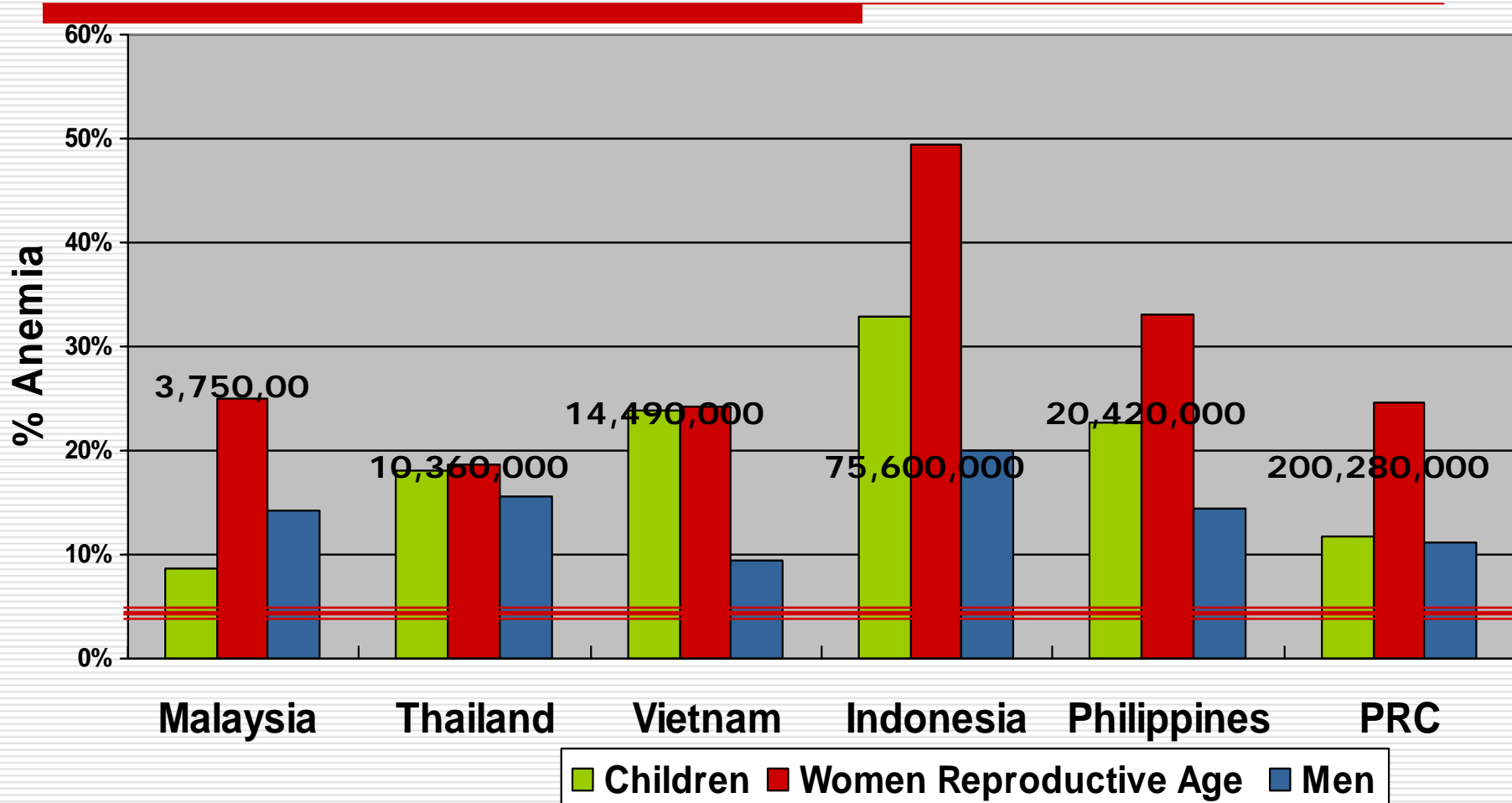


What Can Flour Fortification Achieve in the Next 5 Years? Using Numbers to Put Pieces of the Puzzle Together

Jack Bagriansky
FFI Consultant

Anemia Significant Public Health Problem: ~ 325 million anemia cases



Only clinical anemia. Not including iron deficiency only

Flour Fortification is a Low Cost & Low Risk Intervention

Product Developed
Market Prepared
Capacity in Place
Low Investment

Product Developed with 80 Years Industrial and Public Health Experience

Effective

- Folic Acid fortification can reduce NTD's 70%
- Iron fortification can reduce Anemia and Iron Deficiency Anemia 40% to more than 60%.

