Economic Consequences of Deficiencies

Anna Verster, Senior Advisor on Flour Fortification

Smarter Futures

With thanks to Quentin Johnson (SF/FFI) and Jack Bagriansky

Food Fortification Initiative
Enhancing Grains for Healthier Lives

AkzoNobel

Helen Keller INTERNATIONAL

IFSBH

Ministerie van Buitenlandse Zaken

Population Wide Consequences of Micronutrient Deficiencies

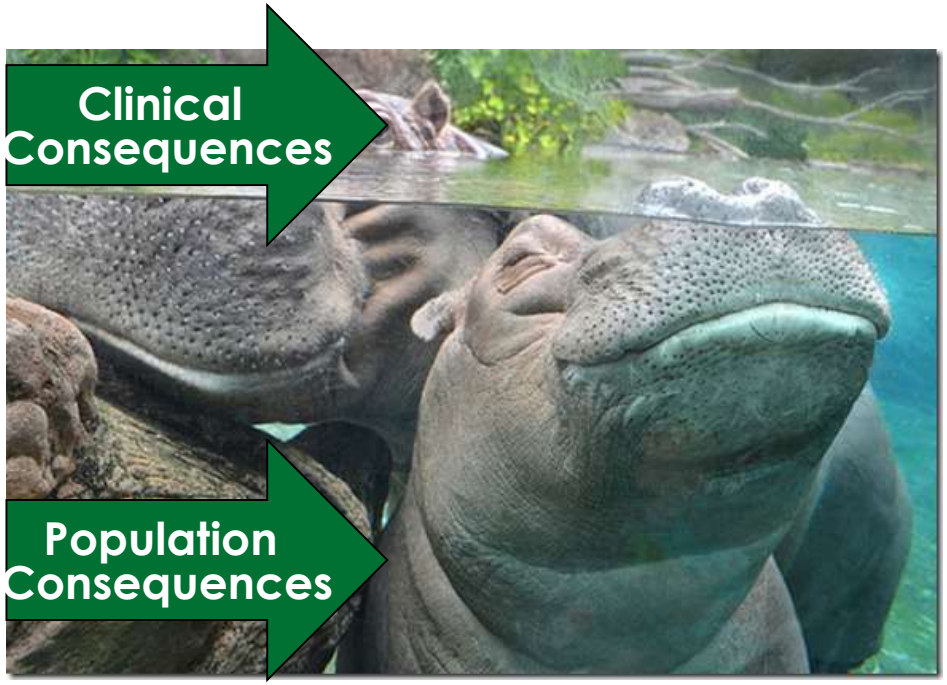


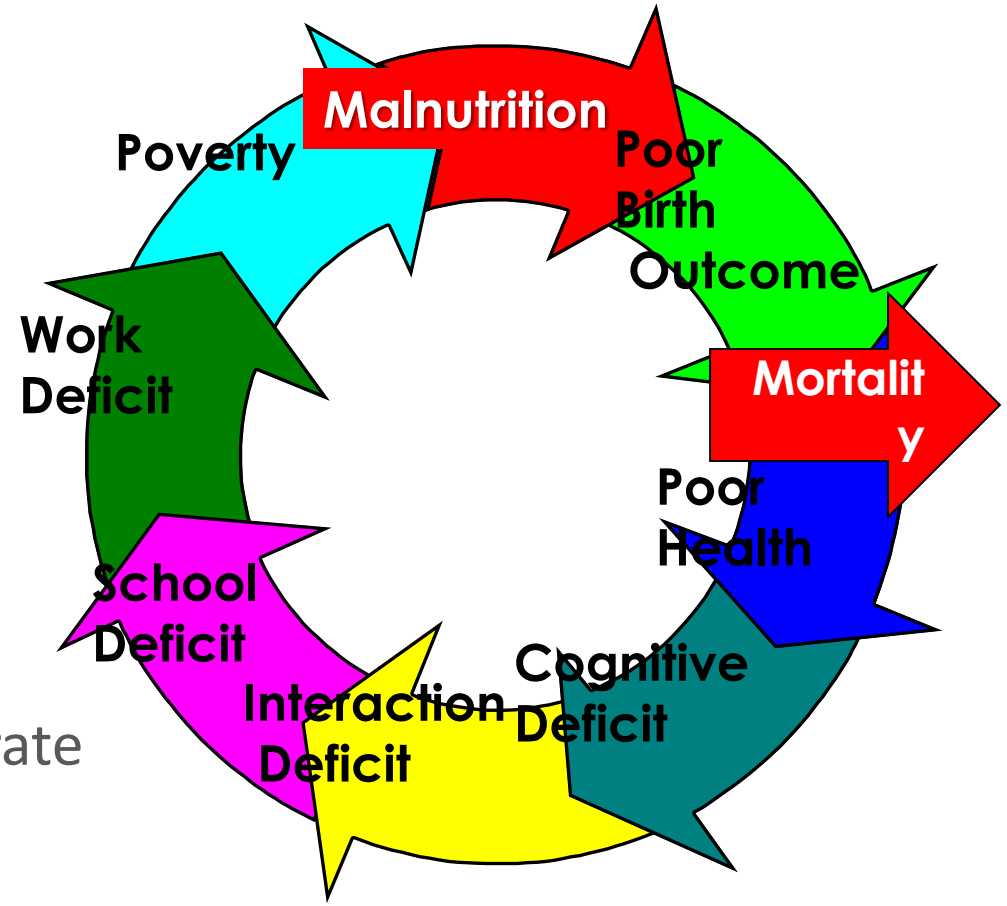
Photo from Animal Planet

- Invisible Burden
  - Biochemical Indicators
- Contributing Factor
  - Mortality
  - Morbidity
  - Mental/Physical Development
  - Adult Productivity
  - Quality of Life
- Advocacy Challenge
  - Make the Invisible Visible
    - Consequence Model
