate	2.9
	B12	7.0
	Calcium	3.5
	Copper	1.6
	Magnesium	5.2
	Manganese	8.2
	Phosphorus	4.5
	Potassium	3.5
Overall		5X

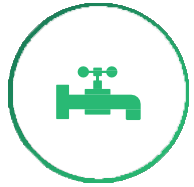
Fortified whole grains can be up to ~5 - 7X more nutritious than refined grains in key components

		Fortified Whole Maize Meal	Fortified Whole Wheat Flour	Fortified Parboiled Unpolished Rice
Macronutrients	Proteins	1.2	1.1	1.1
	Lipids	2.8	1.5	4.8
	Carbohydrates	0.9	1	1
	Fiber	3.8	4.5	3.6
		2.2X	2.0X	2.6X
Micronutrients	Iron	4.9	4.9	7.5
	Zinc	13.6	3.1	7.8
	Vit A	2.1	4.5	18.5
	Thiamin	7.4	9.8	16.4
	Riboflavin	4.7	8.2	1.9
	Niacin	1.3	7.6	8.5
	Pantothenic Acid	12.7		0.7
	Folate	2.9	8.7	
	B6		9.8	8.6
	B12	7.0		1.2
	Calcium	3.5	2.3	2.5
	Copper	1.6		1.3
	Magnesium	5.2	5.5	
	Manganese	8.2		3.4
	Phosphorous	4.5	3.7	2.9
	Potassium	3.5	3.6	1.9
		6.1X	5.4X	5.9X
Overall		5X	5X	7X

2. Fortified whole grain foods can be a budget-neutral substitute to refined and unfortified products



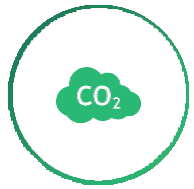
3. Environmental Benefits of Whole Grains



Reduce freshwater use for plant crops by **8.6%²** or 124,000 billion liters, which is the equivalent amount used to grow **legumes, roots and tubers**



Reduce cropland use by **9%** or 720k km², which is equivalent to **twice the size of Germany**



Reduce GHG emissions from plant crops by **9%** or ~450 million Mt of CO₂ or the equivalent emissions of **the United Kingdom** in 2019



Reduce fertilizer use by **11.4%** or ~8 million Mt nitrogen and phosphorous fertilizers, which is the equivalent amount used to grow **nuts, seeds, and sugar crops**

1. Calculated based on weighted average extraction rates for maize, wheat and rice the top 3 produced grains in the world 2. Calculations of reductions in emission taken as percentage of total environmental impact of crops

Source: Global Nutrition Report (2021), Chapter 2, <https://globalnutritionreport.org/reports/2021-global-nutrition-report/health-and-environmental-impacts-of-diets-worldwide/>; [Climate Data Watch \(2022\)](#)

Why shift from refined to Fortified Whole Grains

5-7¹x

more nutritious

FWGs
deliver much higher
quality nutrition with 5-7X
the micronutrient value²



\$0

incremental cost

High quality FWG flour
can be produced **at the
same cost** as refined
flours



25%

lower environmental footprint

Whole grains can feed
more people with **less
land, water, fertilizer
use** and **GHG emissions**



1. Ranges from 6-7 x across the different grains: 6.9x for FWG wheat vs. refined wheat, 6.3x for FWG maize vs. refined maize, 6.8x for FPUR (fortified parboiled unpolished rice) vs. polished rice 2. Across various vitamins and minerals | Source: BCG analysis; FWGA

4. Fortified Whole Grain Maize Meal has been demonstrated to achieve 5-month shelf life observed from shelf-life studies.

