

# Food Security in the Middle Income World: The Case of China and Other Fast Growing Middle Income Countries

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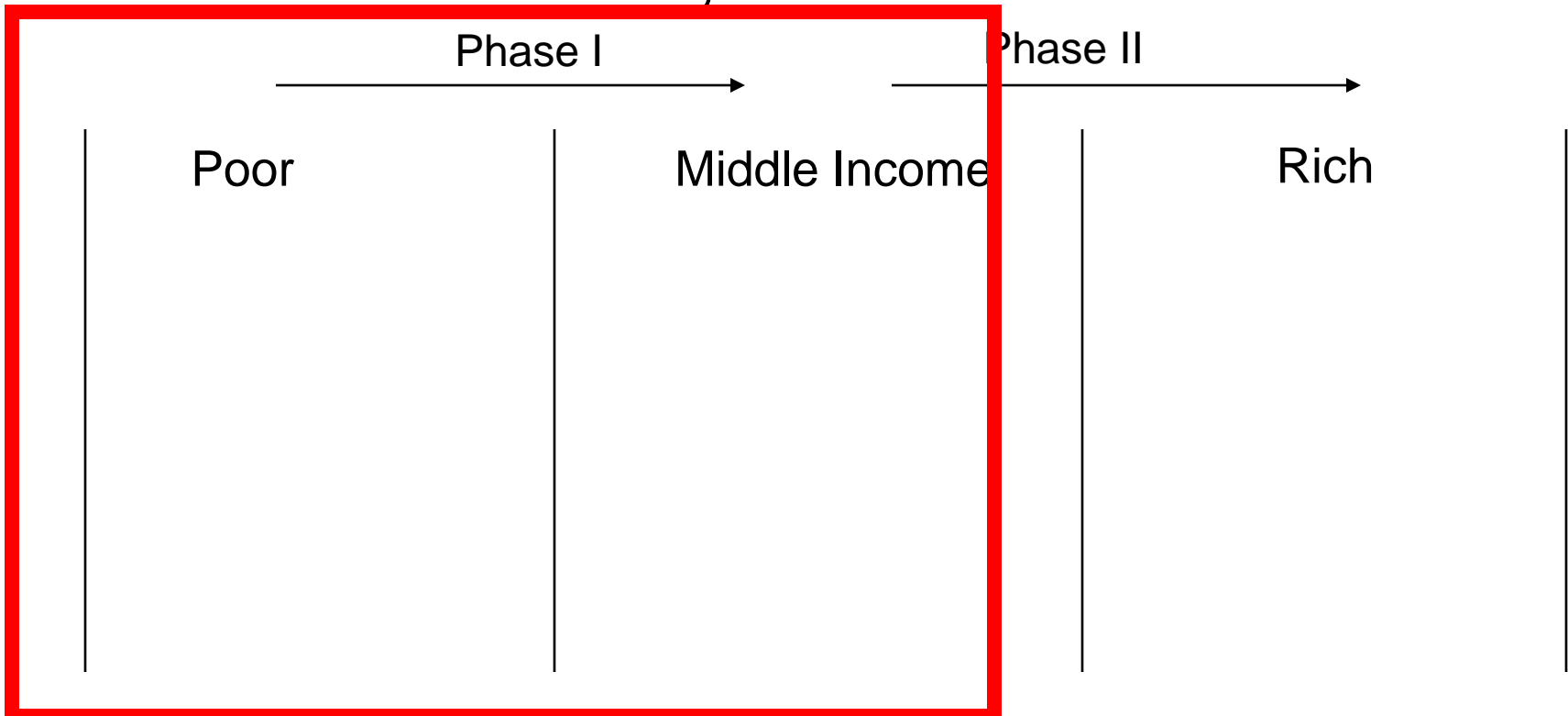
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Poverty Eradication and Sustainable Development: a call for Action"  
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# Plan of presentation

- Traditional food security
- Food security in the middle income world and China,
- Challenges in addressing nutrition insecurity

# Traditional Food Security: in Phase I of development

- The context: Countries at start of Phase I of Economic Development → poor, malnutrition, food deficit, high prices, access is difficult,



# Definition: Traditional Food Security

- Food Security is about having adequate supplies of affordable food for each household (a nation's population) throughout the year to ensure a healthy and productive life (economic growth path)

# Food Security Issues for Poor Countries

- Insufficient calories / protein (macro-nutrients)
- Without enough calories →
  - Poor health
  - Increased morbidity
  - Stunting / wasting / chronic diseases
  - Negatively affects income → poverty trap

# Source of the problem for households

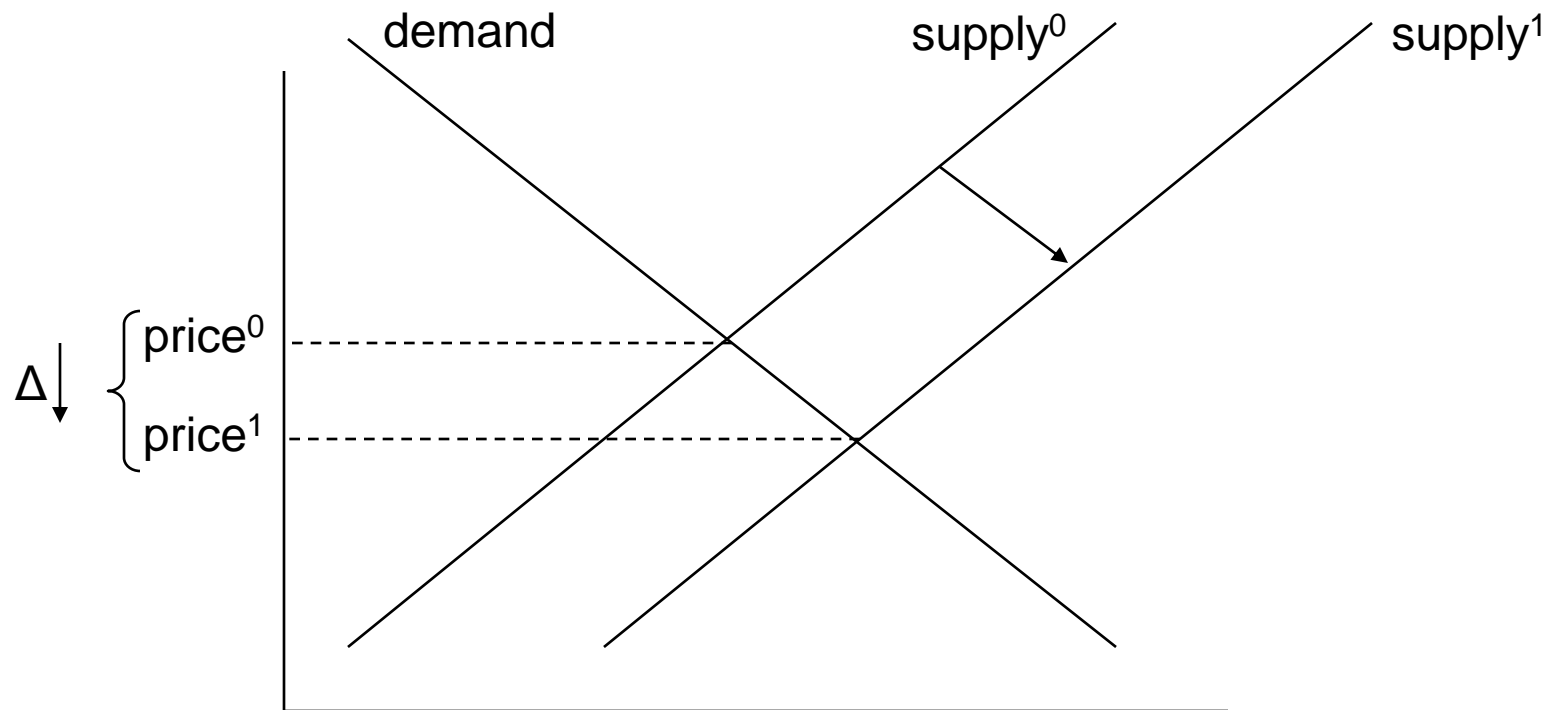
- The problem is one of “economic access”
- Economic access for the rural poor depends on income and food prices
- When prices are low, even those with low levels of income are typically able to access food in quantities enough to escape malnutrition (from the lack of calories)
- When prices are low and incomes are rising, food is even more affordable

