Large Scale Food Fortification

Presentation by

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and

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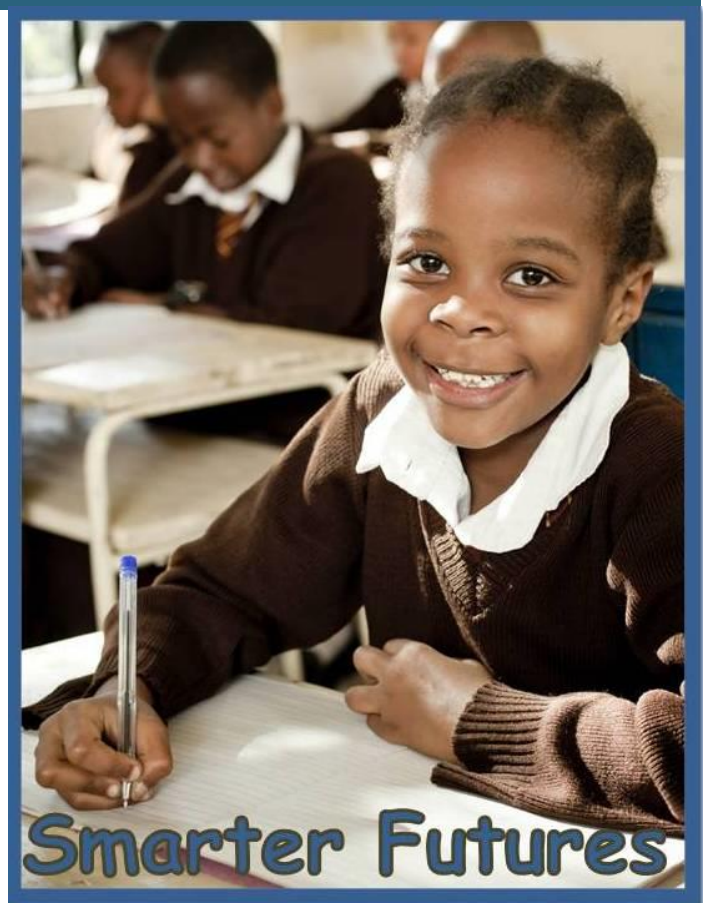
to the **Conference External Cooperation Infopoint**

on

"Food Fortification: Scalable Approaches to Prevent Micronutrient Deficiencies in Populations"

Thursday 15 February 2018, 12:30–14:00, Brussels



I acknowledge with thanks the contributions of many colleagues

Large Scale Food Fortification

- **What is it?**
- Why fortify?
- Who benefits?
- History and current progress
- Evidence of impact
- Cost and benefit
- Programme implementation

What is food fortification?

- **Food fortification** has been defined as the addition of one or more essential nutrients to a food, whether or not it is normally contained in the food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the population or specific population groups (FAO/WHO 1994).

- **Enrichment** is defined as "synonymous with fortification and refers to the addition of micronutrients to a food which are lost during processing"

Food fortification vehicles

OIL

Vitamin A,
D, E

MILK

Vit A,D
Ca

CEREALS

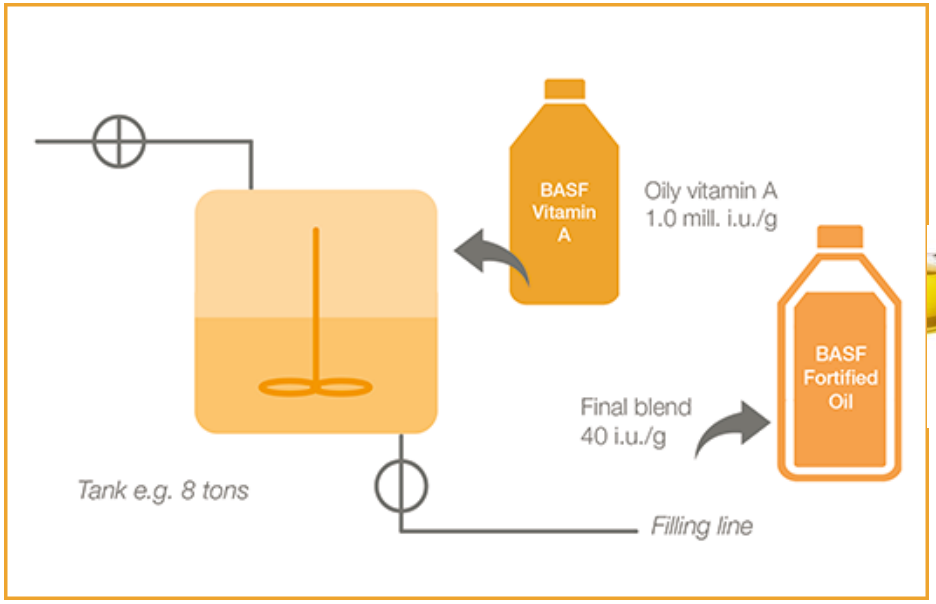
Fe, Zn
Vit. B1, B2, B3, B6, B12
Folic acid
Vitamin A

SALT

Iodine

SUGAR

Vitamin A


BASF
Vitamin
A
Oily vitamin A
1.0 mill. i.u./g
BASF
Fortified
Oil
Final blend
40 i.u./g
Tank e.g. 8 tons
Filling line


azam
WHITE
GOLD
PREMIUM BAKER'S FLOUR
FORTIFIED

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Poverty and economic crisis impact on the nutrition security of the consumer

Food Prices Go Up -

Nutritional Value Goes Down

As people eliminate higher priced items such as proteins, fruits and vegetables from their diet to stretch their food budget, they can still get essential vitamins and minerals if their food staples are fortified according to internationally agreed standards.

The Big Five……..

- ***Iodine*** deficiency is the single most preventable cause of mental retardation and brain damage.
- ***Vitamin A*** deficiency is the leading cause of acquired blindness in children and impairs immune function.
- Severe ***zinc*** deficiency causes short stature, impairs immune function and other disorders
- ***Iron*** deficiency is one of the most prevalent nutrient deficiencies in the world; it affects an estimated two billion people, and causes almost a million deaths a year.
- ***Folic acid*** prevents birth defects of the brain and spine, such as spina bifida.