FWGA accelerated and Real time Shelf-life studies conducted by the University of Pretoria

Determining the best ways to optimize the shelf life and nutritional value of FWG maize flour through:

- 1 Thermal treatment of maize (grain drying)
- 2 Thermal treatment of maize (crush maize)
- 3 Addition of antioxidants (e.g., Vitamin E, Citric Acid)
- 4 Packaging Options
- 5 Degradation of phytates
- 6 Encapsulation of riboflavin

Shelf-life studies key findings:

- Rates of hydrolytic and oxidative **rancidity development slowed down** by drying the grain to **11.5%** moisture and below
- Fortified whole grain maize flour **shelf life at least 5 months** at a mean temperature of 25°C



Reduction in moisture level from **14%** to **11.5%** achieved

Based on thermal treatment of maize from grain drying

Increased investments in grain dryers by millers - Optimization of processing parameters

5. Consumer Research to understand Barriers to Consumption of Whole Grain foods

East Africa

- Rwanda
- Burundi
- Uganda
- Kenya

West Africa

- Nigeria
- Ghana
- Benin
- Senegal

North Africa

- Egypt



Opportunities for Increasing Whole Grain Adoption

- ✓ **Government & Industry Support** - Strengthen **policy** interventions and school feeding programs
- ✓ Enhance taste and texture through **research & development** that drives **product innovation**.
- ✓ **Demand Generation** to improve availability and distribution, in urban & rural areas.
- ✓ **Better Processing & Quality Control** - Remove impurities, improve texture and cooking ease.
- ✓ **Social & Behavior Change Communication (SBCC)** to Promote health benefits, address misconceptions

Consumer research to SBCC development is a 4-step process from consumer engagement research to Campaign development

Step 1

Consumer Engagement Research
(Qual & Quant Research)

- Focus group Discussions
- In-home immersions
- Key Informant Interviews

Step 2

Social Marketing Strategy Development

- Insight validation
- Laddering Research
- Strategy for school & consumer demand generation

Step 3

Concept Development & Testing

- Campaign concept creation
- Testing concepts

Step 4

Campaign Development

- SBCC Campaign Creation
- Campaign Shoot
- Pre-testing Campaign

Barriers to consumption of whole grain foods (FWGMM) in East Africa (Kenya, Uganda, Rwanda & Burundi)

Taste & Sensory Issues

Perceived to be less tasty than refined grains, with a coarser texture and darker color.

Not Modern

Perceived as outdated and less enjoyable.

Limited Availability & Accessibility

Consumers struggle to find whole grain products in retail stores.

Preparation Complexity

Longer cooking times discourage adoption. Refined alternatives are seen as quicker and easier to prepare.

Social Stigma

Linked to the elderly, the sick, and low-income groups. Some believe it is only suitable for convalescence or rural areas.

Shelf Life & Storage

Spoils faster, making storage a challenge for households.

Pricing & Cost Concerns

More expensive in some regions. Refined flour is often more affordable and readily available.

Consumer Insights | Rwanda



Family & Time Together

Mealtime as bonding; FWG enables family-centered care.



Quality & Standards

Trust from hygiene & certification; FWG as safe & premium.



Fulfilling Lost Dreams

Food symbolizes progress; FWG supports aspirations.



Taste & Variety

Consumers want health + taste; FWG balances both.



Nutritious & Cost-Saving

Affordable nutrition; smart family spending.



Transparency (Yellow Flour)

Color raises concerns; openness builds trust.

For FWG to succeed, it must stand for **nutrition, togetherness, trusted quality, aspirational living, affordability, and transparency** – ensuring consumers feel both emotionally fulfilled and practically supported.



GRAINS GREATNESS

Tasty and healthy whole grain maize flour fortified with vitamins and minerals.

A campaign to encourage families to switch to fortified whole grains as it's the healthier option that's tasty too.



I EAT WHOLE
GRAINS 
GREATNESS

AND ENJOY EVERY TASTY BITE

Healthy and tasty whole grain flour
fortified with vitamins and minerals.



I EAT WHOLE
GRAINS 
GREATNESS

TO STAY FULLER FOR LONGER

Tasty and healthy whole grain maize flour
fortified with vitamins and minerals.