Accepted

- On market in about 70 countries including Indonesia, Philippines and Vietnam.
 - Breads & Cakes
 - Instant Noodle
 - Wet Noodle
 - Dry Noodle
 - Industrial Use

Inexpensive

- \$0.02-05/yr per person for 100 g/dy consumption
-

Food Processors & Consumer Trend to Higher Nutrition Awareness in Asia

□ Large Companies:

- China's Jinmailang investment in enhancing nutritional qualities of instant noodles ~ €4.9m.*
- Maggi whole wheat noodles target mothers and youth restricting consumption because "refined flour is perceived as unhealthy."
 - "A roaring success."**

□ Smaller Companies:

- Vietnam Customer Survey suggests lack of awareness but positive orientation to fortification.



Milling Capacity in place: Simple Technical Pathway

- ❑ Large capacity mills.
- ❑ Modern sophisticated management.
- ❑ Low Start-Up Costs
 - Systems/feeders in place
- ❑ Low Recurring Costs
 - \$0.60-1.50/per MT
- ❑ Low technical barriers to entry
 - Already add micro-ingredients
 - Established Supply Chain
 - SE Asia Food fortification revenue in 6 SE Asian markets \$46.7 million 2005*
- ❑ Possible to fortify 100% of milling production.

Large Mills w/ 100% of National Output	
Vietnam	16
Indonesia	5
Thailand	8
Malaysia	13
Philippines	16

TABLE 13: Mill Segmentation in the Western PRC

Annual Capacity (MT)	Number of Mills	% Capacity of the Western PRC
>100,000	75	2.1%
50,000–100,000	480	3.4%
25,000–50,000	1,500	5.4%
12,500–25,000	7,500	14.3%
<12,500	98,000	74.8%

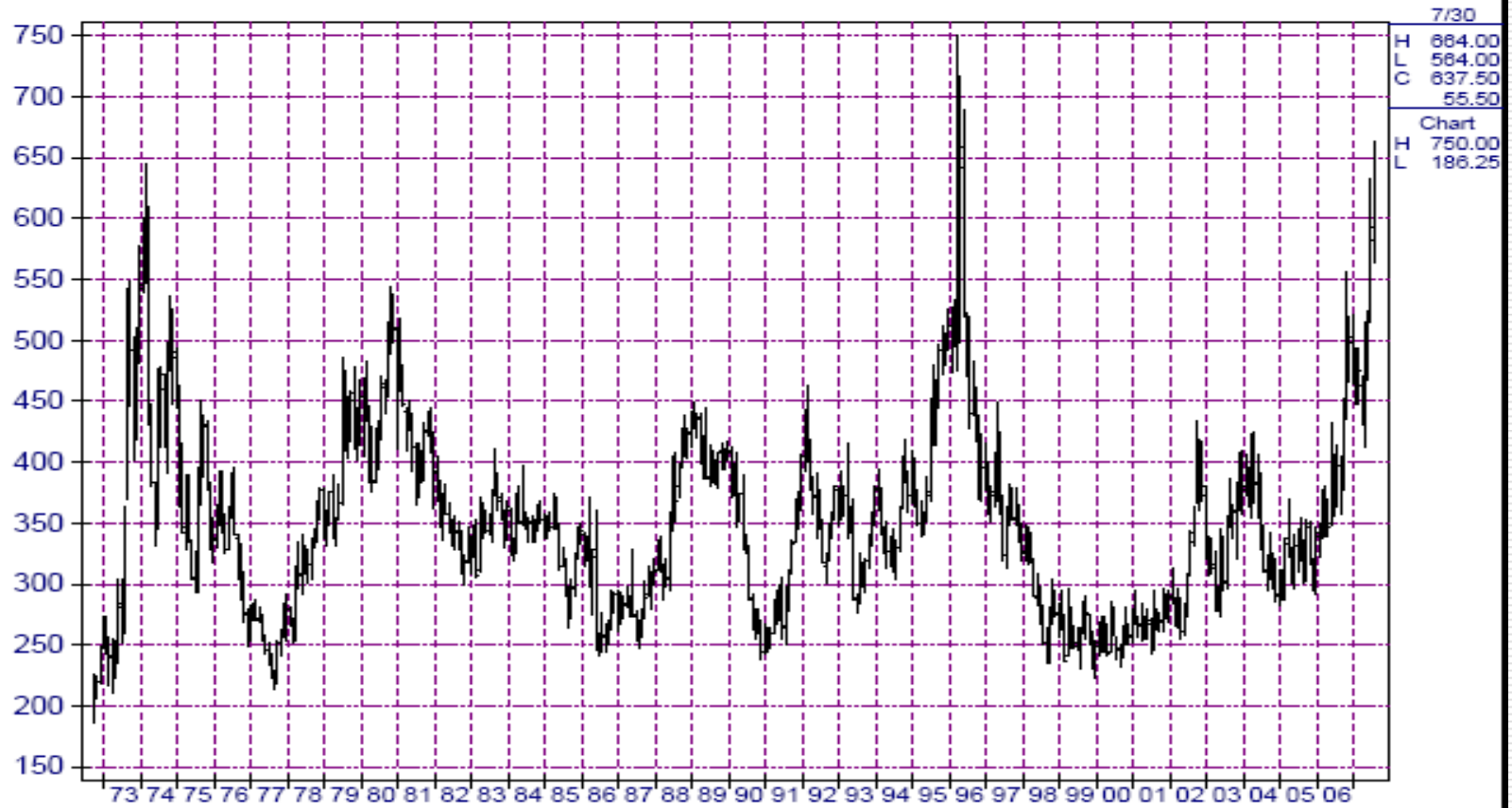
* Frost & Sullivan Consultants: Malaysia, Thailand, Vietnam, Indonesia, Philippines and Singapore