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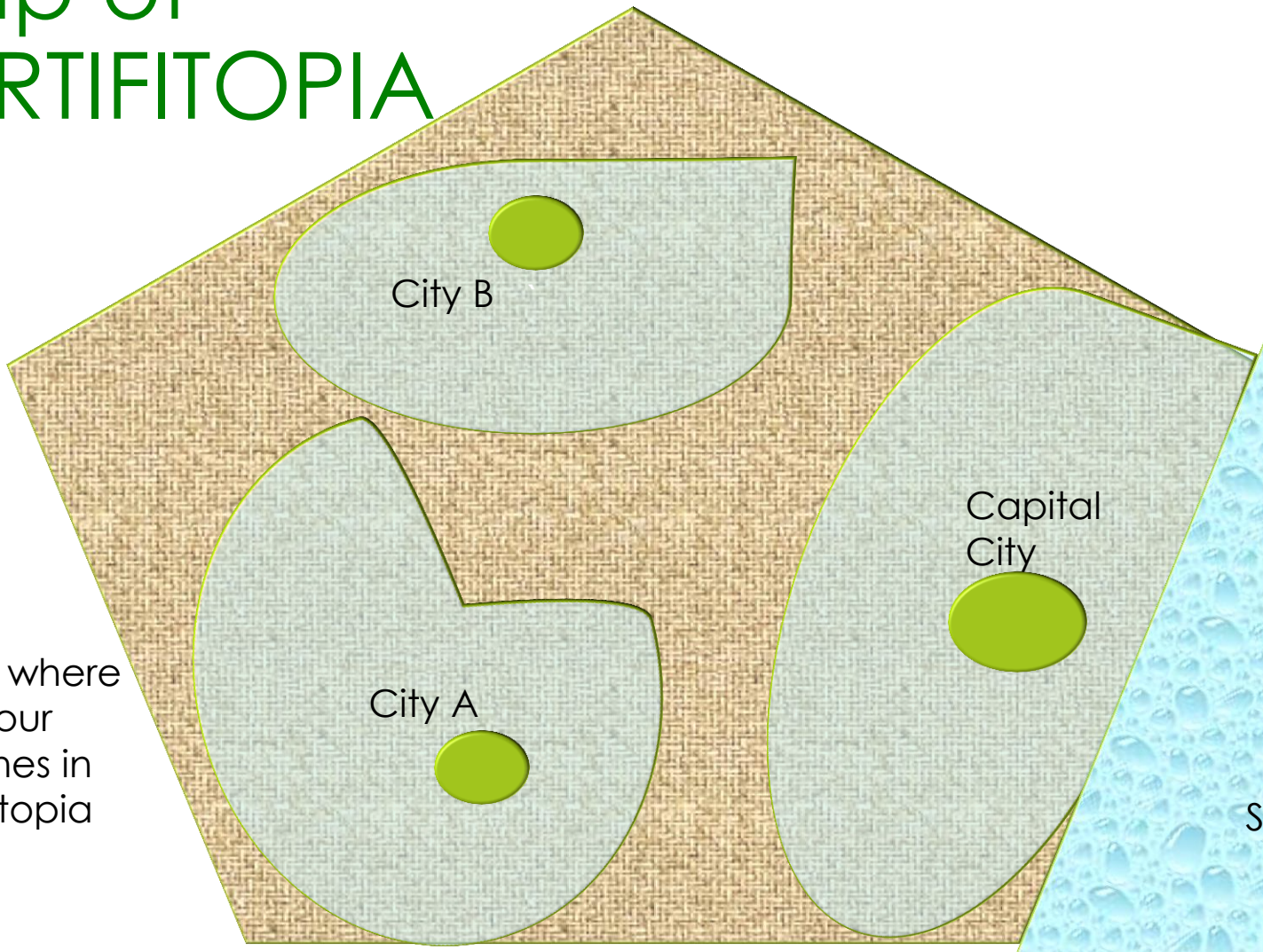
Who will benefit from fortified foods?

- **Food fortification** is an **industrial process.** The industry ensures provision of essential vitamins and minerals according to government standards and regulations.
- Fortified foods reach all those who have **access to the market** and **purchase** their staple food/ oil/ salt.
- This includes **the urban poor**, a fast growing group in many developing countries in Africa and Asia.
- Those who **do not have access** to fortified, packaged commercially processed foods need to receive essential vitamins and minerals through **alternative mechanisms**. This may include provision of multiple micronutrient powder sachets ("sprinkles") or supplements, as well as social safety net approaches, which use fortified foods.