WE EAT WHOLE
GRAINS 
GREATNESS

TO BOOST OUR HEALTH

Tasty and healthy whole grain maize flour
fortified with vitamins and minerals.



WE EAT WHOLE
GRAINS 
GREATNESS

AND ENJOY EVERY TASTY BITE

Tasty and healthy whole grain maize flour
fortified with vitamins and minerals.



I EAT WHOLE
GRAINS 
GREATNESS

TO GET SMARTER

Tasty and healthy whole grain maize flour
fortified with vitamins and minerals.



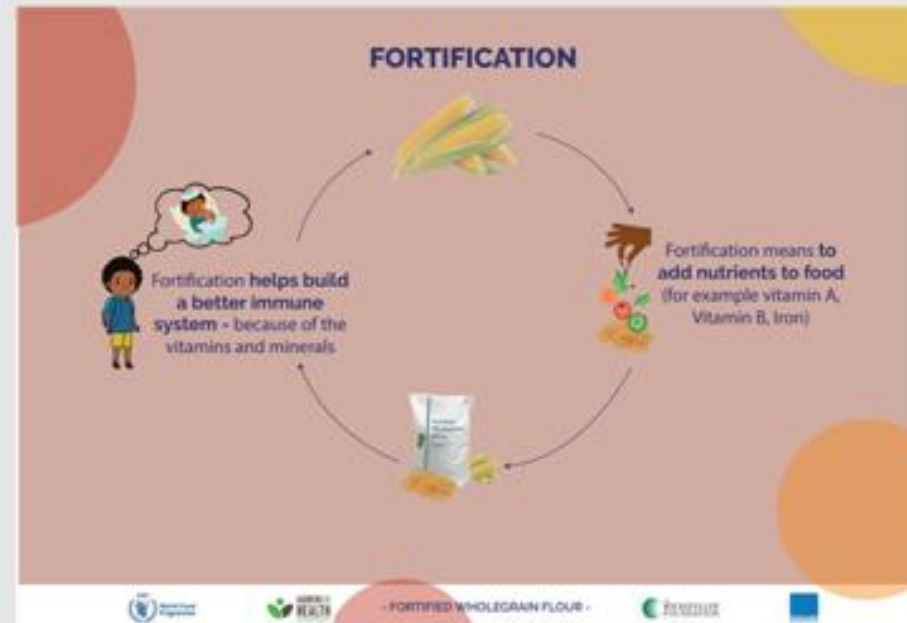
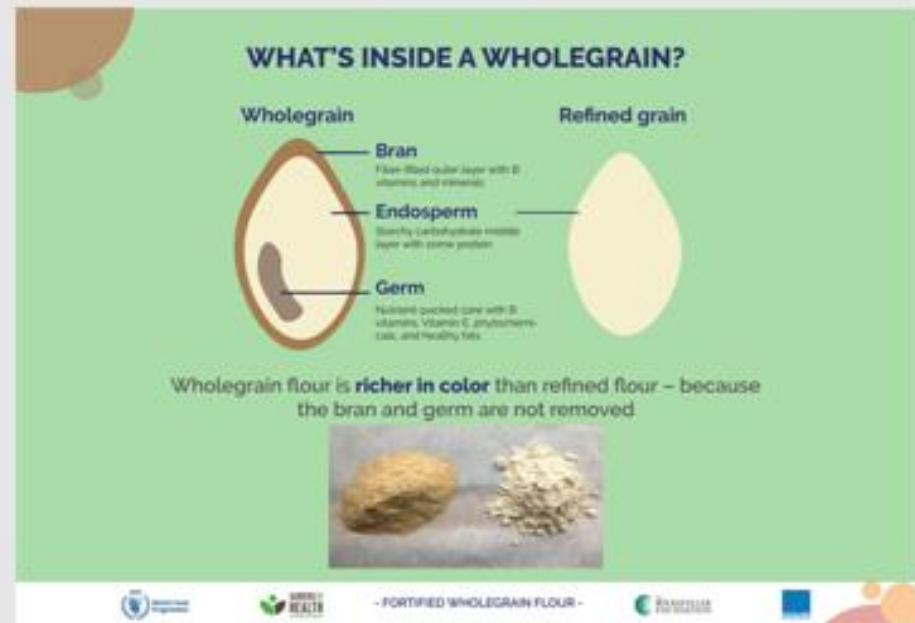
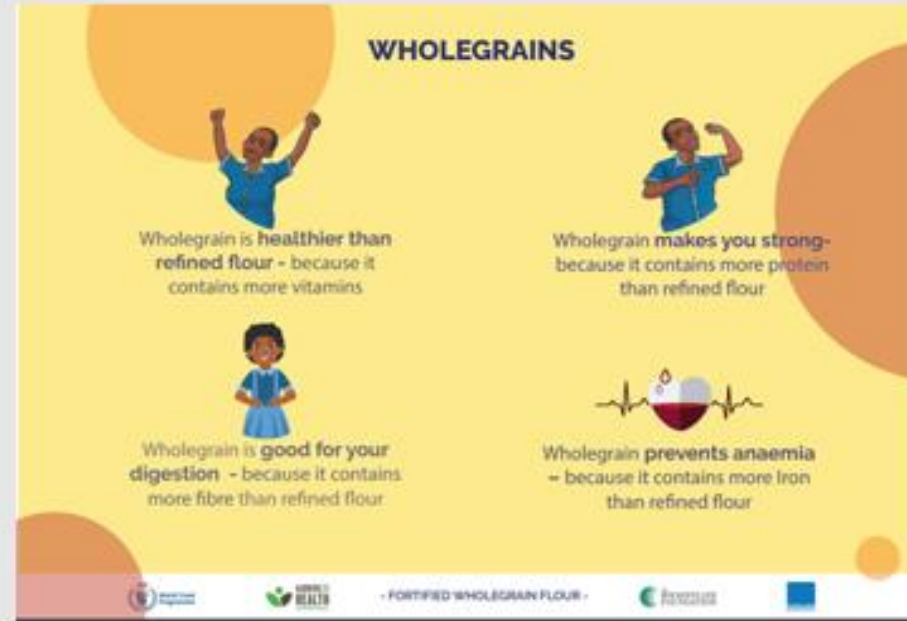
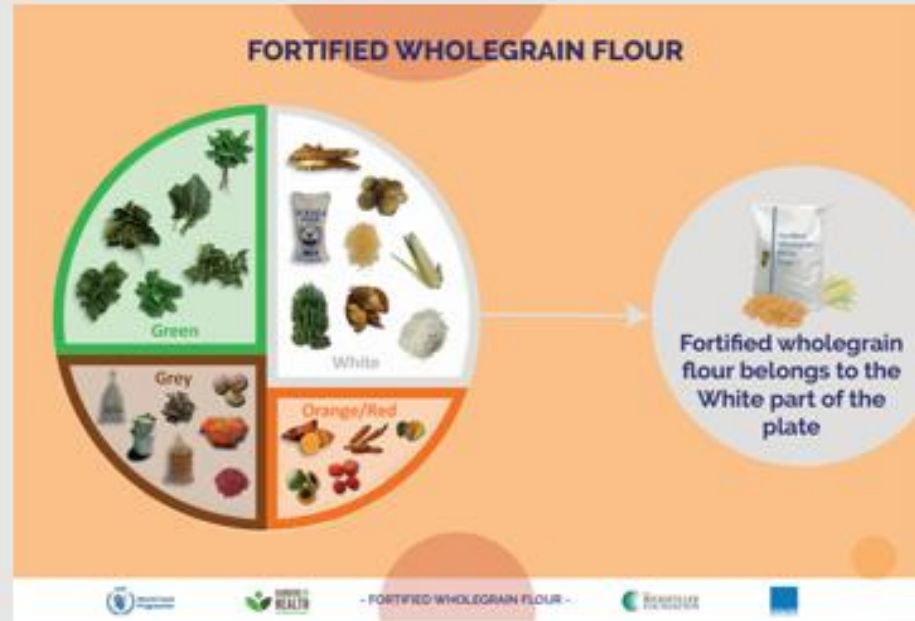
I EAT WHOLE
GRAINS 
GREATNESS