Can Industry Absorb one-time \$0.60-1.50/MT added input cost?

Moore
Research Center, Inc.

Some data provided by Prophethfinance.com

Monthly Nearby Wheat(CBOT)



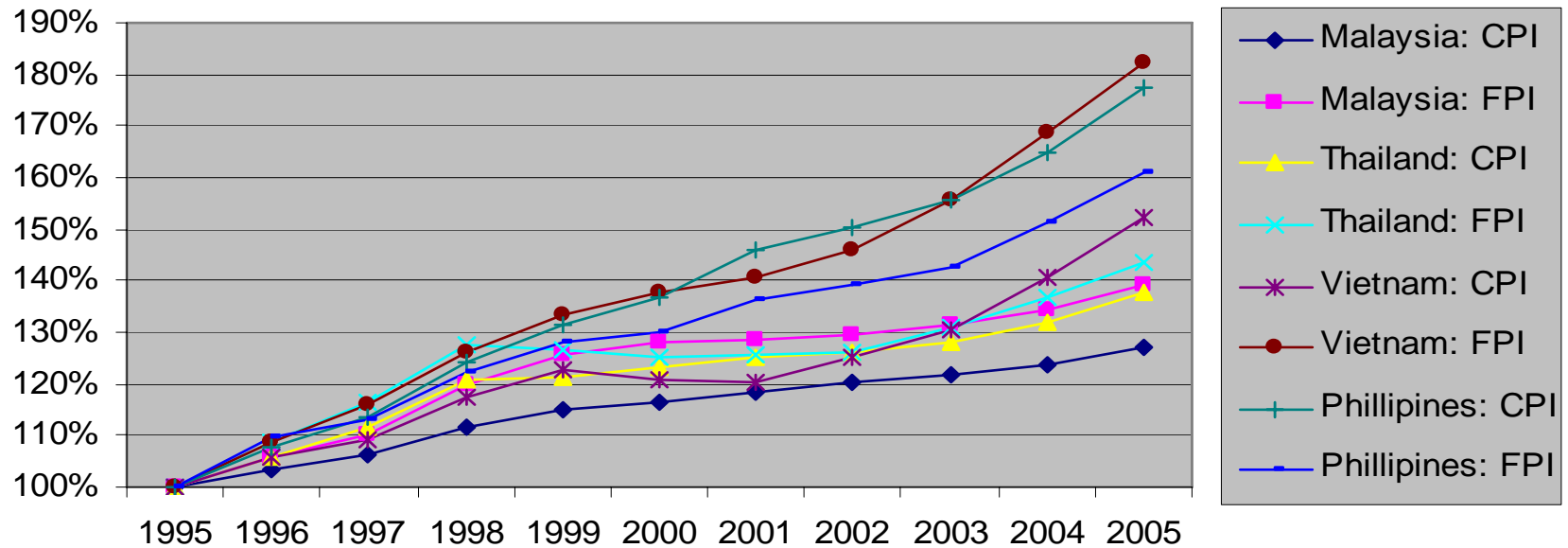
STOCKM.INI

Monthly

Can Consumers Absorb a one-time 0.5-1% Price Rise?