    - Cost of Doing Nothing

Economic Rationale for Investing in Nutrition

- Old News
  - Poverty Root Cause of Malnutrition
- Recent Evidence
  - Malnutrition causes poverty.
    - Human Capital
- Conclusion
  - Lowering rates of malnutrition can accelerate economic growth.

Negative Feed back Loop



Cost-effective Investment

Leading economists, meeting every four years, ranked micronutrient interventions among their top three recommendations in 2004, 2008, and 2012.

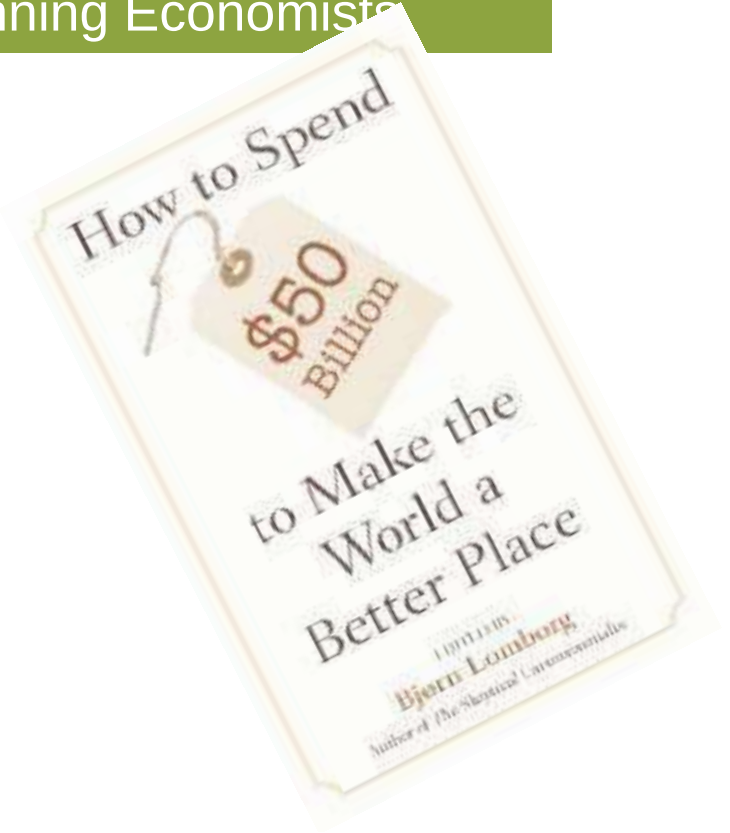
"One of the most compelling investments is to get nutrients to the world's undernourished. The benefits from doing so – in terms of increased health, schooling, and productivity – are tremendous."