TO MAKE ME STRONGER

Tasty and healthy whole grain maize flour
fortified with vitamins and minerals.



In School SBCC Campaign - Keep It Simple



Stamp of Identity: Entry into the Consumer Market with Consumer Brands with the FWG Stamp



- The stamp to be placed on Consumer Brands
- The stamp will be linked to communication
- messaging to run with the SBCC campaigns.

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Rwanda has successfully piloted this shift and demonstrated its budget-neutrality to school feeding programs

The 18-month pilot program¹ in Rwanda supplied **13,765** schoolchildren in **18** schools with FWG maize meal, demonstrating the potential to

Produce high quality FWG flour at the same cost as refined flours



Shift consumer preferences towards healthier FWG foods



Leverage institutional food procurement to improve diets for the most vulnerable in a budget-neutral way



By the end of the pilot ...

73% of schoolchildren were aware of the nutritional benefits of FWG foods

97% of schoolchildren in Grade 6 preferred wholegrain maize meal to refined equivalent

Planning for Scale-up

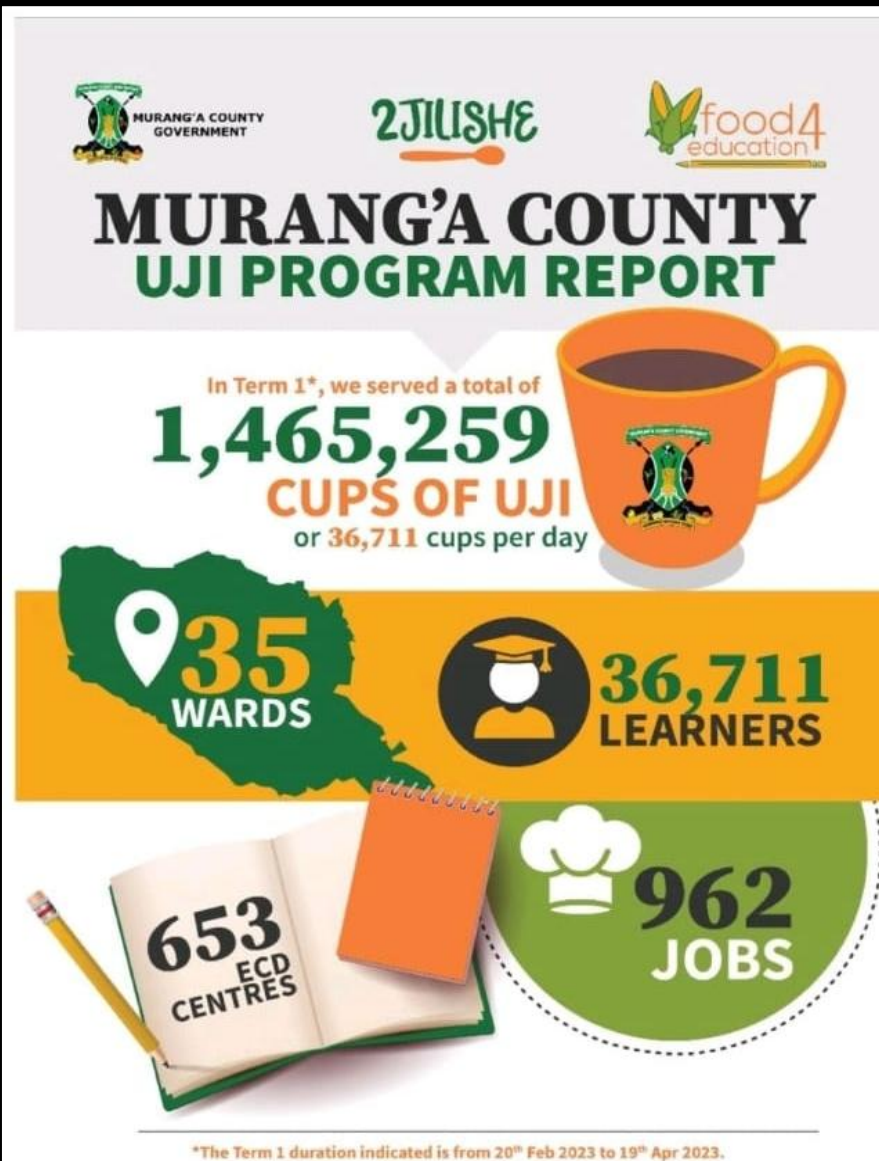
Universal coverage by the Government of Rwanda to reach 4.2 Million children in Rwanda in 2026