Consumer and Food Price Indexes Up 27-82% over 10 yrs

10 Year Annual % Changes in Consumer and Food Price Indexes

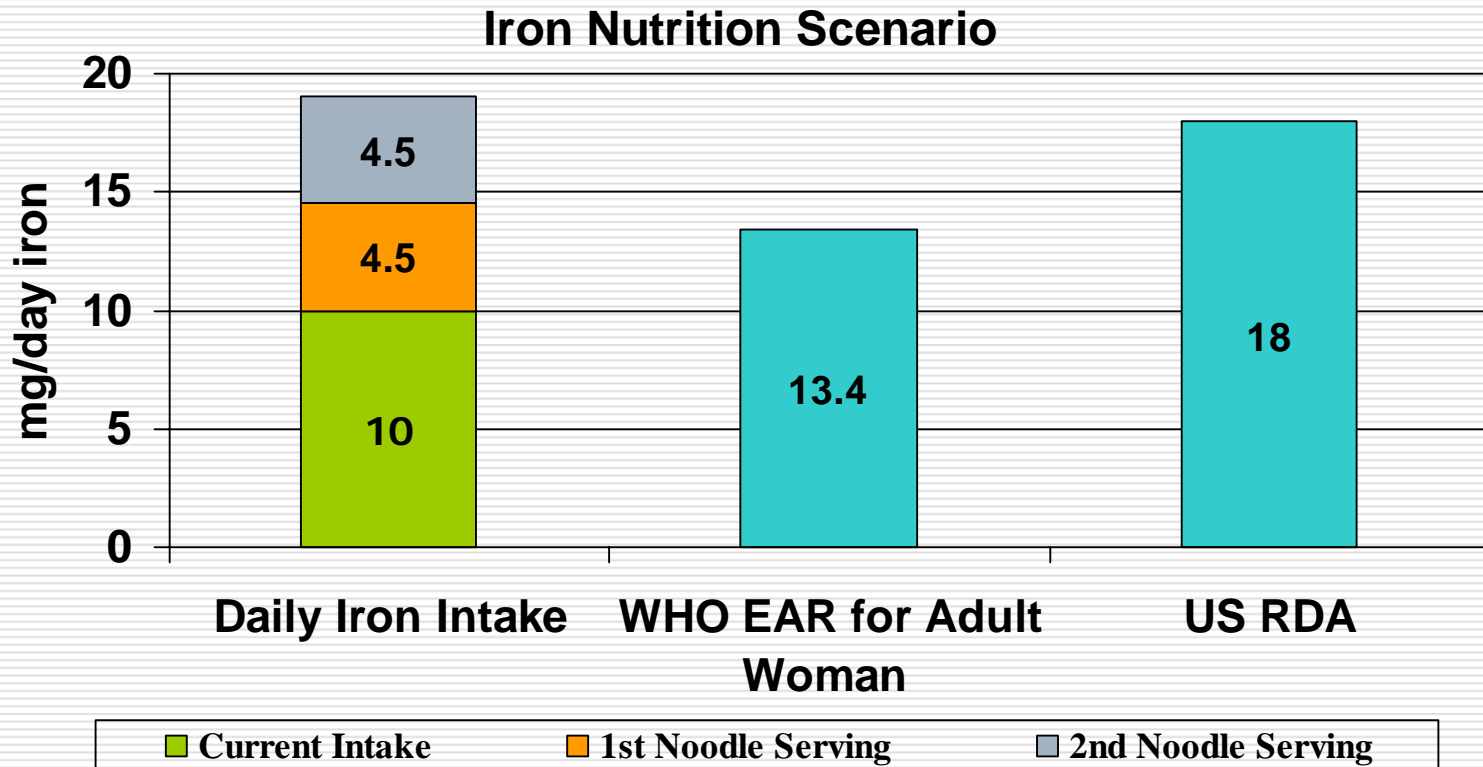


National Standards & Regulatory Environment is Developing

	Mandatory		Voluntary		Guidelines
	Indonesia mg/kg	Philippines mg/kg	Vietnam mg/kg	Malaysia * units/100g	ADB mg/kg
Iron	50	70-105	60	4.2	60
Zinc	30		30	1.6	30
Thiamin	2.5		2.5	0.42	2.5
Riboflavin	4		4	0.67	4
Folic Acid	2		2		2
Niacin				4.6	
Vitamin A		50-75		1000	

National food inspection and analysis capacities growing to meet requirements of regional and global food trade.

What will 75 g portion of noodles with 60 ppm added iron achieve?