# Phase I: route to success (economy starts off poor)

- Increasing Incomes (in part with investment into Ag)
  - Rising Consumption
- Falling prices (in part with investment into Ag)
  - More Rising Consumption
- Falling Morbidity / Basic Education
- Stage I of Transformation of the Economy
  - Industrialization (phase I → low wage mfging)
  - Urbanization (phase I → temporary / permanent for some)
- Increasing Incomes [wages constant / more off-farm employment opportunities]
- Rising Consumption

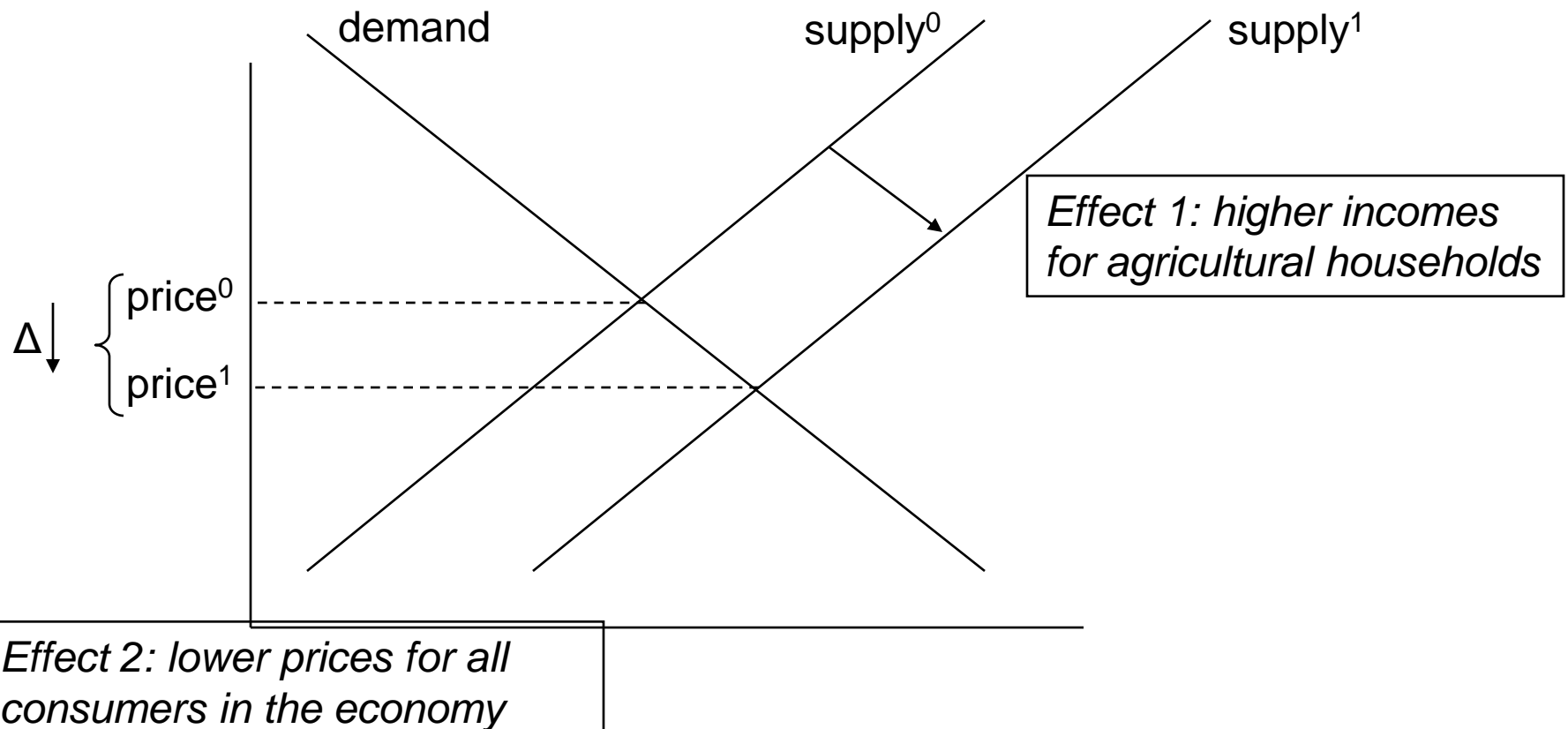
*[virtuous cycle begins → pushes economy to middle income]*

# Importance of Green Revolution, Agricultural Sector Investments (e.g., Irrigation) and Farm Policies (e.g., Land Reforms / Subsidies)





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- Falling prices (in part with investment into Ag)
  - More Rising Consumption

*[virtuous cycle begins → pushes economy to middle income]*

- Falling Morbidity / Healthy Labor Force (*other policies: Basic Education*)
- Stage I of Transformation of the Economy (*also need good industrial and trade policies*)
  - Industrialization (phase I → low wage mfging)
  - Urbanization (phase I → temporary / permanent for some)
- Increasing Incomes [wages constant / more off-farm employment opportunities]
- Rising Consumption

# Metric for success: Traditional Food Security Policies

- Sufficient, low-priced calories / protein → macro nutrients is enough for most of the population
  - Those working in factories and constructions sites are healthy and strong
  - Those left working on the farm (larger farms) are healthy and strong

*This is why producing lots of cheap calories and vegetable proteins is important ... Food Security with Phase I characteristics is an important part of development strategy when countries are just beginning their development push ... when they are poor people need sufficient macro nutrients*