Map of FORTIFITOPIA



This is where the flour reaches in Fortifitopia

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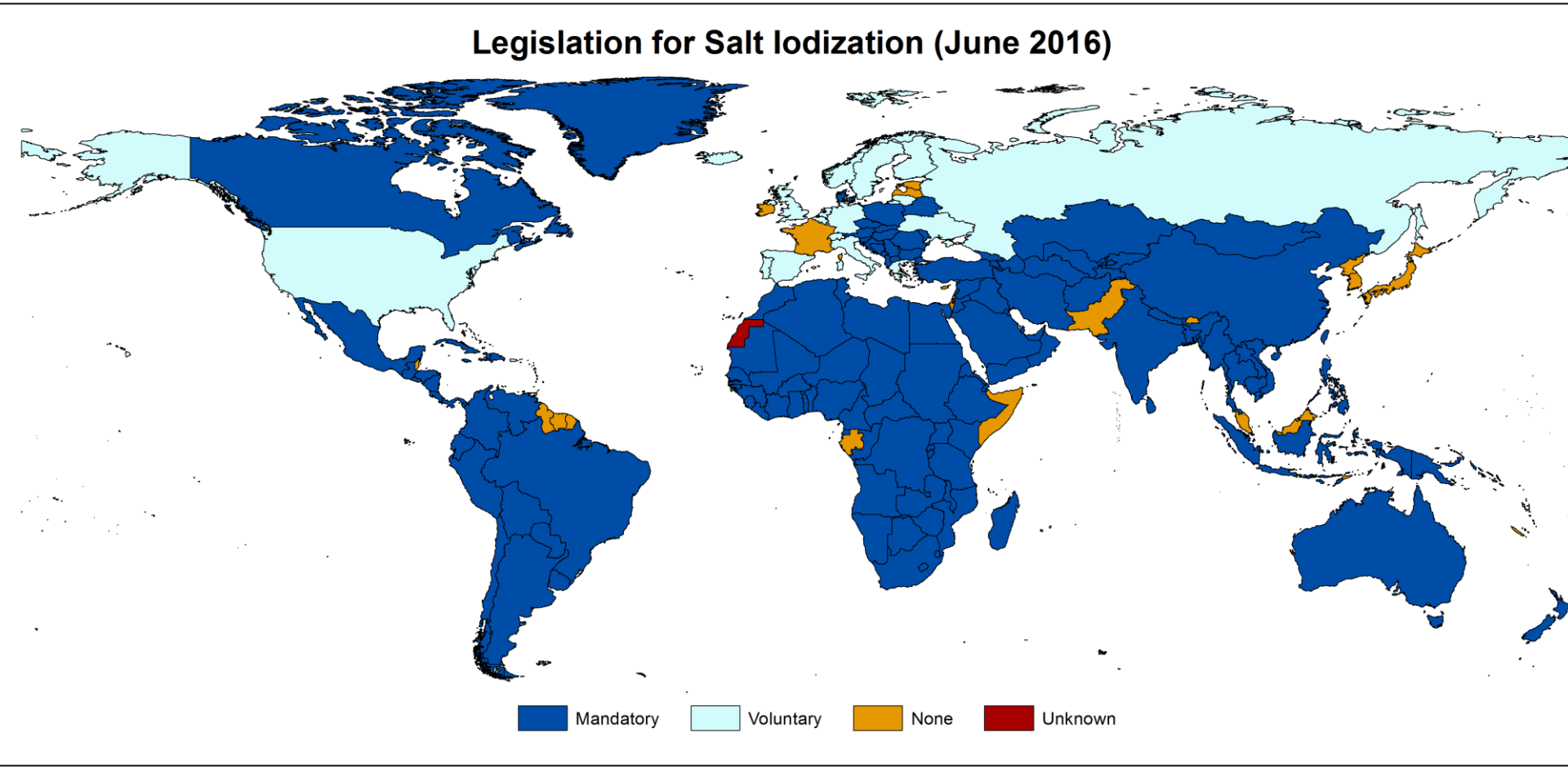
Photo by Eugène Trutat –
This photograph is part of the Fonds Eugène Trutat, preserved by the muséum de Toulouse.

- In Switzerland around the 1920's, ***cretins*** were common
- **Cretinism** is a condition of severe physical and mental retardation due to iodine deficiency

Iodine deficiency disorders

- Iodine deficiency is the world's most prevalent, yet easily preventable, cause of brain damage.
- In certain regions of Switzerland, 0.5% of the inhabitants were cretins, almost 100% of schoolchildren had large goiters, and up to 30% of young men were unfit for military service owing to a large goiter
- **Iodization of salt** was introduced in Switzerland in 1922. The USA quickly followed.

Current status of salt iodization worldwide



Fortification of flour

- During the 1940s, Britain and the USA started enriching flour as a means to improve the health of their populations during WWII.
- While fortification of flour was never really embraced in Europe, countries all around the world started flour fortification in the late 20st and early 21st century. To date, more and more countries are adopting this measure.

One intervention; many benefits

Cereal flours can be fortified with many vitamins and minerals

Nutrient	Number of countries that include nutrient in wheat flour fortification standards
Iron	85
Folic acid (vitamin B9)	80
Thiamin (vitamin B1)	59
Niacin (vitamin B3)	57
Riboflavin (vitamin B2)	57
Zinc	25
Vitamin B12	15
Vitamin A	15
Vitamin B6	13
Calcium	5
Vitamin D	4

Fortification prevents and treats iron deficiency and nutritional anaemia

In children:

- Iron deficiency impairs cognitive development in children
- This mental capacity is never regained and in turn limits academic performance and future earnings potential.
- Childhood anaemia globally is associated with a 2.5% drop in wages in adulthood.

Fortification prevents and treats iron deficiency and nutritional anaemia

In adults:

- Iron deficiency reduces productivity
- In 10 developing countries, annual physical productivity losses due to iron deficiency was up to 3% of GDP
- Anaemia contributes to maternal death
  - In developing countries, one-fifth of perinatal mortality and one-tenth of maternal mortality are attributed to iron deficiency

Folic acid prevents births defect of the brain and spine

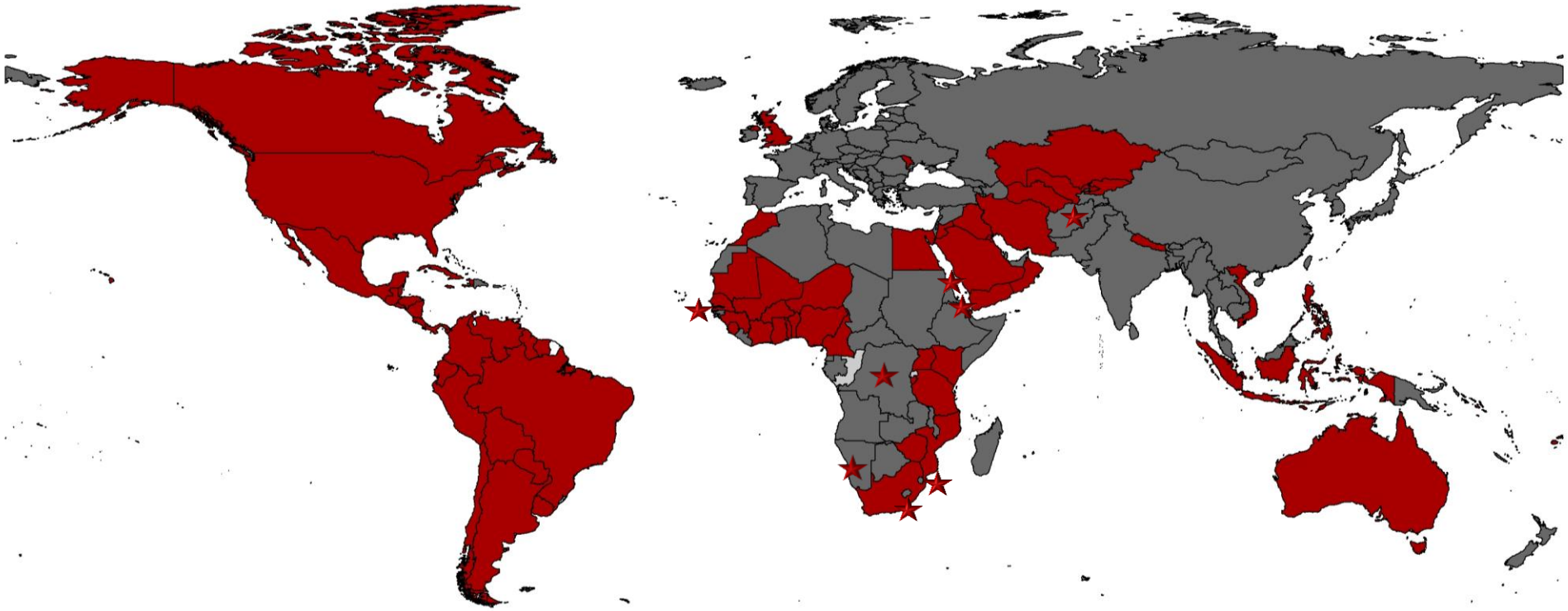
- Children born with spina bifida will undergo a lifetime of surgeries and face many health issues.
- Spina bifida cannot be cured.
- Almost 300.000 birth defects of the brain & spine can be prevented annually