Kenya ECD Pilot by F4E led to 4% increased enrollment & 65% improved attendance consistency

ECD SCHOOLS



PRIMARY & SECONDARY SCHOOLS

More than 50% of flour consumed in Kenya is from micro millers.
FWGA is working with posho millers to fortify WGF & supply to schools



Micro-Millers
Community Sales
Reps - micro millers



Institutional Consumers
Primary and ECDE schools



Direct Consumers
These will include school children and walk-in customers at micro millers



Wholesalers
Bulk sellers to institutions, retailers and customers

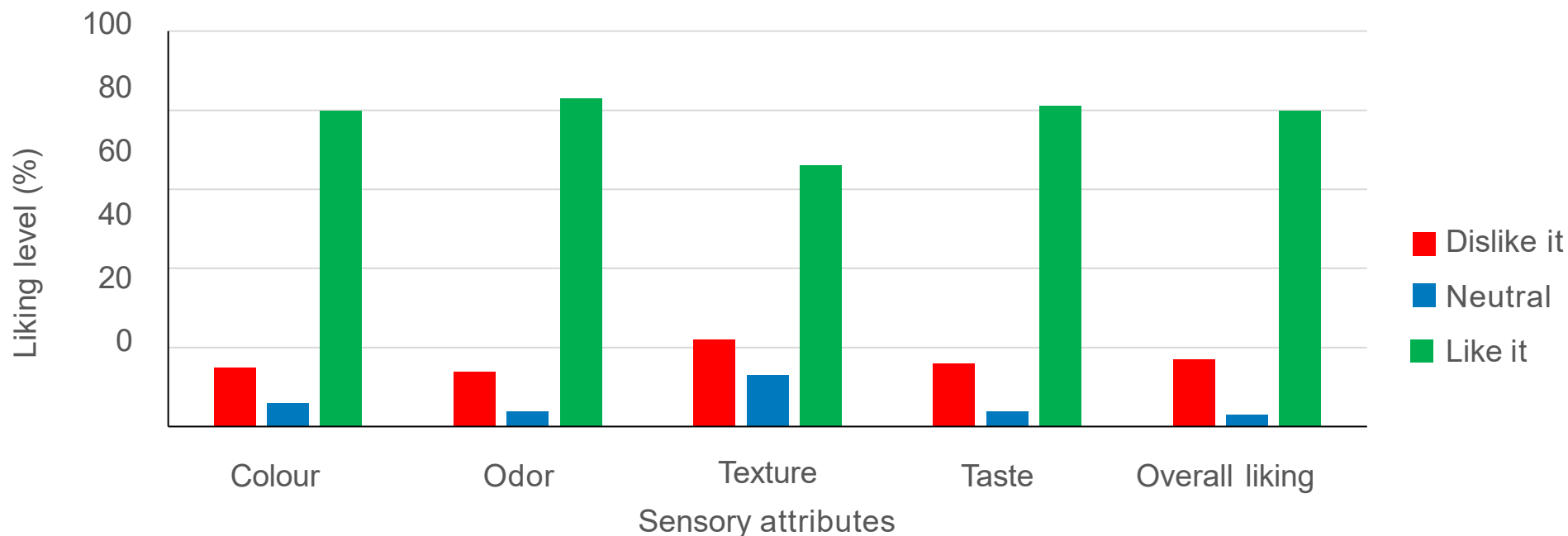
- Link Schools to Micro Millers (Demand Creation)
- Supply Micro Millers with Mixers &
- Technical Assistance to improve Quality
- 1,509 metric tonnes of whole grain flour milled inception.
- Over 200,000 students currently consuming FWGs