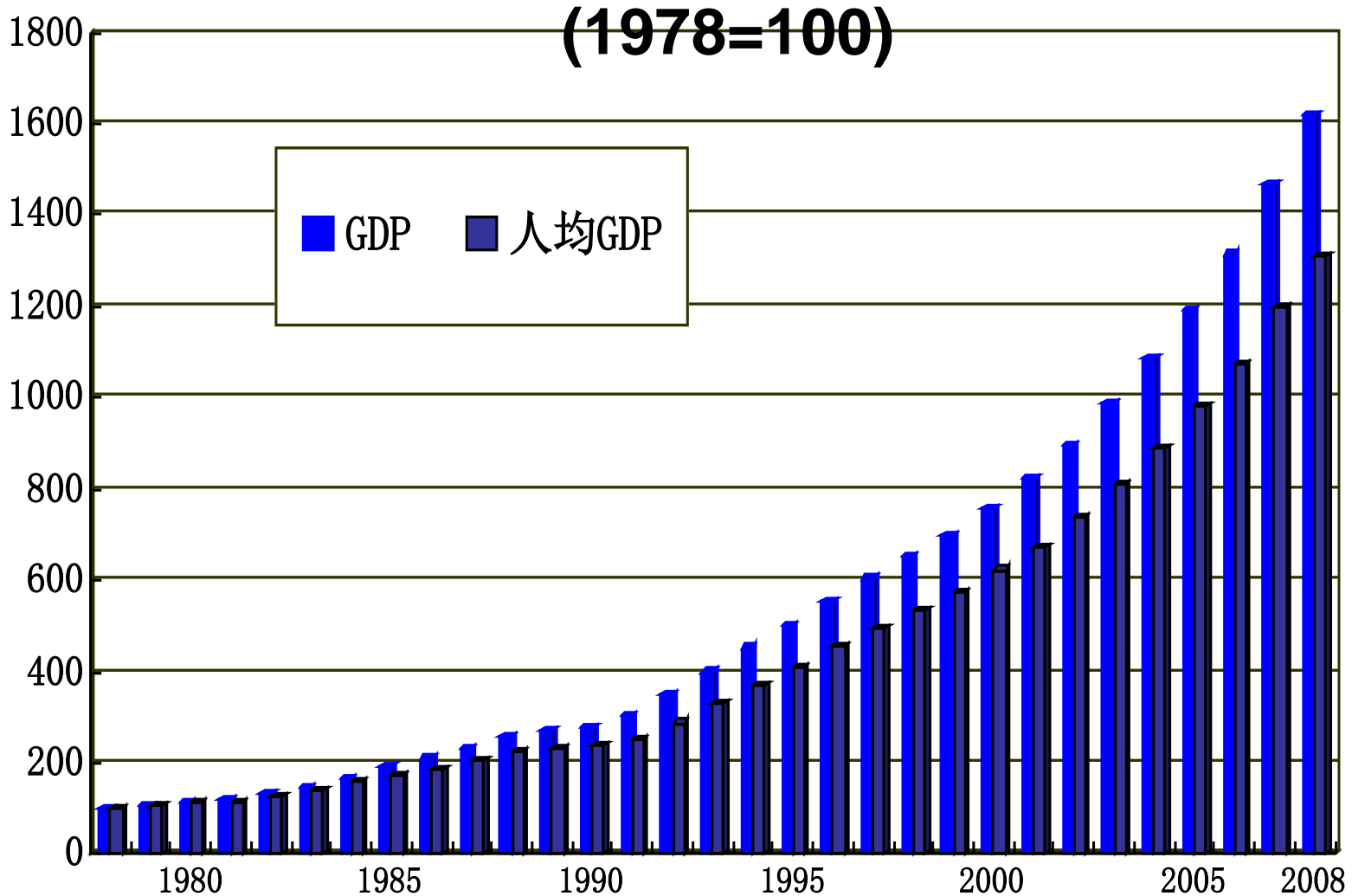
# Food security at the end of phase 1 of development

- Macro nutrient sufficiency:
- Micro nutrient deficiency!
  - Hidden hunger:
    - Iron
    - Zinc
    - Vitamin B
    - More

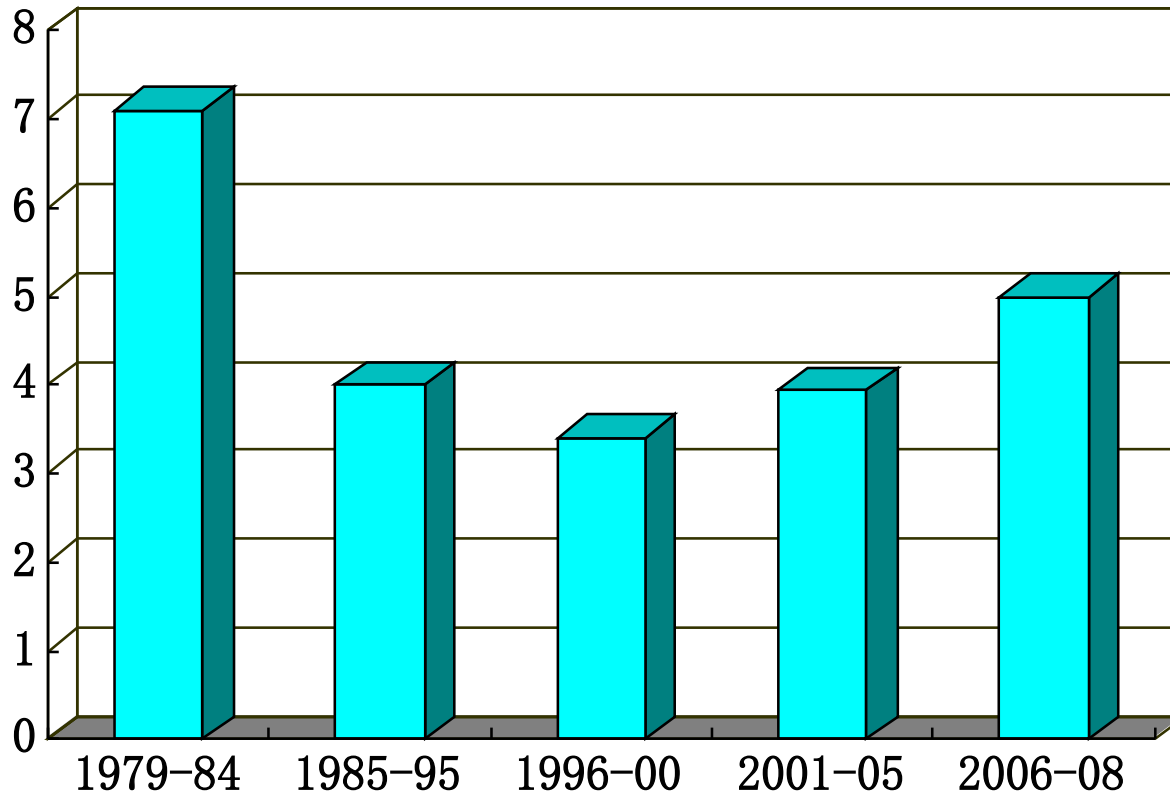
China's experience since the 1980s is classic example about how a country should become food secure