Since 1991we know that birth defects of the brain and spine can be prevented by folic acid:

- Folic acid is a B vitamin that our bodies need to make new cells.
- In 1991, a study showed that **400 micrograms of folic acid daily taken from 8 weeks before conception** till 12 weeks into the pregnancy can reduce the risk of birth defects of the brain and spine by up to 70%.
- This made it possible to **prevent** these debilitating birth defects.
- Pregnant women all over the world are given iron and folic acid tablets during pregnancy, mostly in the 3d trimester.
- That is **too late** for preventing birth defects of the brain and spine.

Global Progress

86 countries have mandates to fortify industrially milled wheat flour with at least iron or folic acid.



★ Afghanistan, Democratic Republic of Congo, Gambia, Lesotho, Namibia, Qatar, Swaziland, and the United Arab Emirates fortify more than half their industrially milled wheat flour even though it is not mandatory.

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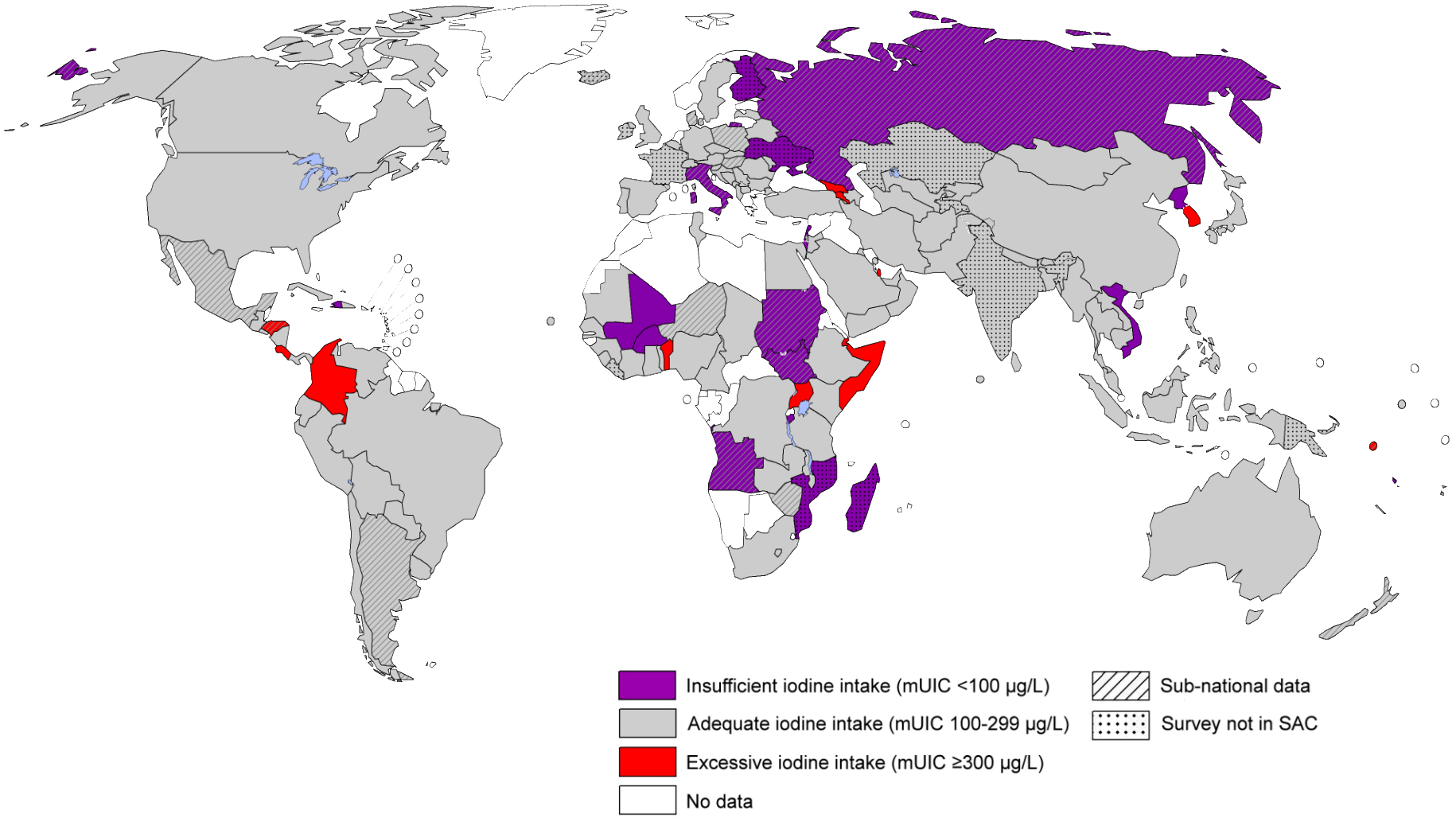
Global Scorecard of Iodine Nutrition 2017