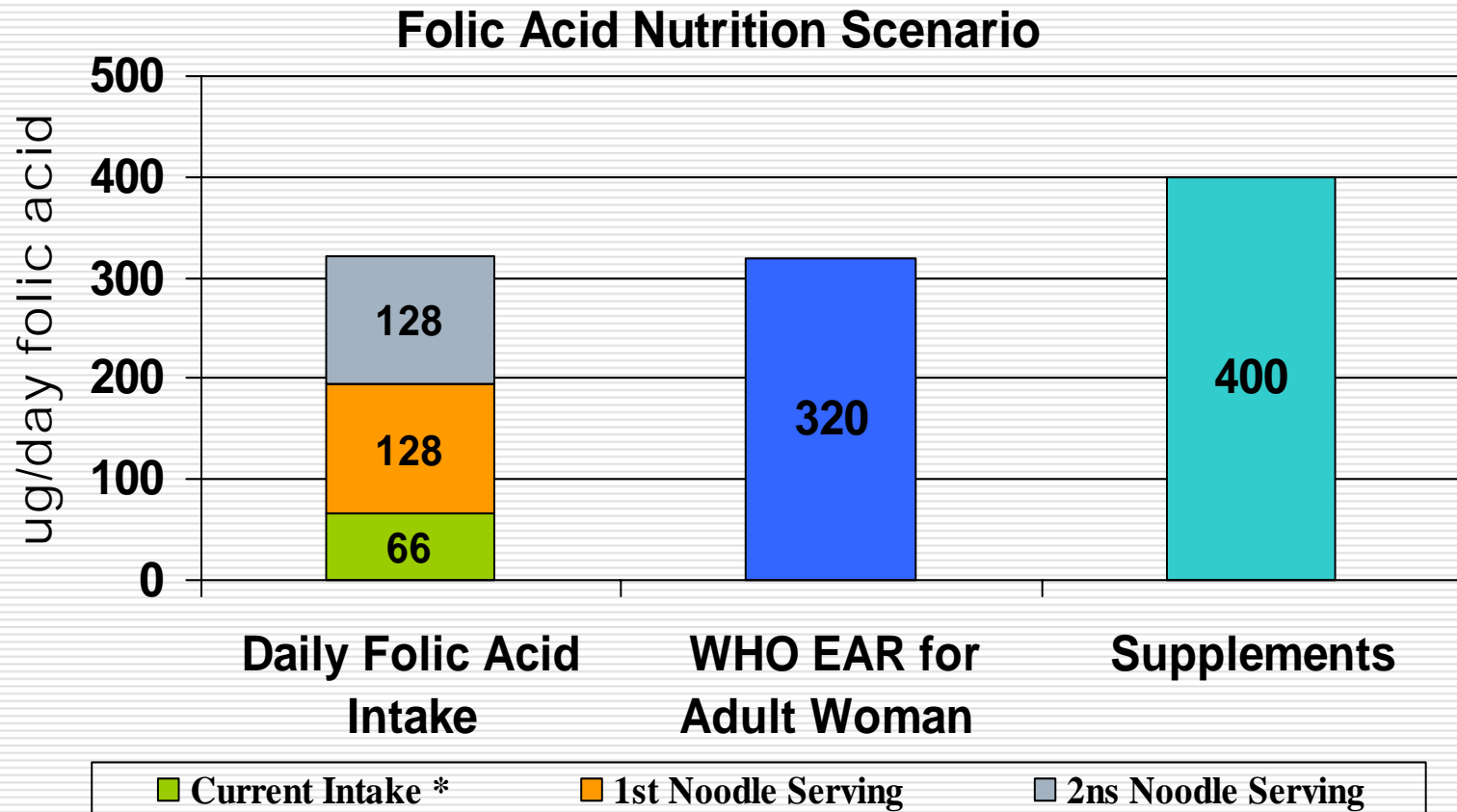


Calculation: $75\text{g} \times 60\text{ ppm} = 4.5\text{ mg intake}$

*Vietnam Nat Nutrition Survey: mean intake ~ 70%RDA

Estimated Average Requirement

What will 75 g portion of noodles with 2 ppm added folic acid achieve?