# Annual GDP growth at nearly 10%

GDP in 2008 was 16 times of that in 1978

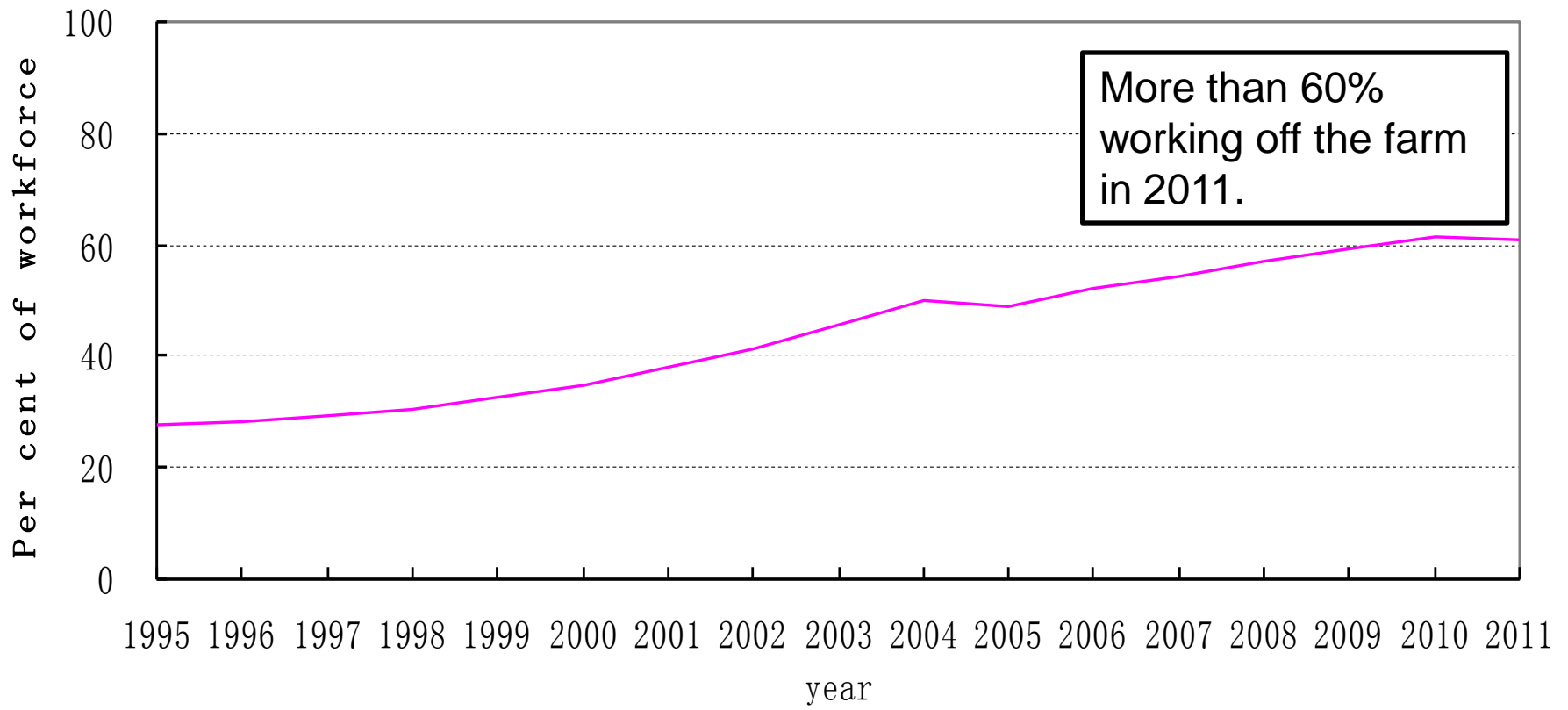


# Agr.GDP annual growth at 4.4% (1979-2008)



Ag.GDP annual growth is 4 times of population growth(1.1%)

# Lot's of people moving into cities/off-farm sector





# There are sufficient calories in China ..

And other middle income countries  
(Kcal for 2009)

- China: 3036
- Brazil: 3173
- Mexico: 3146
- Thailand: 2862
- Turkey: 3666

FAOSTAT (2010)

# There are sufficient calories in China .. And other middle income countries (Kcal for 2009)

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FAOSTAT (2010)

# Food Security Challenge in the middle income world

- Economic Context
- The Problem
- The Reason
- Policy Options

# The Context: The Economic Setting of Middle Income Countries

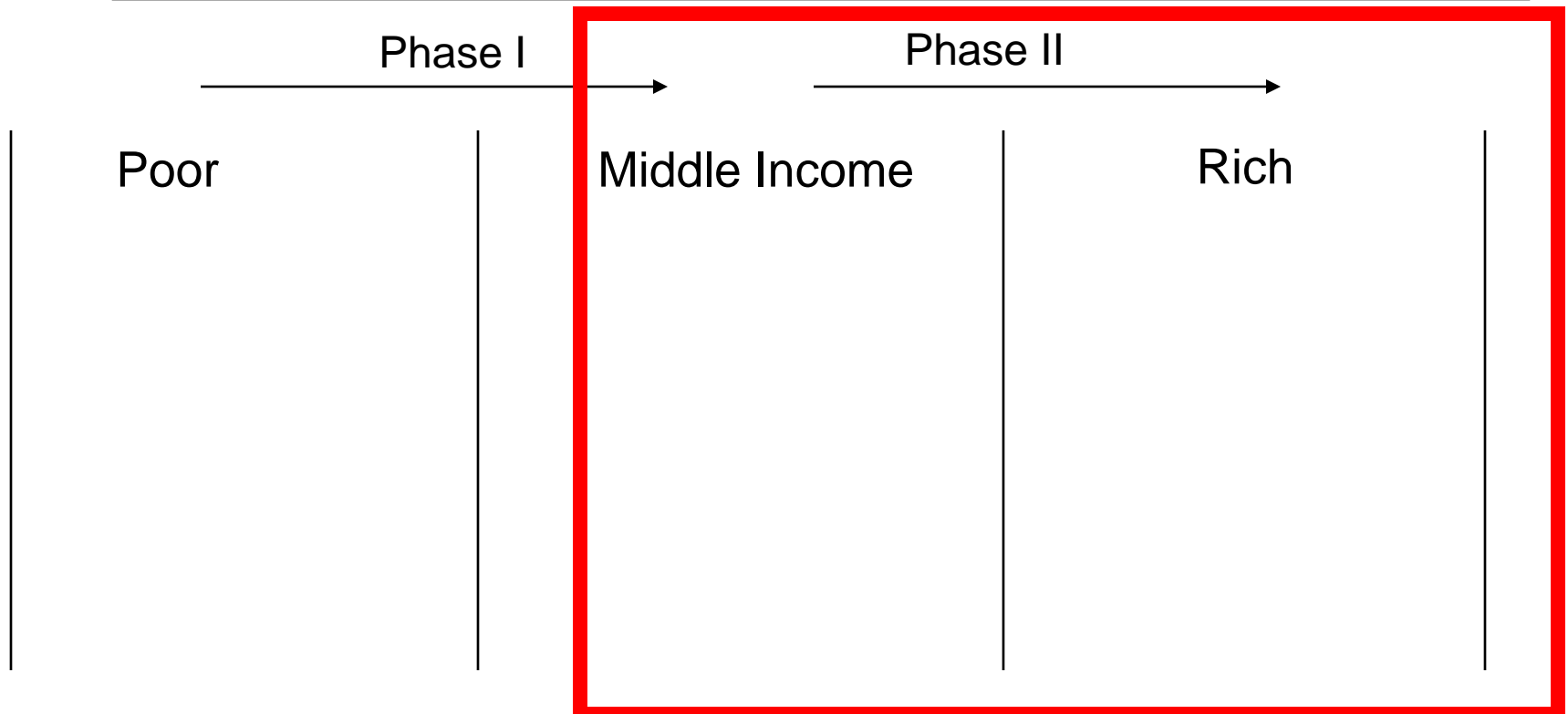
this is important to understand as it explains how malnutrition can coexist with rising incomes