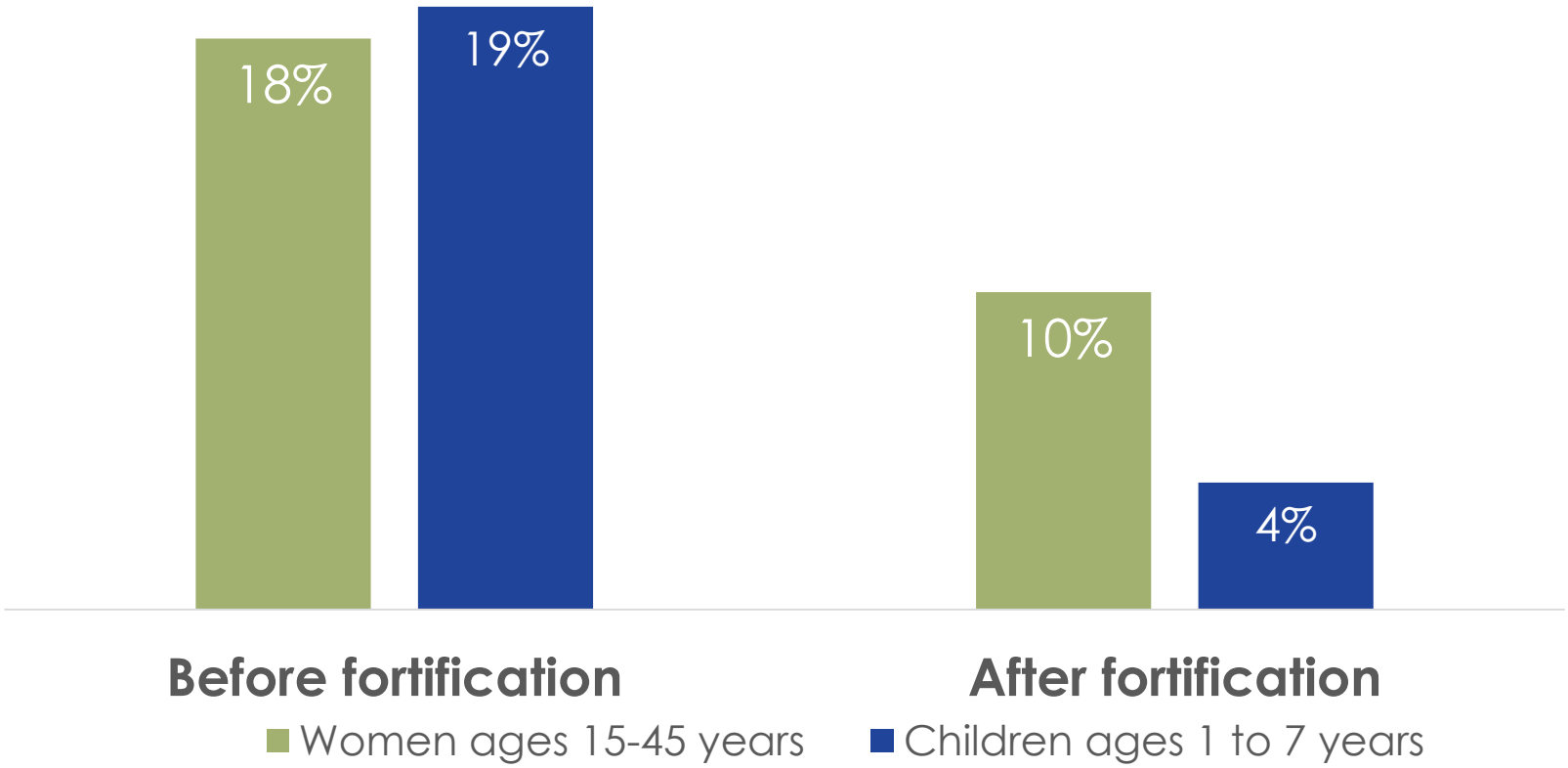
Based on median urinary iodine concentration (mUIC) in school-age children (SAC) and adults



IODINE global network

Note: The boundaries, colours, denominations, and other information shown on this map do not imply any judgment on the part of the Iodine Global Network concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

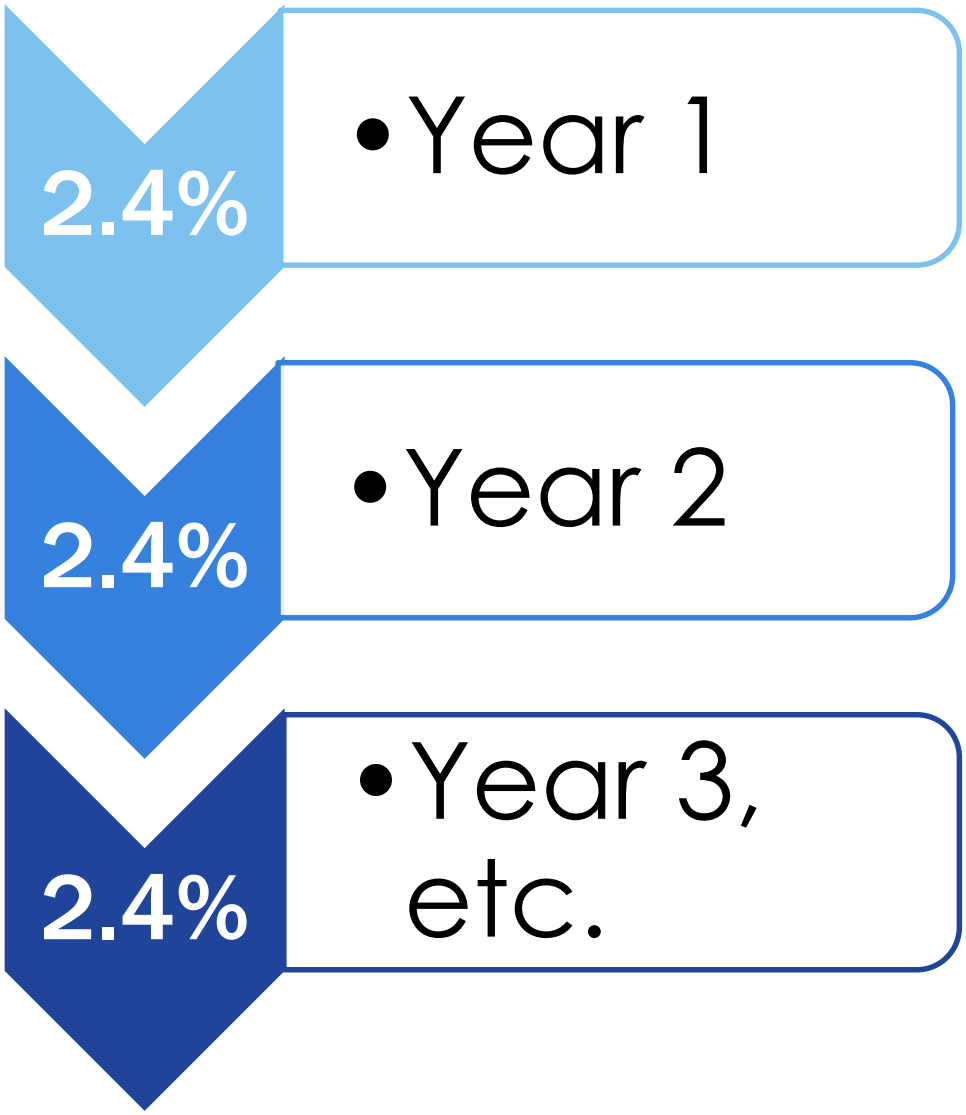
Fortification reduced anaemia among women and children in Costa Rica