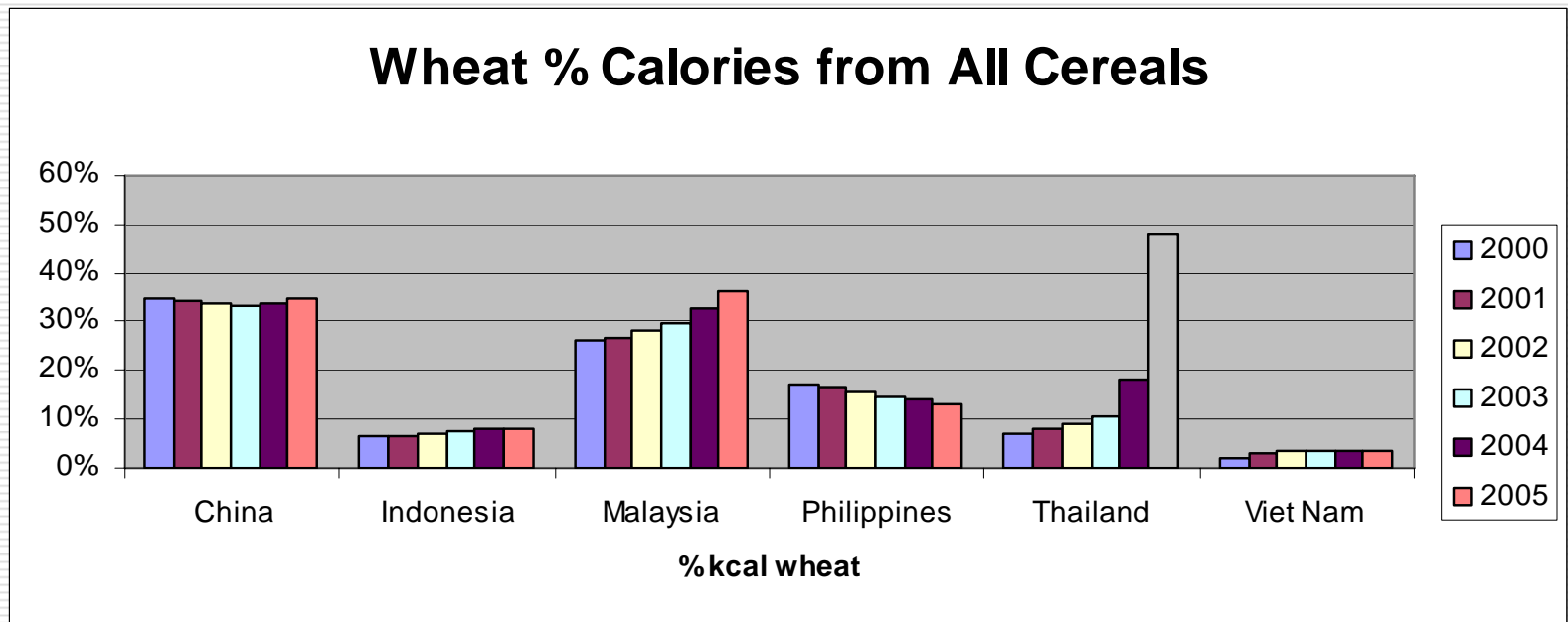


Calculation: $75\text{g} \times 2\text{ ppm} \times 85\% = 128\text{ ug intake}$

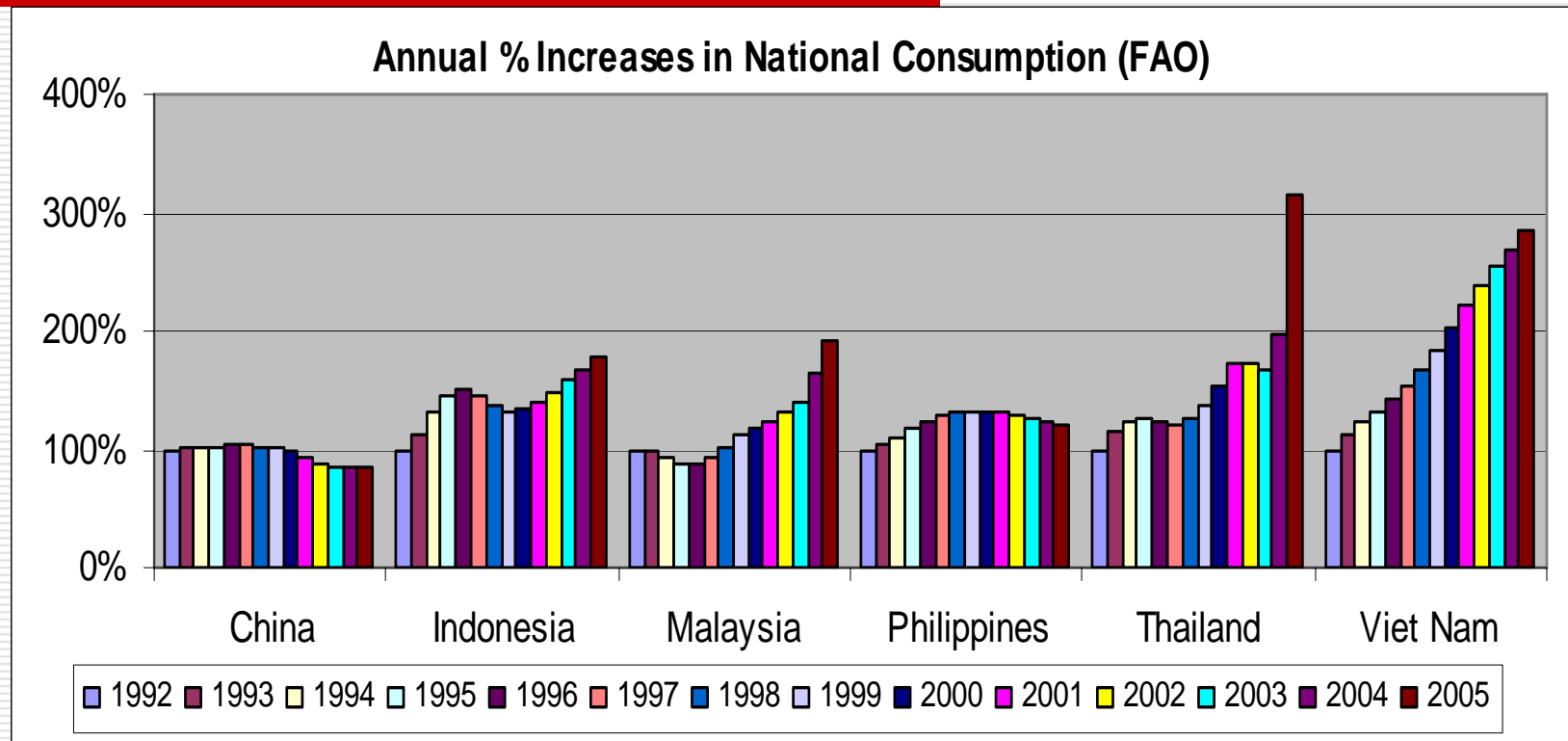
Coverage, Targeting

Do at-risk populations eat enough flour for fortification to make a significant difference?

Secondary Staple: Do People Consume Enough to Make a Difference?



Wheat Flour Consumption increasing in ASEAN Countries



Given the trend in income growth and urbanization elasticities suggest wheat consumption will grow faster, while growth in rice consumption will be much slower.*

Reaches Vulnerable & Low Income Populations

- Inexpensive
 - Instant Noodles in Thailand cost ~ 5 Baht while rice with curry on the street costs between Baht 15-20.*
- Widely Consumed among urban poor
 - Jakarta: Noodles widely consumed among urban poor.**
 - Poorest consume street food because no fuel for cooking.
 - Thailand: "The economic bubble has blown away. Real demand is in place. In every industry, volume has dropped dramatically. Only Instant Noodles reported 25-30% growth."*
 - Noodle sales are a key indicator of economic down turn in Thailand – just as sales of potatoes increase in the West during economic downturn.*
- Anemia and folic acid deficiency are public health issue in affluent populations as well.

* Asia Pacific Management Forum 1999

** ADB, Indonesia Urban Nutrition RETA

Urban Poor: Growing Consumer Market