# Food Security Challenge is different

in (rapidly growing) middle income countries

- The context: Countries in Phase II of Economic Development

Economic Development is the process of transforming from poor to rich, but, in fact, it happens in TWO PHASES



# Phase II is different

- Who are we talking about?
  - Countries with income per capita levels between \$5,000 to \$12,000 US dollars / capita
  - And a lot of other similar characteristics

# Middle Income Countries Aspirees for High Income Status

- Argentina
- Brazil
- Chile
- Costa Rica
- Malaysia
- Mexico
- Russia
- Thailand
- Tunisia
- Turkey
- Uruguay
- Venezuela

*China*

# Phase II is different

- Who are we talking about?
  - Countries with income per capita levels between \$5,000 to \$12,000 US dollars / capita
  - And a lot of other similar characteristics



# Phase II countries are in new stage of transition

- In phase II (especially for rapidly growing countries), economic dynamic of a country is different from those in phase I:
  - Wages rising
  - Rapid, permanent urbanization
  - Low wage manufacturing / subsistence agriculture disappearing
  - Re-industrialization → high-value, innovation-based industries and service sector
  - High premium on education/health (need to have skills in math / science / language / foreign language / etc. to get a job – at the high and rising wage rate)

# All of this, of course, takes place in an environment that is NOT that of a fully developed country

- Characterized by underdeveloped (less than perfect) economic and social institutions:
  - Less than perfect credit markets (have to save for everything – housing / education / etc)
  - Less than perfect health insurance
  - Less than perfect social security
  - Less than perfect welfare systems

[that is these countries typically only have a low and permeable safety net]

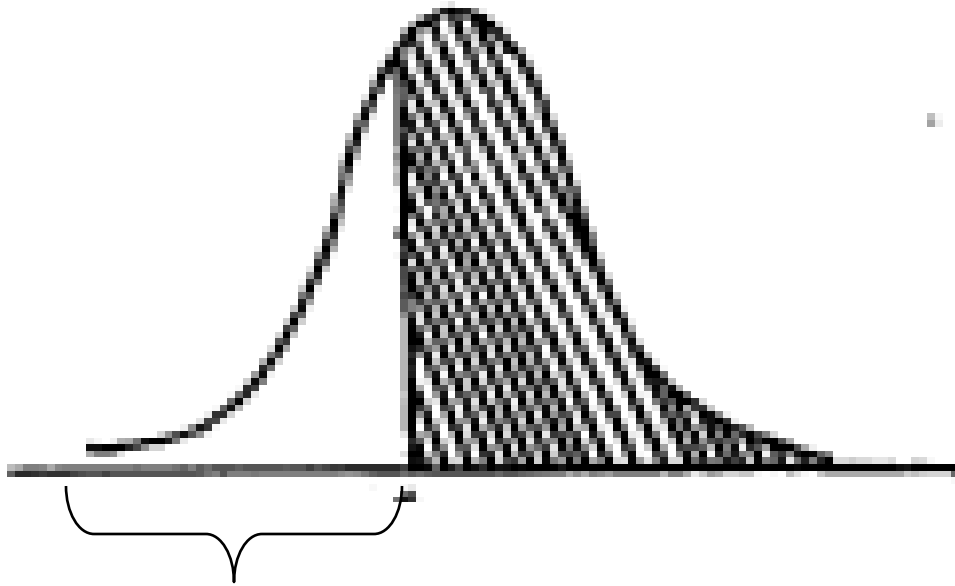
# Aspirees almost all are countries with high levels of Inequality (gini ratios)

- Argentina (46)
- Brazil (54)
- Chile (52)
- Costa Rica (50)
- Malaysia (46)
- Mexico (52)
- Russia (42)
- Thailand (42)
- Tunisia (41)
- Turkey (43)
- Uruguay (42)
- Venezuela (44)

*China: 50*

## Implications of high inequality:

Although average per capita income rising  
& absolute grinding poverty is disappearing  
→ still many “near-poor” people



China: 150 million people < \$2 / day

300 million people < \$3 / day

*[although most billionaires in the world!]*

# Food security in the Middle Income World

- Not macro nutrient deficiency:
- Micro nutrient deficiency!
  - Hidden hunger:
    - Iron
    - Zinc
    - Vitamin B
    - More

As we have seen:

There are few calorie deficiencies  
(Kcal for 2009)

- Brazil: 3173
- China: 3036
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FAOSTAT (2010)

# Food security in the Middle Income World

- Not macro nutrient deficiency:

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- Iron
    - Zinc
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# What is evidence of micronutrient deficiencies in middle income countries?

- Whole World
- Case Study of China



# Scope of problem (% with iron-deficient anemia)

Country	Pre-school	Pregnant Women	Reproductive-aged Women
Brazil	55	29	23
Mexico	30	26	21
Thailand	25	22	18
Turkey	33	40	26
China	20	29	20
US	3	5	7

And infants and school-aged children (in poor rural China):

Between 2008 and 2013 we tested nearly 60,000 students across China for iron-deficiency anemia