Nobel laureate economist Vernon Smith, part of 2012 Copenhagen Consensus Expert Panel

http://www.copenhagenconsensus.com/projects/copenhagen-consensus-2012/outcome

Prioritizing Development Challenges by Economic Criteria

Copenhagen Consensus: 10 Global Development Challenges Considered by Panel of Nobel Prize Winning Economists



Nobel Prizewinning Economists: Finn Kydland, Robert Mundell, Douglass North, Thomas Schelling, Vernon L. Smith

The Copenhagen Consensus 2008: Highest Benefit Cost Ratio

	Solution	Challenge
1	Micronutrient supplements for children (A & Zn)	Malnutrition
2	The Doha development agenda	Trade
3	**Micronutrient fortification**	Malnutrition
4	Expanded immunization coverage for children	Diseases
5	Biofortification	Malnutrition
6	Deworming, other nutrition programs in school	Malnutrition
7	Lowering the price of schooling	Education
8	Increase and improve girl's schooling	Women
9	Community-based nutrition programs	Malnutrition

Examples of Economic losses
The National Burden of IDA, VAD & NTD

1. Child Mortality Cost of VAD
2. Neo-Natal Mortality Cost of IDA in Pregnant Women
3. Maternal Mortality Cost of IDA in Pregnant Women
4. Mortality & Disability Cost of NTDs
5. Future Productivity Loss Due to Cognitive Deficits in Children
6. Current Productivity Loss Due to Anemia in Adult Women and Men
7. Summary: Money, Mortality

Source: Jack Bagriansky
IDA = iron deficiency anemia
VAD = vitamin A deficiency
NTD = neural tube defect

Costs of Anemia

Anemia leads to:

- 17% ***lower productivity*** in heavy manual labor
- 5% ***lower productivity*** in other manual labor
- Estimated 2.5% loss of earnings due to ***lower cognitive skills***

The Economics of Food Fortification (2006) by Sue Horton
Photo from The Lewis Family Blog http://lewisesinchina.blogspot.com/2008/04/trek-on-yellow-mountain.html

Cost Benefit Analysis: Tool to Rationally Prioritize

- Measures all benefits and costs of an intervention in monetary terms.
  - Cost Effectiveness often used where it may be inappropriate to monetize health effect or benefit.
- Tool to Establish Priorities
  - Valuation of program in monetary units allows decision-makers to directly compare interventions.
  - Determine if it is a sound investment/decision.
    - Compared to other nutrition interventions
    - Compared to other national development investments

Using Global Science and Evidence to Develop National Policy and Programs

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Global Perspective: Advantages of Flour Fortification