	10 Yr Urban Population Growth		New Urban Consumers 000,000
	2004 000,000	2015 000,000	
PRC	516.7	685.4	168.7
Indonesia	103.4	144.4	40.9
Malaysia	16.5	22.3	5.8
Philippines	50.5	67.4	16.9
Thailand	20.4	25.0	4.6
Viet Nam	21.6	30.0	8.4

“700 million people in Asia live on less than US\$1 a day, 400 million of which reside in urban areas. Each day a further 120,000 people are added to the populations of Asian cities due to rural-urban migration.” ADB, 2006

Scenarios for the Future:

What if all the flour in East & South East Asia were fortified?

What is the Nutrition protection and benefits at current consumption.

Beyond the Average: What's real intake of flour consumers?

	Average Consumption FAO	Consumers Urban Pop + 10%	Estimated Average Intake of Flour Consumers
	g/dy	%	g/dy
PRC	164	43%	377
Indonesia	48	52%	93
Malaysia	156	73%	214
Philippines	62	68%	91
Thailand	64	35%	182
Viet Nam	26	29%	91

National average / % Consumer = Average g/dy for consumers

Nutrition Protection Delivered at Estimated Consumption

	Estimated "Corrected" Consumption	Iron Nutrition		Folic Acid Nutrition	
		Added Iron Intake @ 60ppm	% Daily Iron Needs (WHO EAR)	Added Folic Acid @ 2 ppm**	% Daily Folic Acid Needs (WHO EAR)
	g/dy	mg/dy	% 13.4 EAR	ug/dy	% 320 EAR
Viet Nam	91	5	41%	155	48%
Indonesia	93	6	42%	158	49%
Philippines	91	5	41%	155	48%
Thailand	182	11	81%	309	97%
Malaysia	214	13	96%	364	114%
PRC*	377	23	169%	401	125%