Wheat flour, maize flour, powdered milk and liquid milk fortified with iron

Martorell 2015

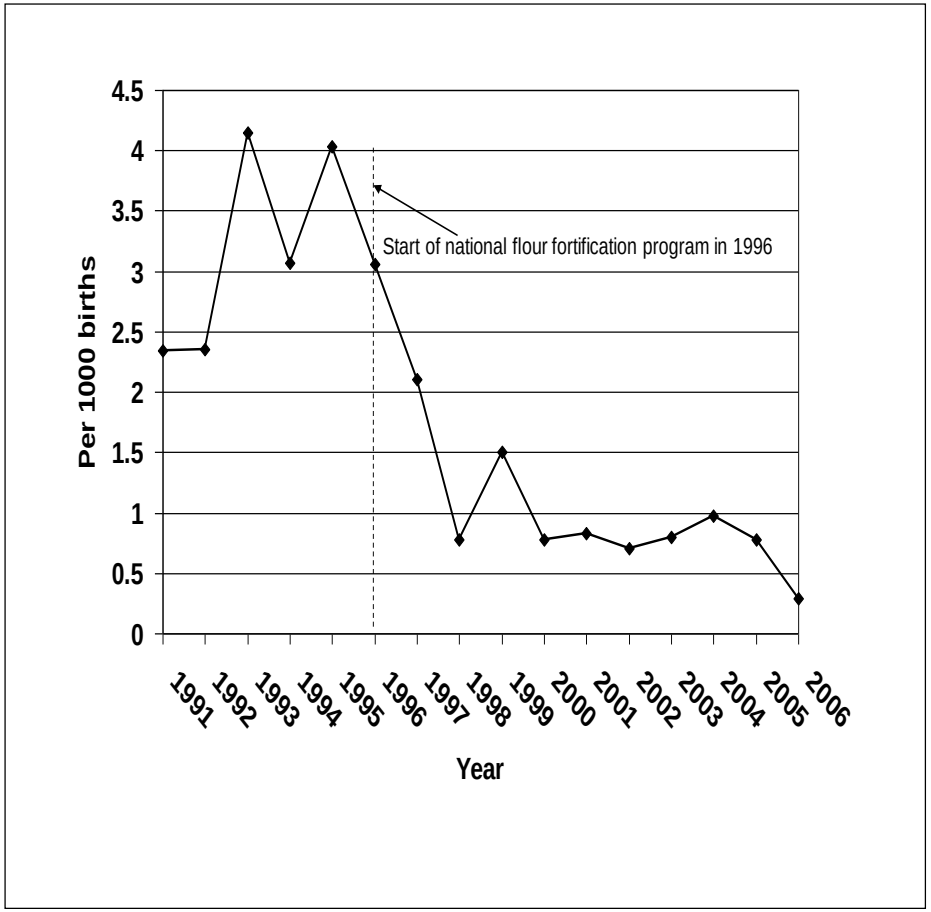
Each year of flour fortification is associated with a 2.4% decrease in anemia.



Barkley, J., Wheeler, K., and Pachón, H. Anaemia prevalence may be reduced among countries that fortify flour. British Journal of Nutrition, 2015. 114, pp 265-273. doi:10.1017/S0007114515001646.

Impact of Flour fortification with folic acid on preventable birth defects

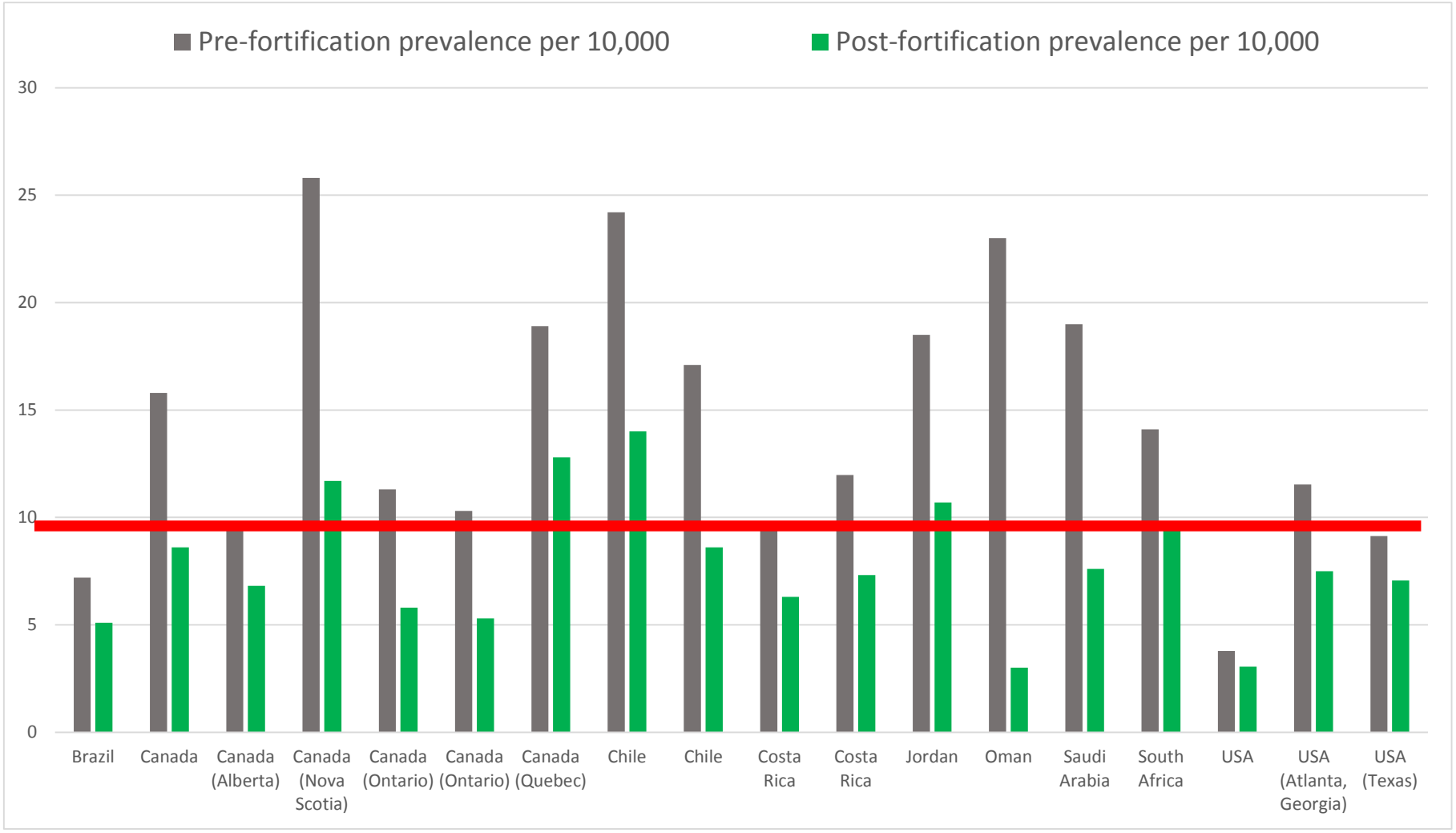
- The discovery that folic acid can prevent these birth defects led Oman to start fortification of flour with folic acid in 1996, soon followed by the US and Canada.
- The impact was immediate!