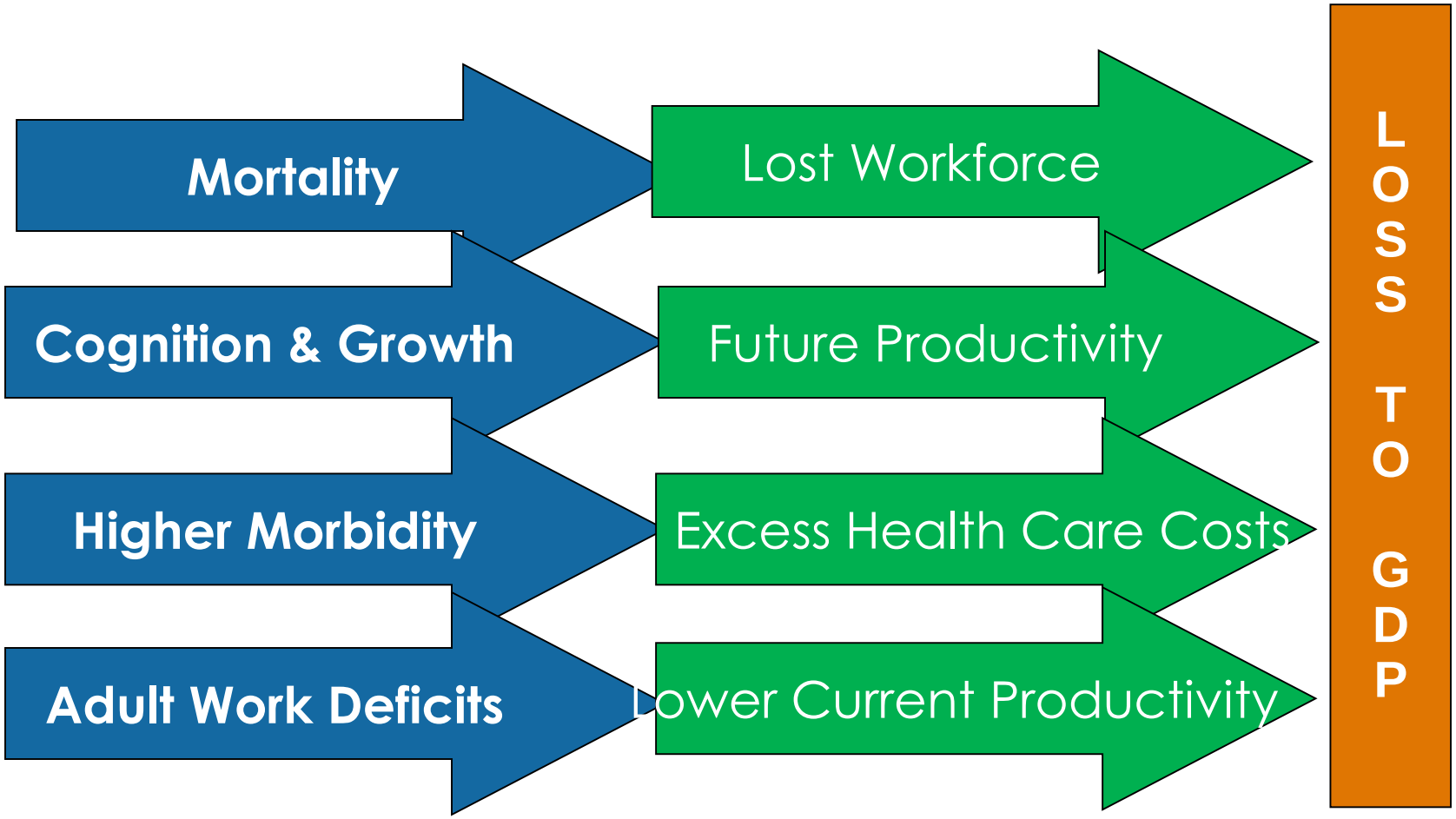
- Daily Dietary Dose Optimizes Impact
- Market-wide coverage (large population)
- Little build-out of Industry & Distribution Infrastructure
- No Behavior Change
  - High Compliance
- Affordable & Sustainable Financing
  - Small % of milling inputs
  - Invisible % consumer purchase
- Frees Public Sector Resources to focus on highest risk
- Global Claim:
  - "No other technology available today offers as large an opportunity to improve lives and accelerate development at such low cost and in such a short time." (World Bank)
  - Principle is the same of flour, maize, oil, sugar

National Perspective: Advantages Depend on Environment

- Public Health:
  - Prevalence of Vitamin & Mineral Deficiency?
- Market & Distribution:
  - How many people purchase and consume flour?
- Consumer Pattern:
  - How much flour do they consume?
- Industry:
  - What proportion can be fortified at reasonable cost?
- Government:
  - What is public food control and quality assurance capacity?

Differs by Vehicle

4 Pathways of "Damage" to Measure Baseline Economic Loss



Over a 10 year period, the economic losses add up!