infants

# What is the quality of China's youngest babies?

- Testing  $\approx$ 2000 babies and their Mom's in Southern Shaanxi

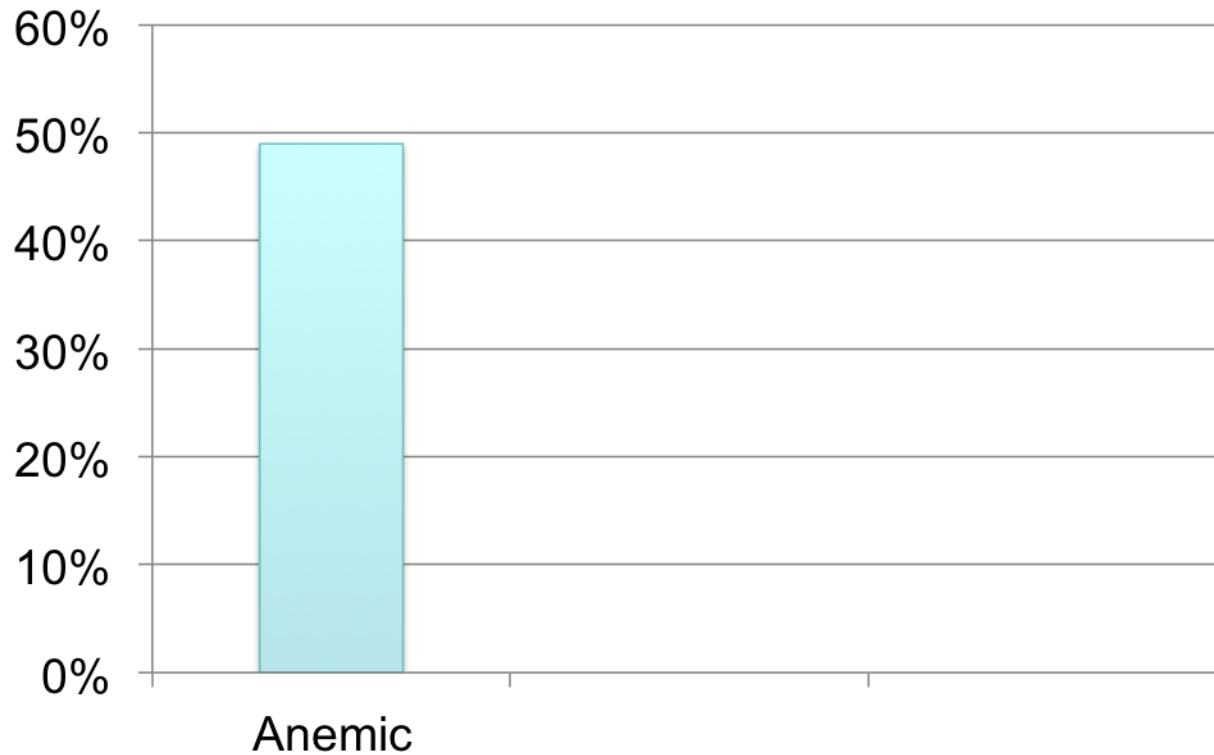


# Malnutrition during the first 1000 days

- Of the 2000 babies tested:
  - 995 of them are malnourished  
or  
*≈ 50 percent of infants are seriously sick*

*[Note: few are stunted or wasted]*

# Of the nearly 2,000 babies tested....



**49% were anemic**

→ But less than 5% were stunted/wasted, indicating that this is a *micronutrient* problem—the babies are getting enough calories, but not enough nutrients

# What are the Cognitive Consequence of Malnutrition?



*All babies are being given an Infant IQ test (Bayles test)*

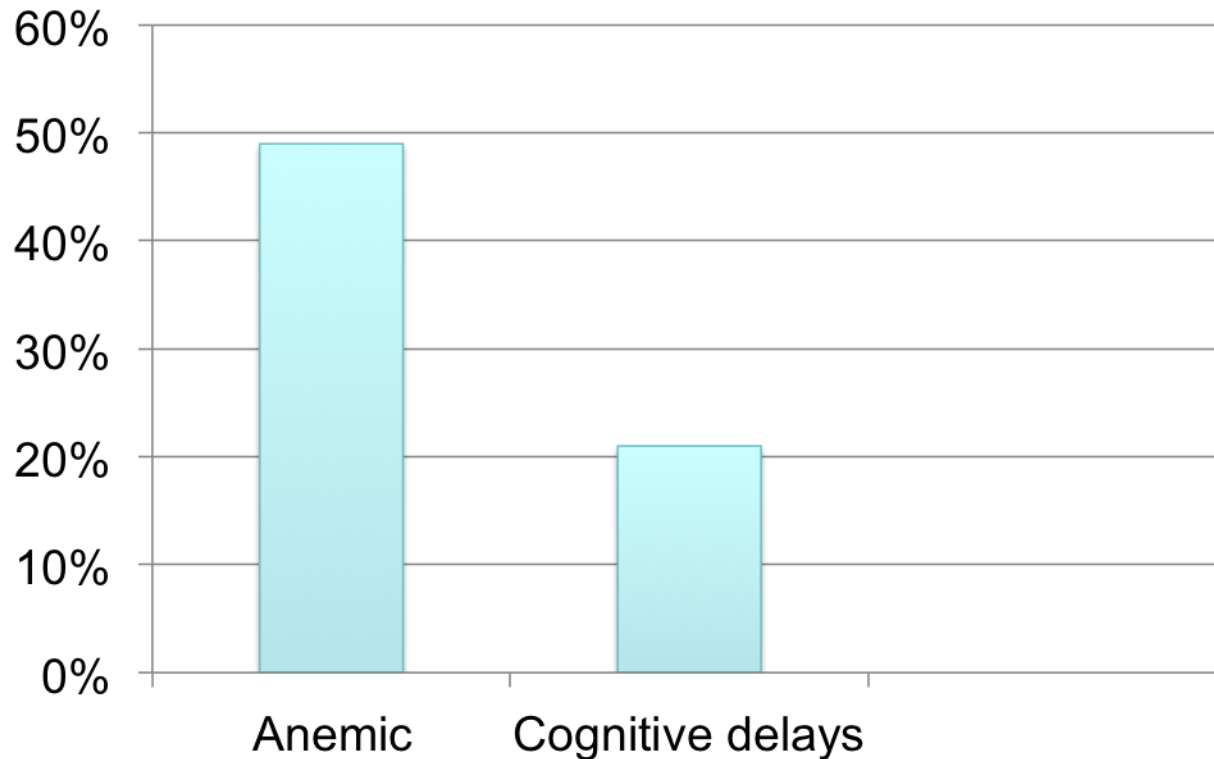


# Cognitive Consequence of Malnutrition

- Around 40 percent of infants FAILED their baby infant IQ tests
  - Sub-normal cognition
  - Sub-normal motor skills

