



WORLD BANK

"Synergies in Child Nutrition: Interactions Among Health & Environment, Care Practices, and Food

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Outline

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4. Operationalizing the UNICEF Framework
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6. Evolution of stunting rates and Prevalence of Adequacy in F, C and HE
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Motivation

- Increases in real GDP and income are insufficient for reductions in child malnutrition.
- *"The determinants of malnutrition are multi-sectoral and the solution to malnutrition requires multi-sectoral approaches."*
- Nutrition-sensitive interventions in different sectors e.g. agriculture, health, water & sanitation.

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Contributions of the study

- Identifies data limitations and areas for improvement
 - Among the first comprehensive investigations
- Informs broad policy design & choices
 - **"Systematic Diagnostic"** of the main correlates and determinants of malnutrition
 - **Identifies potential "binding constraints"** (e.g. inadequate H&E, or Care, or Food) in reducing malnutrition
 - **Evidence on synergies:** more rigorous justification for multi-sectoral interventions

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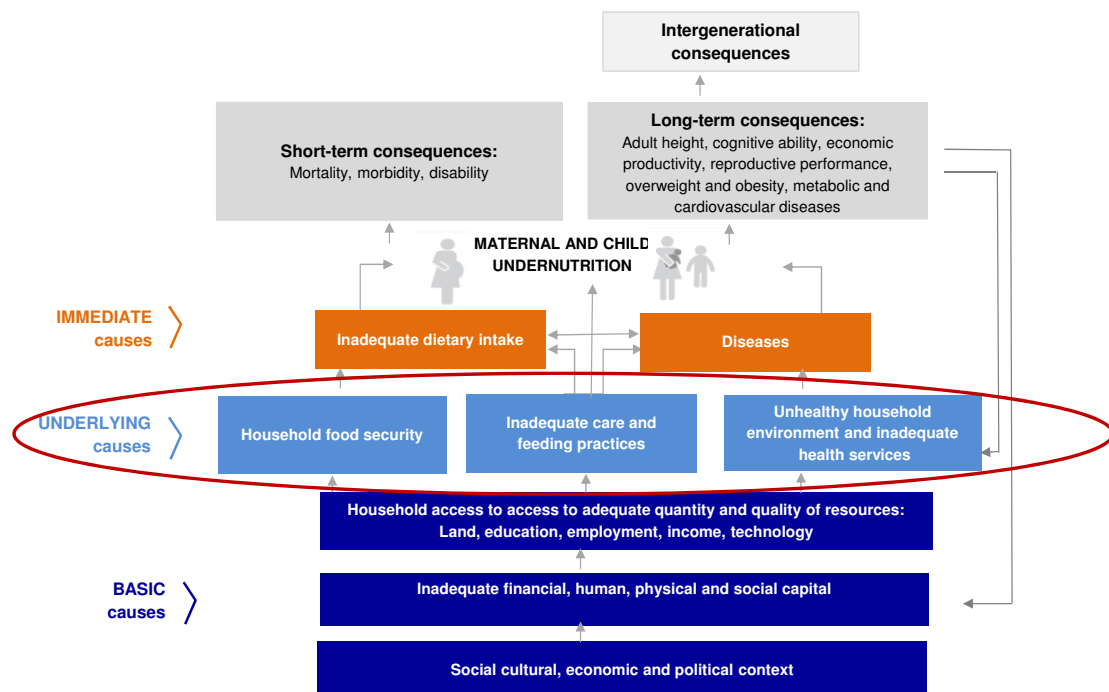
The UNICEF conceptual framework