(Consumption X added units)/EAR = % Daily Needs

*1.25 ppm folic acid
** 85% retention

Benefits: Improved Folic Acid Nutrition with Coverage & Consumption Projections

	Problem	Intervention		Coverage	Benefits	
	Current Est NTD/yr #	Projected Nutrition Input % ug/dy	Assumed Effectiveness %	Estimated Consumers %	Potential NTD Cases Prevented # %	
Indonesia	11,013	155	27%	52%	1,541	14%
Philippines	4,944	158	28%	68%	928	19%
Viet Nam	4,038	155	27%	29%	312	8%
Thailand	2,472	309	54%	35%	469	19%
Malaysia	1,340	364	64%	73%	621	46%
PRC	80,000	401	70%	43%	24,332	30%

Assume: 400 ug/dy (supplements) Delivers Optimal (70%) Protection
 $\# \text{ NTD Cases} \times \% \text{ Effectiveness} \times \% \text{ Coverage} = \text{Lower } \# \text{ NTD Cases}$

What's the Effectiveness of Iron Fortification for Consumers?

Range & Magnitude of What's Possible

		% Reduction
National Evaluation	Venezuela (ID)	59.5%
	Venezuela (Anemia)	43.8%
Efficacy Trial	Vietnam	88.4%

Iron Nutrition Input % Average Requirement		Assumed Effectiveness %
PRC	169%	50%
Malaysia	96%	28%
Thailand	81%	24%
Indonesia	42%	12%
Viet Nam	41%	12%
Philippines	41%	12%

Benefits: Improved Iron Nutrition with Coverage & Consumption Projections

	Problem	Intervention	Coverage	Benefits	
	Anemia Cases 000,000	Assumed Effectiveness %	Estimated Consumers %	Projected Reduction in Anemia Cases 000,000	%
PRC	200.28	50%	43%	43.51	22%
Malaysia	3.75	28%	73%	0.78	21%
Thailand	10.36	24%	35%	0.87	8%
Indonesia	75.60	12%	52%	4.86	6%
Viet Nam	14.49	12%	29%	0.50	4%
Philippines	20.42	12%	68%	1.67	8%

Cases x Effectiveness x Coverage = Reduced Cases or Benefit

National Reduction in Anemia Reduces National Economic Loss

	Future Losses		Current Losses		Total Losses		Productivity Gains	
	Child Cognition	Male Workers	Female Workers	Losses	% GDP	Reduced Losses		
	\$ 000,000/yr	\$ 000,000/yr	\$ 000,000/yr	\$ 000,000/yr	%	%	\$ 000,000	
PRC	1482.7	2294.7	4142.4	7919.8	0.3	22%	\$1,742	
Indonesia	863.4	567.4	921.3	2352.1	0.6	6%	\$141	
Malaysia	104.6	172.3	173.5	450.5	0.3	21%	\$95	
Philippines	248.4	156.1	225.6	630.1	0.5	8%	\$50	
Thailand	189.4	239.8	231.7	660.9	0.3	8%	\$53	
Viet Nam	80.4	47.8	136.8	265.1	0.5	4%	\$11	

What can be achieved in Current Health & Market Environment?

- 6 Country Anemia Prevalence reductions: 4-22%
 - ~ 50 million cases prevented
 - ~ additional 50 million protected from iron deficiency
 - Reduced risks of maternal and perinatal death
 - Current and future economic productivity gains:
 - ~ \$350 million annually for 5 SE Asian countries
 - ~ \$1.7 billion for PRC
 - 6 Country NTD reductions: 8-30%
 - > 25,000 fewer birth defect cases annually
 - Deaths, life-long disability and health care cost
 - Synergistic with public health interventions
 - Reaches 29-73% enabling health interventions to target.
 - Sustainably implemented in the private market place with no opportunity costs to other health and nutrition programs
-

Conclusion:

It's So Cheap, It's a Shame.

- Fortifying 100% of ~ 9.7 million MT in Vietnam, Malaysia, Indonesia, Philippines and Thailand is feasible.
 - Total Cost at \$1.50/MT = \$14.5 million/yr
 - Asian Animal Feed Additives Market earned revenues of \$284.3 million in 2005 and expect to reach \$474.8 million by 2012 (Frost & Sullivan).
 - Human nutrition investment ~ 6% of 2005 animal feed market!
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