\$1 investment in ECD school feeding can result in \$ 4-9 investment returns
ECD school feeding in Kenyan county's through Fortified Whole Grain porridge will lead to both improved nutrition for students and demand creation for local suppliers



Benin: Consumer research to inform decision-making.

Currently over 100,000 school children consuming PUR



- Immersions undertaken and there has been good appreciation of the meals prepared with PUR (>80% color, odor, taste, overall acceptability)
- Less appreciation for its texture (<65%)
- Working on tailored SBCC campaign for the successful introduction and sustainable adoption
- Scale up to achieve universal coverage from 2026

FWGA Partners and Members | The Alliance has 19 Partners who provide their expertise and operational guidance and open up FWGA to a wider network and over 150 members who benefit from being part of the Alliance



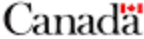
The Rockefeller Foundation



novo nordisk foundation



IDRC · CRDI
International Development Research Centre
Centre de recherches pour le développement international



Canada



BOSTON CONSULTING GROUP



gain
Global Alliance for Improved Nutrition



dsm-firmenich



CIMMYT



CGIAR



Citi Foundation



citi



PROTECTS
Tetra Pak
WHAT'S GOOD



TechnoServe
Business Solutions to Poverty®



SANKU



VANGUARD
ECONOMICS



PARTNERS
IN FOOD
SOLUTIONS
Connecting Expertise with Opportunity



ONE ACRE FUND



EAGC
EASTERN AFRICA GRAIN COUNCIL



capiconic



sightandlife



CAPWELL INDUSTRIES
MARK OF QUALITY



SHALEM
INVESTMENTS LTD



STAWI
Foods & Fruits Limited



Green Without Borders
Agribusiness | Innovation | Sustainability



+100
Micro
millers



Unikorn



BURUNDI
FORTIFIED
FOODS



TOTAHARA
DUFUNGURE NEZA



MINOLACS



BARAKA FLOUR MILLS



MAHWI
GRAIN MILLERS



minimex
AFRICA'S FINEST MAIZE PRODUCTS



Cellion
INTERNATIONAL



RWACOF
EXPORTS



SOY
AFRIC
NURTURING FAMILIES SINCE 1974



SOCOPA



SimplyFoods
Making daily simple



PREMIUM
FOODS



Fortis
Fortis Mills Limited



MAISHA
FLOUR MILLS LTD
QUALITY FOR LIFE



JUFRA FOOD PROCESSORS



max
INDUSTRIES LIMITED



Shepherd's Mills



DIDI
FARMS



ENGSKO
UNITED MILLING SYSTEMS



AGSOL



SORELA
SUPPLIES



S&S
SCALES &
SOFTWARE (K) LTD



Interfield
Food Testing
Laboratories



M-ENGINUITY
Tech • Innovation • Growth



HEXAGON NUTRITION



XG
MILLS LIMITED



BEST



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THANK YOU.