Year	Iron Deficiency Anemia				Folic Acid Deficiency			
	Perinatal Mortality Future Productivity	Adult Anemia Current Productivity	Childhood Anemia Future Productivity	Total IDA	Death & Disabilty Future Productivity	Medical & Welfare Current Expenses	Total Folic Acid	Total Projected Damage
	$000,000/yr	$000,000/yr	$000,000/yr	$000,000/yr	$000,000/yr	$000,000/yr	$000,000/yr	$000,000/yr
2009	$ 1.57	$ 76.61	$ 4.77	$ 82.95	$ 1.39	$ 0.34	$ 1.73	**84.7**
2010	$ 1.58	$ 77.37	$ 4.82	$ 83.78	$ 1.40	$ 0.34	$ 1.75	**85.5**
2011	$ 1.60	$ 78.15	$ 4.87	$ 84.62	$ 1.42	$ 0.35	$ 1.77	**86.4**
2012	$ 1.62	$ 78.93	$ 4.92	$ 85.46	$ 1.43	$ 0.35	$ 1.78	**87.2**
2013	$ 1.63	$ 79.72	$ 4.97	$ 86.32	$ 1.45	$ 0.35	$ 1.80	**88.1**
2014	$ 1.65	$ 80.52	$ 5.02	$ 87.18	$ 1.46	$ 0.36	$ 1.82	**89.0**
2015	$ 1.67	$ 81.32	$ 5.07	$ 88.05	$ 1.48	$ 0.36	$ 1.84	**89.9**
2016	$ 1.68	$ 82.13	$ 5.12	$ 88.93	$ 1.49	$ 0.37	$ 1.86	**90.8**
2017	$ 1.70	$ 82.96	$ 5.17	$ 89.82	$ 1.51	$ 0.37	$ 1.87	**91.7**
2018	$ 1.72	$ 83.79	$ 5.22	$ 90.72	$ 1.52	$ 0.37	$ 1.89	**92.6**
	$ 16.4	**$ 801.5**	**$ 49.9**	**$ 867.8**	**$ 14.5**	**$ 3.6**	**$ 18.1**	**885.9**
	1.9%	90.5%	5.6%	98.0%	1.6%	0.4%	2.0%	

A Strategy to Lower the Burden: Flour Fortification

Depending on:

1. Coverage of Flour Consumption
2. Effectiveness Among Consumers
   - Flour Addition Rates
   - % RNI for Risk Groups
   - Projected Reduction in Baseline Prevalence

We can calculate the benefits of Flour Fortification

- Money and Lives

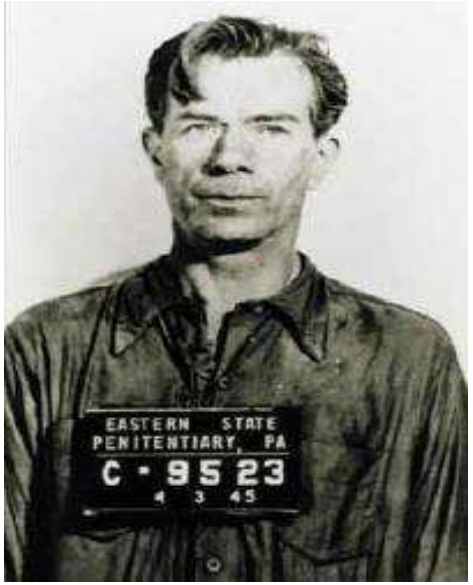
Then Estimate the Cost of Flour Fortification

And calculate the 10 Year Benefit Cost Ratio

Source: Jack Bagriansky

Multiple Rationales for Investment in Flour Fortification

- Moral
  - Humanitarian Imperative
- Good Governance
  - Obligation to Citizen Rights to Nutrition
- Economic Growth & Development
  - National Development Investment



Willie Sutton: Infamous Bank Robber in 1930's USA Depression Era.
Question: *Why do you rob banks?*
Answer: "*That's where the money is.*"

Average Premix Cost for 1 Metric Ton

One metric ton of flour is about 2,200 pounds, as pictured here. FFI photo.