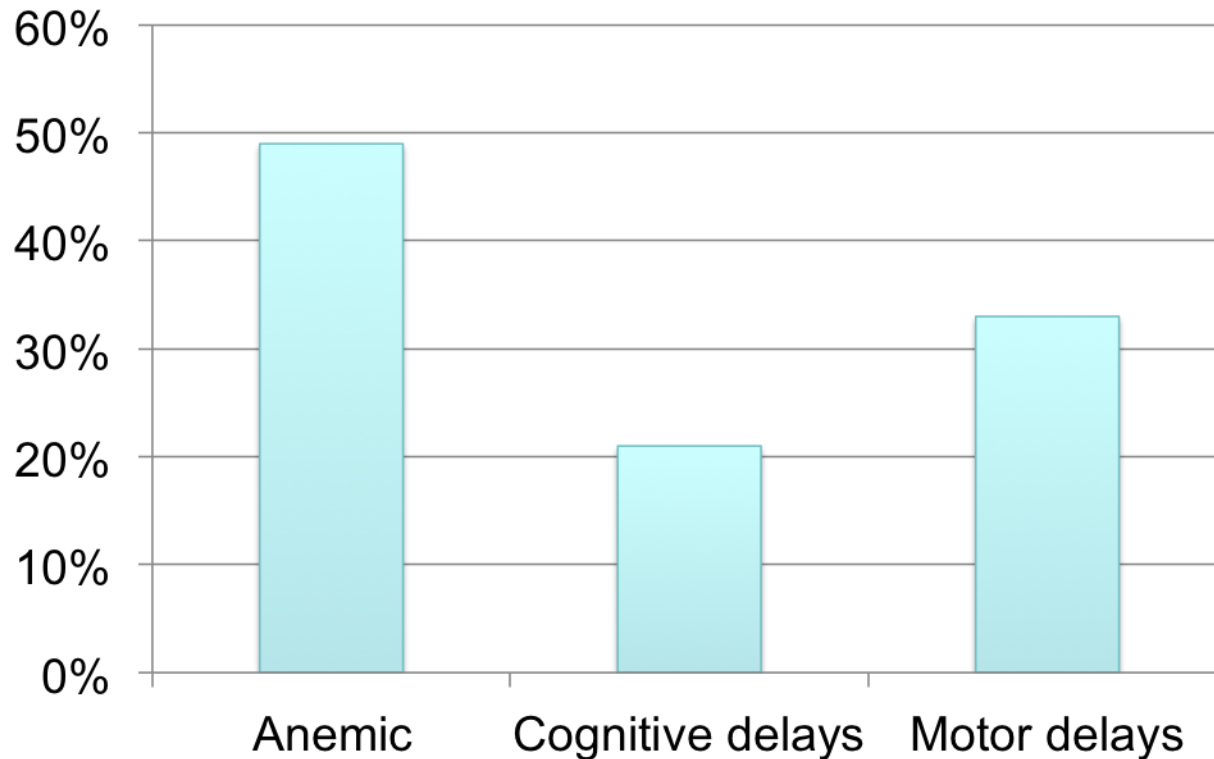


# Of the nearly 2,000 babies tested....



21% were cognitively delayed – scored outside of the “normal” range for other babies their age around the world

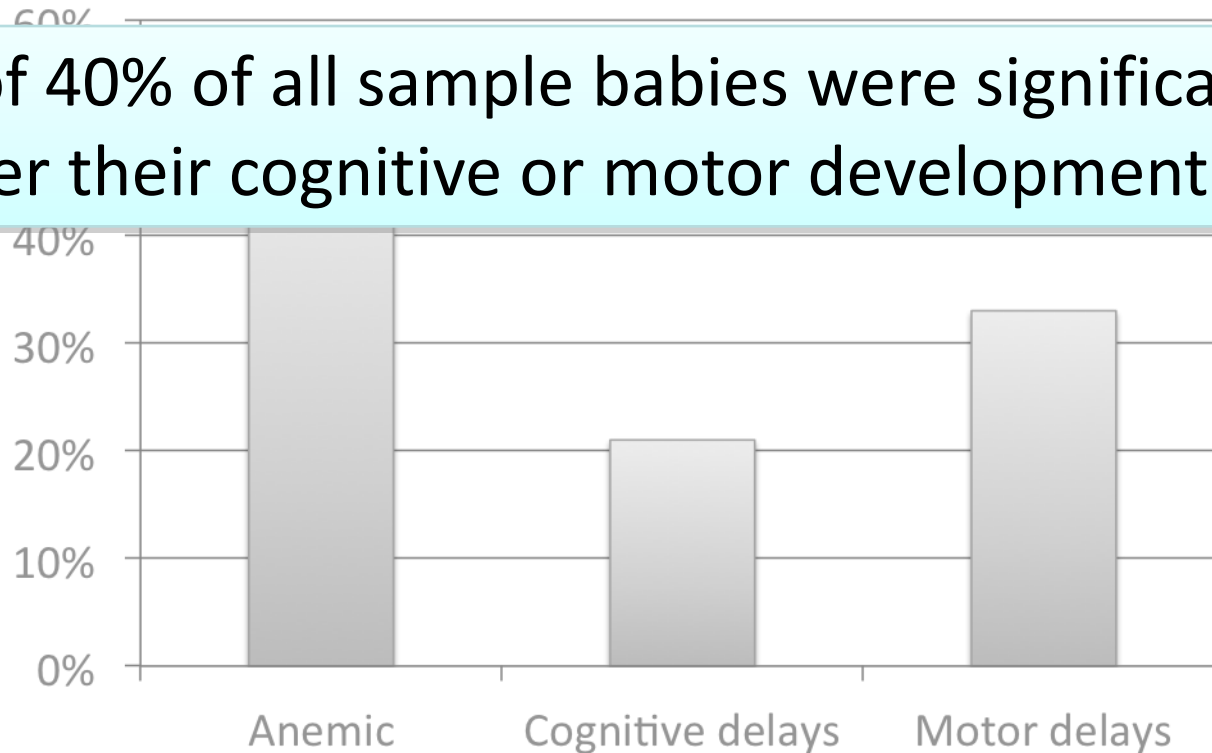
# Of the nearly 2,000 babies tested....



**33% were significantly delayed in their motor development**

# Of the nearly 2,000 babies tested....

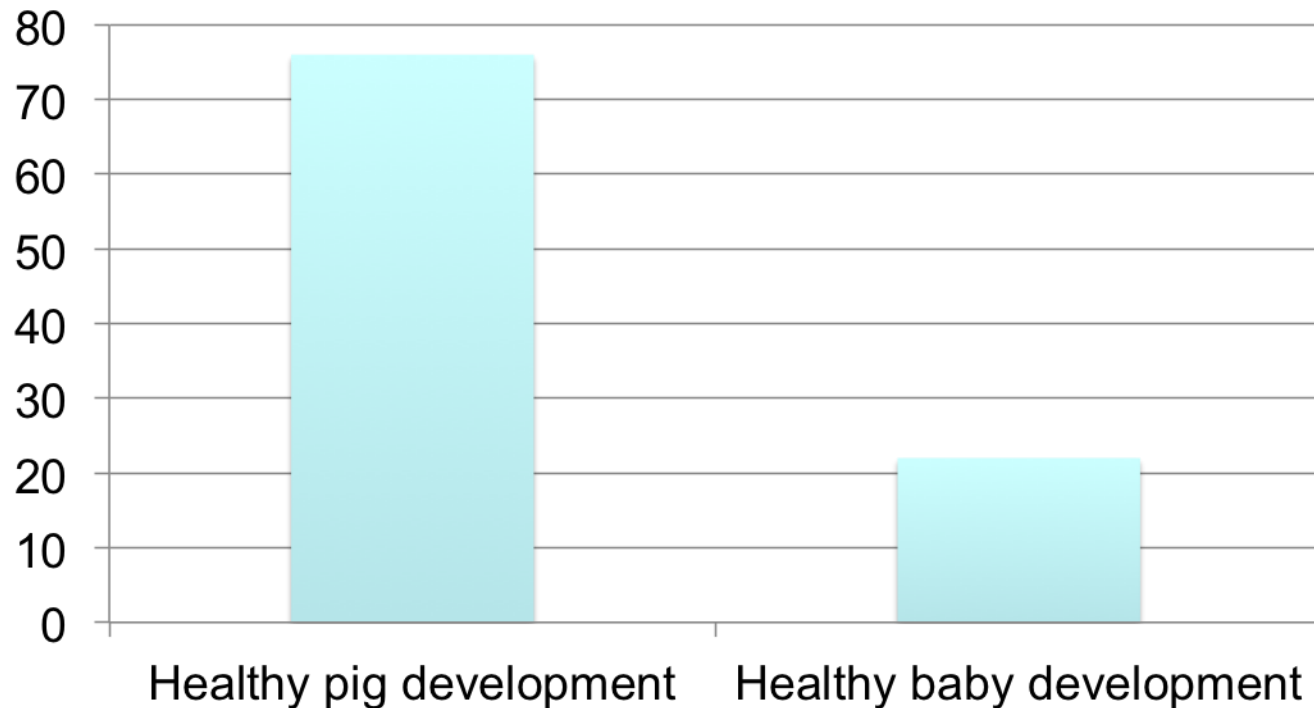
A total of 40% of all sample babies were significantly delayed in either their cognitive or motor development (or both!).