Reduction in birth defects of the brain and spine in Oman

Reductions in birth defects of the brain and spine due to fortification

The red line shows the situation in Europe. No change for 15 years.



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Average cost of vitamin and mineral premix to fortify 1 metric ton

One metric ton of wheat flour is about 2,200 pounds or 1,000 kilograms, as pictured here. FFI photo.

Wheat Flour:

Average of US$ 3 to fortify with iron, folic acid, and other B vitamins

Maize Flour:

Average of US$ 4 to fortify with iron, zinc, vitamin A, folic acid, and other B vitamins

Annual net savings from adding folic acid to flour

Chile	South Africa	United States
• 2.3 million international dollars[1]	• 40.6 million rand[2]	• 603 million US dollars[3]

These are conservative estimates!

[1] Llanos, A., et. al., Cost-effectiveness of a Folic Acid Fortification Program in Chile. Health Policy 83 2007:295-303.
[2] Sayed, A., et.al., Decline in the Prevalence of Neural Tube Defects Following Folic Acid Fortification and Its Cost-Benefit in South Africa. Birth Defects Research 82 2008:211-216.
[3] Grosse, S., et. al., Retrospective Assessment of Cost Savings From Prevention. American Journal of Preventive Medicine , 2016.

Cost:benefit analysis

- In **Tanzania**, a World Bank analysis shows that food fortification could generate 8,220 shillings in net savings for every 1,000 shillings spent on fortification.
- In **Zambia**, every 1 Kwacha invested in maize flour fortification has the potential to return 6.9 Kwacha to the economy through improved health and higher productivity.
  - Cost per person per year in Zambia: 72 Kwacha (US $7.91)

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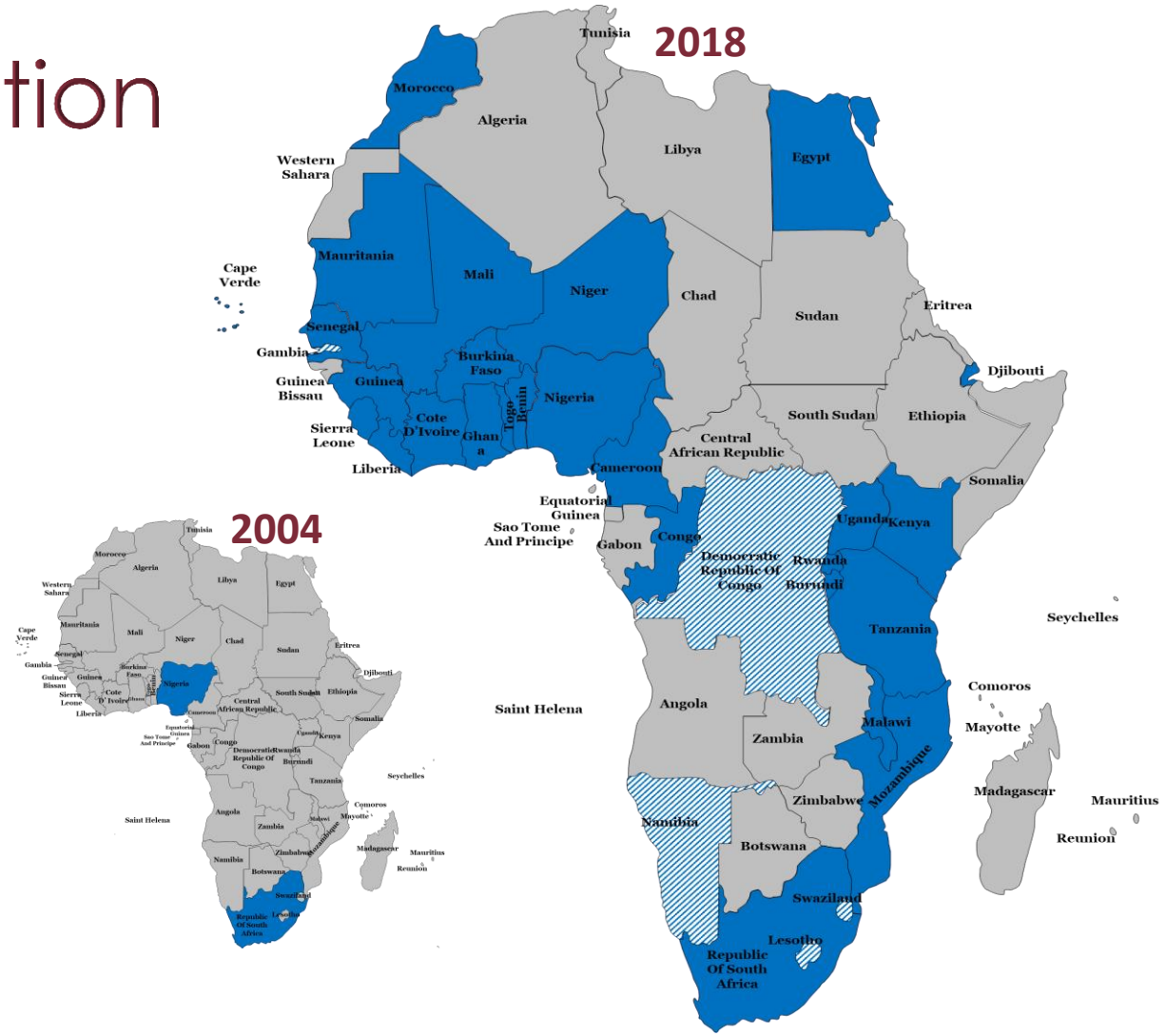
Flour Fortification in Africa: 14 Years of Progress