Wheat Flour:
US$ 3 to fortify with iron, folic acid, and other B vitamins

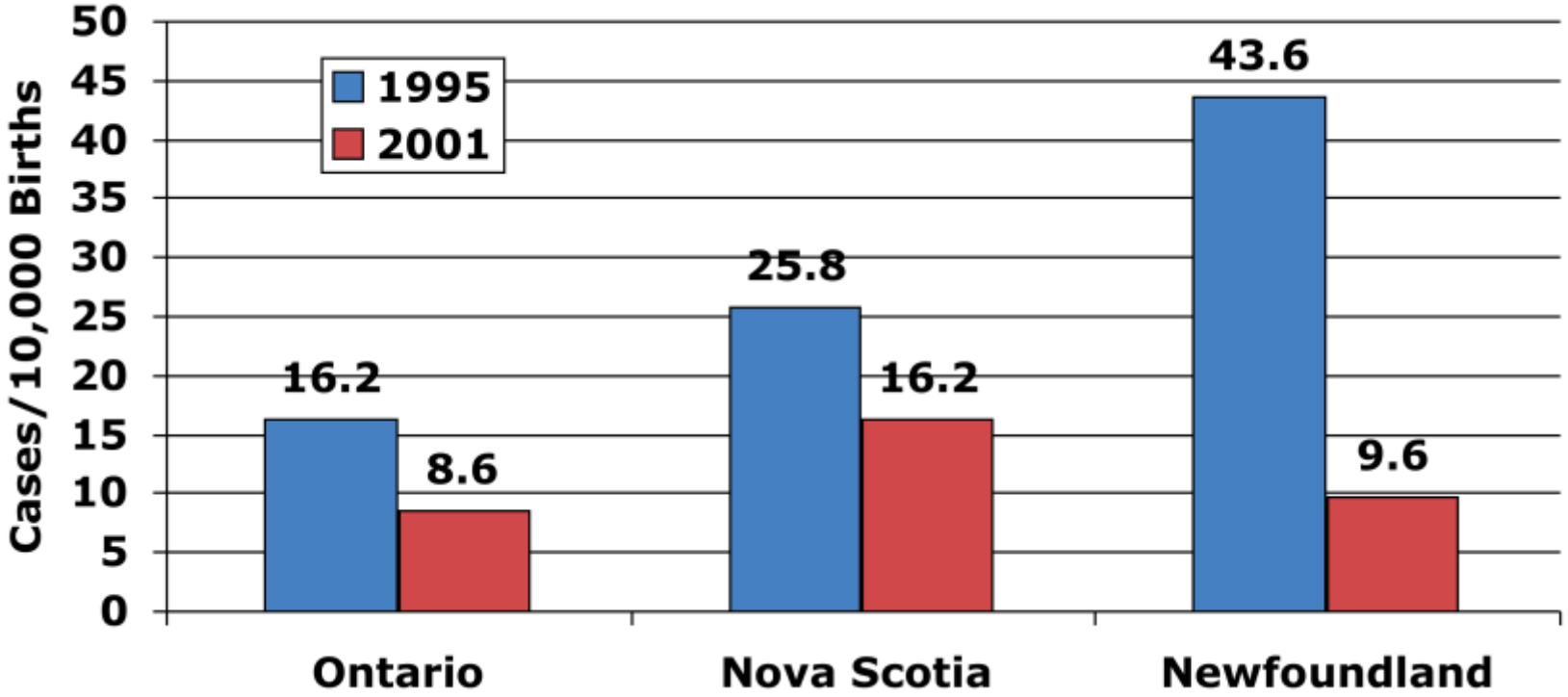
Ground Maize:
US$ 4 to fortify with iron, zinc, vitamin A, folic acid, and other B vitamins

Rice:
US$ 6 to US$ 20 to fortify with iron, zinc, vitamin A, folic acid, and other B vitamins