33% were significantly delayed in their motor development

# Unaware and Uninformed

**Percent of Caregivers Who Think  
Micronutrients are Needed for...**



**Caregivers know more about pig nutrition  
than they do about baby nutrition!**

# Ultimate Consequences:

If the micronutrient deficiencies of infants / toddlers are not corrected before baby is 30 months old →

- Life time effects on:
  - IQ
  - Mental health
  - Height
  - Weight
  - Health

# What does this mean?

## In harshest terms:

Up to 20 percent of China's future population are in danger of becoming **PERMANENTLY** physically and mentally **HANDICAPPED**

Childhood Anemia (persisting  
through school age)

In fact, anemia is all over poor areas in China

	Total
Total	33.7
Shaanxi—2008 (Dataset 1)	37.5
Shanxi—2009a (Dataset 2)	31.6
Gansu—2010 (Dataset 3)	31.2
Qinghai—2009 (Dataset 4)	51.1
Ningxia—2009 (Dataset 5)	25.4
Sichuan—2010 (Dataset 6)	24.8
Guizhou—2010 (Dataset 7)	33.1

Luo, R., X. Wang, C. Liu, et al. (2011) "Alarming High Anemia Prevalence in Western China." *Southeast Asian Journal of Tropical Medicine and Public Health* Vol. 42 No. 5





Poor areas of China

**Children  
with anemia  
( $\approx 33\%$ )**

Children with  
out

$\approx 30$  million school aged children  
are estimated to have anemia ...

# Anemia → can have severe effects on infant / children populations

- Anemia affects:

- Birth weights
- Infant mortality
- Infant morbidity
- IQ
- Health

- Anemia affects:

- School performance
- Attendance
- IQ
- Health
- Behavior

*Anemia → poor educational and cognitive performance / Stoltzfus et al. 2001 (in developing countries); **Bobonis et al. 2006 (in India)**; Halterman et al. 2001; Nokes et al. 1998 (US)*

These are mostly PERMANENT / lifelong effects!

# Summary: Longer-run Implications for Economy / Society

- 100s of million of children are cognitively impaired ...
- They are not competitive in school system
- Drop out / do not learn
  - It is ok at first ... wages are rising ... still low wage, unskilled jobs [this actually exacerbates the drop out problem ... victim of own success]
- Low wage jobs disappear ... only high wage jobs left ... employers will not hire someone for a high wage if they can barely read and write (no math / no science / no language skills → no formal job)
- Polarization of the labor market:
  - Half in high wage sector (rich get richer)
  - Half in informal sector ... or drop out all together (gangs / organized crime)
- Society has to spend more and more on police / crime / security ... large part of labor force is unproductive (or counter-productive) → **VICIOUS CYCLE and STAGNATION**

# Explanation for the causes of the new Food Security Challenge

# Real Question: What is going on?

- Countries are growing and growing fast
- Wages are rising
- There are a lot of poor people, but, not extreme poverty
- So, why don't families invest in their:
  - Babies?
  - Children?
  - Mother's to be?

# Two reasons

## REASON ONE:

### **The Price of Food:**

- Victim of their success in Phase I ...
- Investments in agriculture / open door policies → are behind growth ...
  - contributed to alleviation of worst poverty
  - and: made price of food low ...
- Cheap calories (from staples) raise demand for staples by those in the lower end of the income distribution (even though they could afford more)

# Many reasons for not spending more on diversified diet

- a. Real cost of meat and fruits and vegetables is not only relatively expensive, they are absolutely expensive (in real terms)
  - Need refrigeration
  - Need markets close by
  - Need time if markets not close by
  - More expensive to prepare

## b. Many competing uses for extra income ...

- There is extra income ...
- But, as DuFlo and Banerjee point out:
  - There are many competing uses for the income of families in developing countries (especially in countries with underdeveloped economic and social institutions – which as we see characterizes middle income countries)
    - Saving for marriage
    - Saving for housing
    - Saving for retirement
    - Saving for catastrophic illnesses/injuries
    - Temples; celebrations; and more
    - Etc / etc / etc
  - Why spend additional money on higher-priced, more varied diet



# REASON TWO: absence of knowledge

- Hidden hunger: no outside symptoms
- Slow and imperfect correlation between nutrition intervention and anemia status and behavior/performance/physical status
- With high rates of migration, caregiving is being done by Grandma: “I never ate meat, and aren’t I ok?” ...
- Time inconsistency between demand for skills and need to invest in skills: Current health and cognitive skills are fine for now; but, not sufficient for 10 to 20 years from now
- Lack for formal nutrition education/training.

# Empirical evidence

- The most educated person in a rural community is often the principal of the school:
  - But: only 1 out of 20 even know what “anemia” is
  - Principals believed that only 3% of their students were nutritionally deprived (actual number is more than 33%)
- Only 2 out of 100 caregivers have had any formal education/training in nutrition ...
- MORE (high mobility of parents in search for new jobs in cities)

## 3d. Policy Responses

# Policy implications

- Social return to good nutrition  $>$  Individual return to good nutrition
  - It is hard for individuals that are poor to invest in something (even something good with a high rate of return) that has a return that is 10 to 20 years away (like nutrition for education) [because of a low discount rate or “impatience”]
- ➔ THEREFORE, there appears to be a role for the state in trying to address micronutrient-deficiency based food insecurity

# Possible interventions

- Education in schools
- Training in villages / through public health system
- **Ag Diversification**
- **Fortification (grain/salt / flour / etc.)**
- Direct MMN supplemental programs:
  - Needs to be free (maybe then not even enough)
  - Raise benefit further by giving CCT

# Challenges to these interventions

- Edu and training: Hard to “teach old dogs new tricks”  
OR: there are other constraints (e.g., markets too far away / refrigeration not available / etc.)
- Encourage diversification (how?)
- Fortified foods
  - Works with salt and iodine ... but, iron-fortified flour has not been successful. Many rural households still eat their own-produced foods
- Supplementation is expensive
  - Difficult to run CCT’ s

# The Challenge of Meeting New Food Security Challenge

- Policy makers have to be thinking ahead ...
- At a time when wages are still low (but about ready to begin rising), the education system needs to be making sure everyone goes to high school (and learns math / science / language / etc) ...
- To do this effectively, micronutrient deficiencies need to be overcome (and there needs to be an early and concerted effort by the state) ... closely after the time that it just won the Green Revolution ...

# Is this a new challenge?

- Maybe only an issue with RAPID growth (the type of growth that happens in a globalized, high-tech world) ...
- if movement from middle income to high income lasts several generations ...
- learning about nutrition can occur slowly ...
- wages can rise more slowly ...
- institutions (credit; health; social security) can gradually emerge ...
- education can expand gradually so there is not the same problem of an entire generation needing to be cognitively healthy and educated at a time when individuals/society has not recognized the need ...



# Irony of combatting food security in phase II of development

- Policy prescription (for the poor) is:
  - Eat More Meat!
  - Buy More Fruits and Vegetables

[or get these micronutrients from some other source]

Thank you very much!