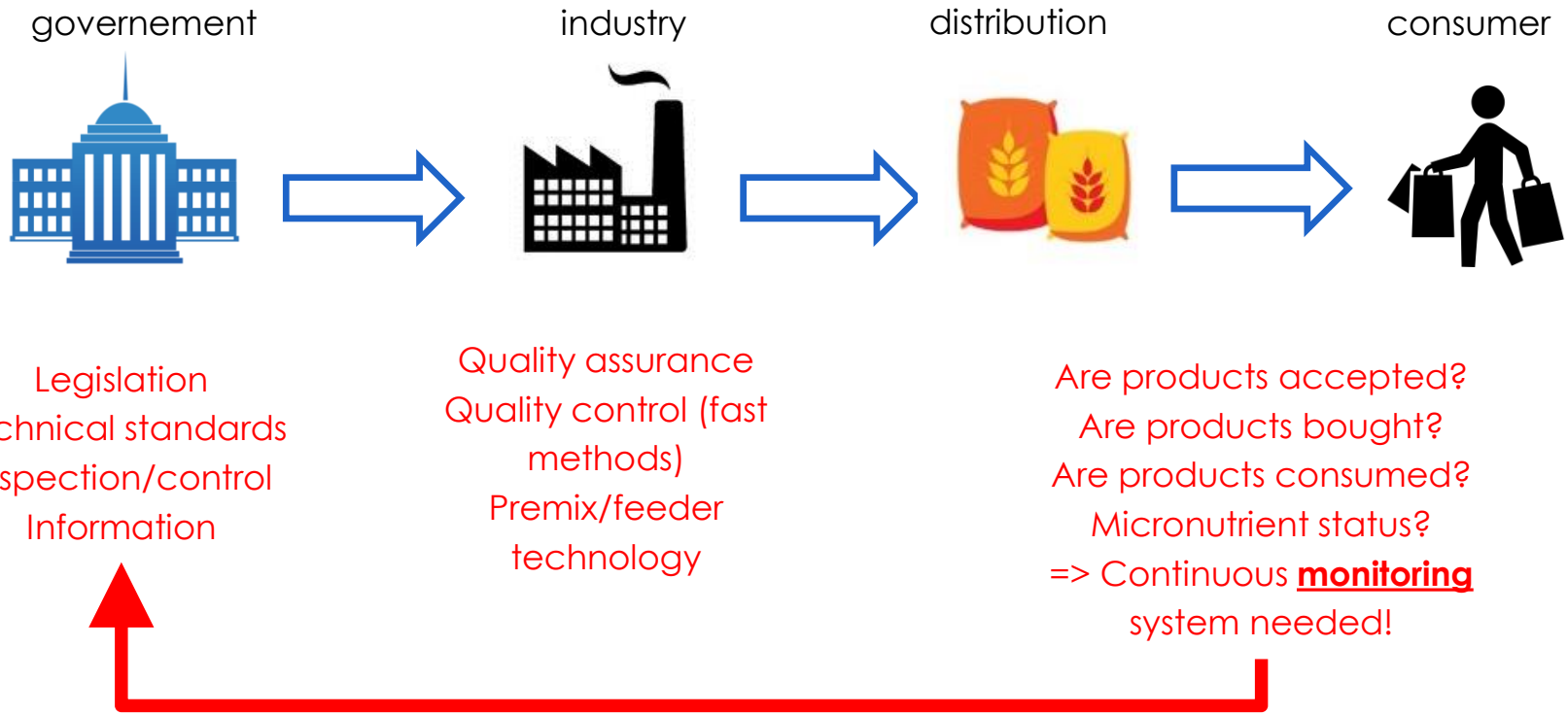


Country has legislation to mandate fortification of wheat flour alone or in combination with maize flour (27 countries in February 2018)

At least 50% of industrially milled wheat or maize flour is fortified even though fortification is not mandatory (5 countries in February 2018)

Fortification programmes

- Fortification operation: relatively easy
- Setting up national fortification programmes: challenge!



Successful food fortification programmes:

- ✓ Are well implemented and monitored, including quality assurance and quality control
- ✓ Optimize coverage and consumption
- ✓ Use vitamin and mineral levels and compounds according to WHO recommendations, based on actual consumption
- ✓ Involve all stakeholders

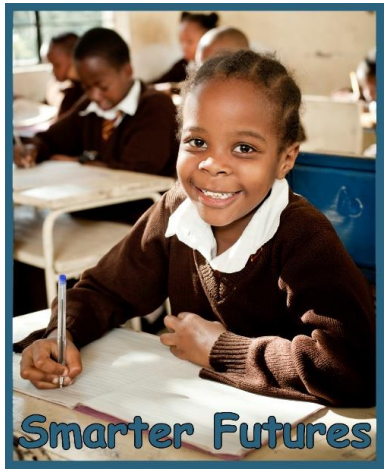
AkzoNobel

IFSBH INTERNATIONAL FEDERATION FOR SPINA BIFIDA AND HYDROCEPHALUS

Helen Keller INTERNATIONAL

Food Fortification Initiative
Enhancing Grains for Healthier Lives

gain
Global Alliance for Improved Nutrition



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BÜHLER

HEXAGON NUTRITION
Nutritionally Yours...

BioAnalyt
measure for life

unicef

WFP

World Health Organization

World Vision

THANK YOU!

Some useful websites:

- www.Smarterfutures.net
- www.FFInetwork.org
- www.ifglobal.org
- www.hki.org
- www.gainhealth.org
- www.fortificationdata.org