Effectiveness of National Flour Fortification Programmes

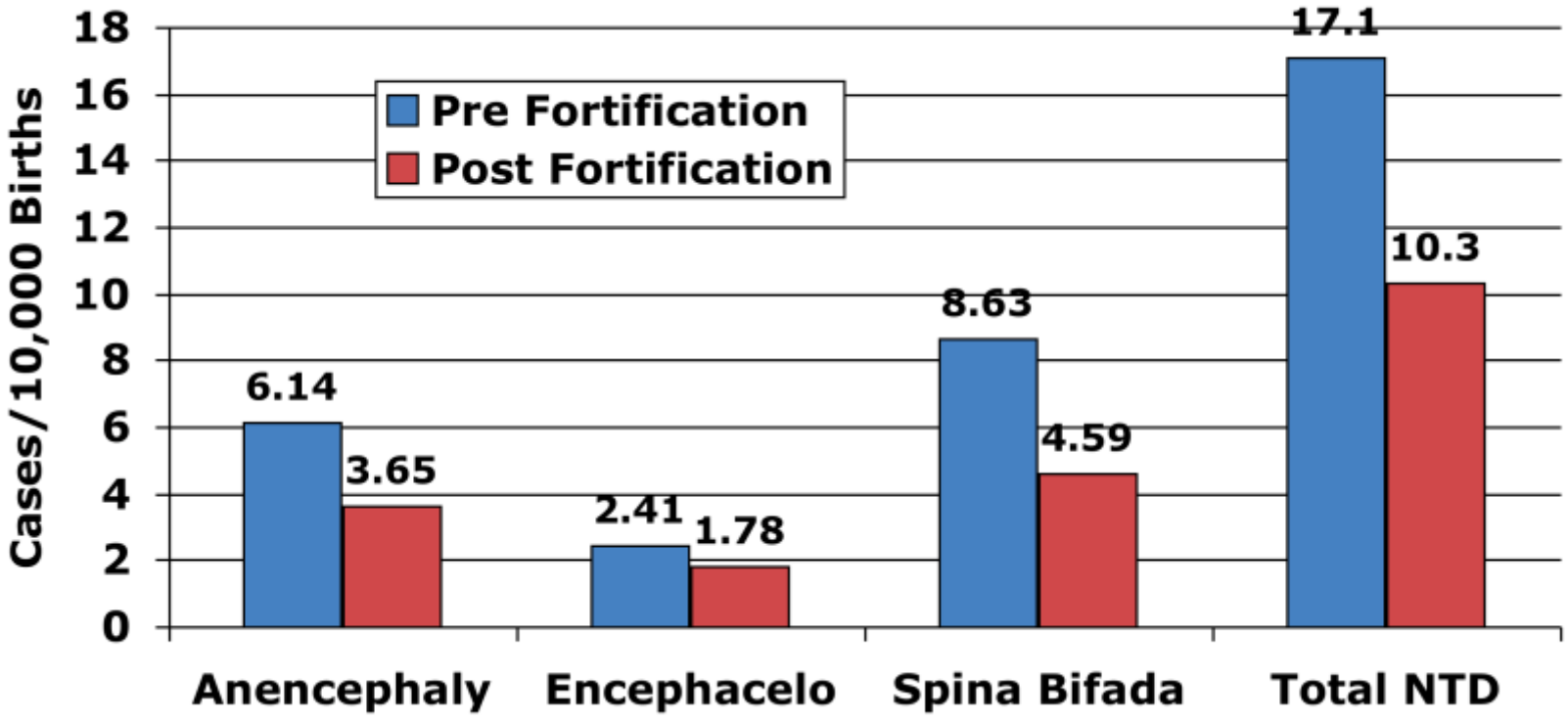
National Programme Evaluations Prevalence of Iron Deficiency and Anemia					
Country	**Risk Group**	**Condition**	**Pre**	**Post**	**% Reduction**
Venezuela	Children > 5yrs	Iron Deficiency	37.2%	15.5 %	58.3%
		Anemia	18.1%	17.1 %	5.5%
Costa Rica	Adult Women		18.4%	10.2 %	45%
Kuwait			33%	24%	27%
Oman	Pregnant Women		49%	31%	37%

Canada Folic Acid Fortification: 37-78% Decrease in NTDs and Cost savings of about $1 million annually

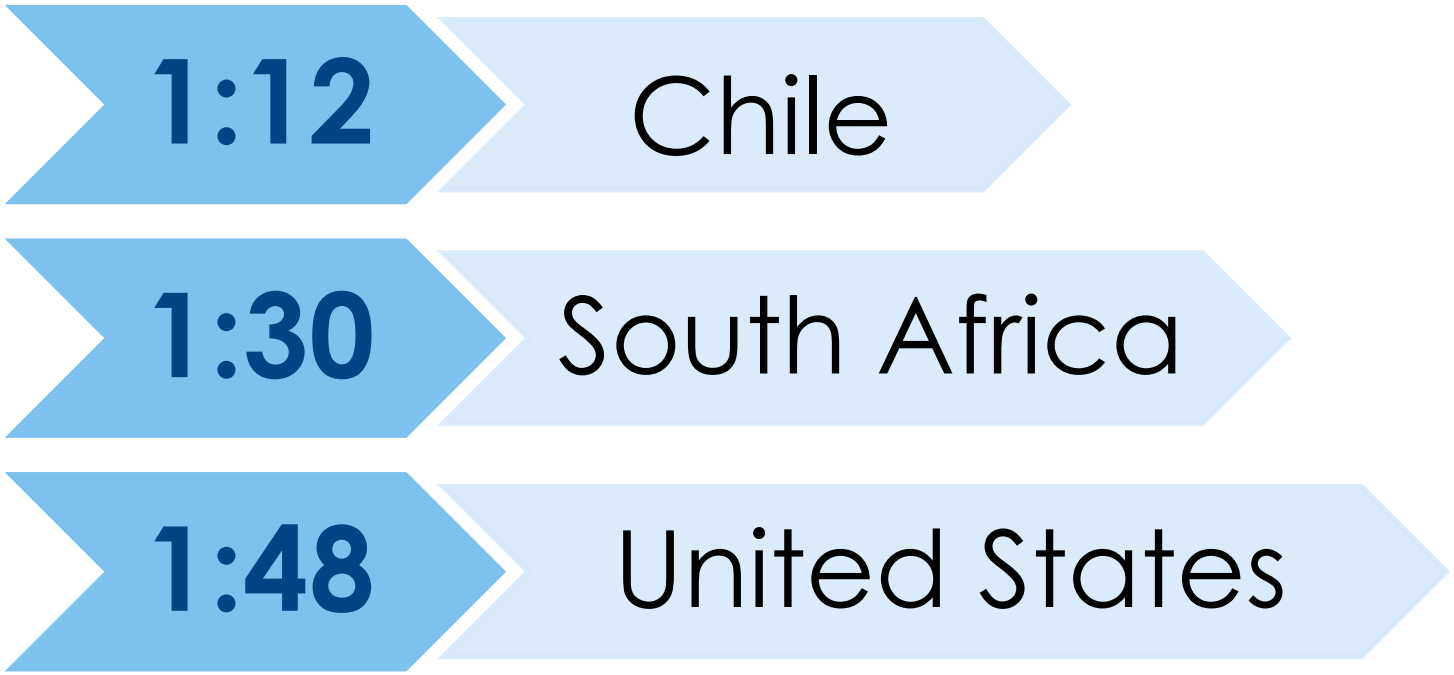


The number of specialized operations on children born with NTDs in Canada at Toronto Sick Childrens Hospital has dropped from 52 per year before folic acid fortification to 12 per year

Chile Folic Acid Fortification: 40% Decrease in NTDs



The Cost: Benefit Ratio for Preventing Spina Bifida



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Grosse, Scott, et. al., Reevaluating the Benefits of Folic Acid Fortification in the United States: Economic Analysis, Regulation, and Public Health. American Journal of Public Health 95 2005:1917-1922.

A Modeling Tool was developed for Cost Benefit Analysis

- Excel software with multiple spreadsheets
- Fixed parameters used to determine **health** and **economic** related losses based on existing literature and economic studies.
- - Anemia, iron deficiency, NTDs
- Specific data for countries can be used based on country official data and statistics.

Rationale for the modeling tool

- Development of cost benefit case for flour fortification.
- Advocacy to private sector, milling industry etc.
- Allows economists to compare benefit:cost ratio of flour fortification to other government programmes and health interventions
- Advocacy tool for policy makers in government ministries and Prime Minister Office

Smarter Futures offers Training on Cost Benefit Analysis

- Objective: to develop a specific, concrete and national case for the cost-effectiveness of flour fortification
- Estimate and validate country health statistics
- Estimate Economic Losses
- Determine the costs of doing nothing
- Calculate costs of Flour Fortification
- Generate spreadsheet calculations on cost:benefit

Methodology

- Workshop Structure based on 4-5 days
- Country teams representing Industry, Ministry of Health, Ministry of Trade and/or Finance
- Country team 3 – 7 people ideal
- Data collection by country teams prior to the workshop – essential!
- Country teams need to reach consensus on their own country data and statistics.

Workshops held and planned:

- Eastern, Southern, Central Africa, held in Dar es Salaam, Tanzania, December 2013http://www.ffinetwork.org/about/calendar/2013/CostBenefit2013.html
- West Africa UEMOA and CEMAC countries, in French to be held in Dakar, late 2015
- North Africa, possibly 2016
- Further workshops as requested