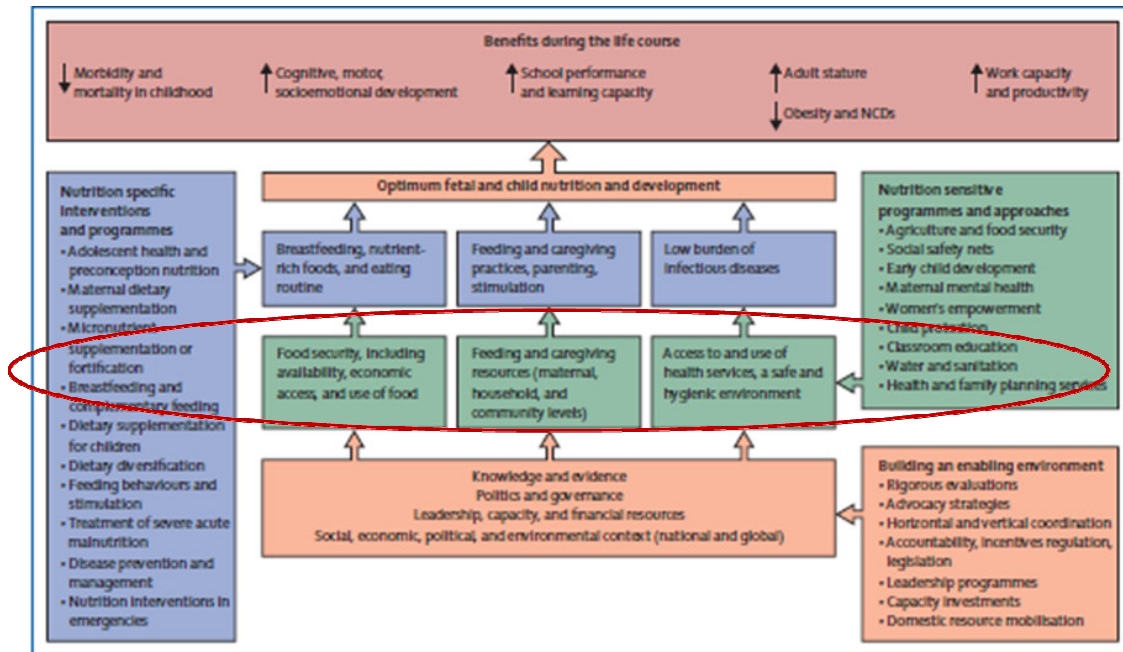
The UNICEF framework (UNICEF 1990) highlights the role of 3 main underlying causes

- a) food security,
- b) child care practices, and
- c) Environment & Health

play in child nutrition.

One of the fundamental ideas underpinning this conceptual framework is that there are substantial interactions and **synergies** among food security, health environment, and care.





Source: the Executive Summary of "The Lancet Maternal and Child Nutrition Series 2013.

Operationalizing the UNICEF framework

- Review: the ideal data/info needed (from nutrition discipline) contrasted against the data available from surveys
- Definition of "adequacy" in F, C and H&E: based on the underlying components using thresholds based on accepted international standards

Thresholds for Adequacies

1. USAID (2012) "Maternal Dietary diversity and the implications for children's diets in the context of food security." **USAID's Infant and Young Child Nutrition project** www.iycn.org
2. WHO (2013) "Table 2, Summary of WHO Position papers-recommended routine immunizations for children"
3. WHO and UNICEF (2006) "Core questions on drinking-water and sanitation for household surveys"
4. WHO (2008) "Indicators for assessing infant and young child feeding practices – part I: definition"
5. UNICEF (1990) "UNICEF Strategy of improved nutrition of children and women in developing countries A UNICEF Policy Review", New York

Table 1: Countries and Data Sources

Region	Country - data source
SAR	Bangladesh (Helen Keller 2010, 2011 and IFPRI 2011)
	Nepal (DHS 2001 and 2011)
LAC	Bolivia (DHS 2003 and 2008)
	Peru (DHS 2005 and 2012)
EAP	Cambodia (DHS 2005 and 2010)
	Indonesia (Riskesdas 2010)
SSA	Ethiopia (DHS 2000 and 2011)
	Zimbabwe (DHS 2005 and 2010)

Context and Data

Most samples are mainly **rural**,

➤ apart from Bolivia, Peru, Zimbabwe and Bangladesh (HK) for which urban make up one third-to half of the sample.

Table 2: Components of Food Security

Ideal Indicators	AVAILABLE
Children's Dietary Diversity Score	Yes (Not HK)
Mom's Dietary Diversity Score	No
Minimum Acceptable Diet (for children 6-24 months)	Yes
Food Insecurity Experience Scale	No (Only HK)
Household Hunger Scale	No
Coping Strategy Index	No
Relative prices of different food groups	No
PROXIES IF IDEAL INDICATORS ARE NOT AVAILABLE	
Household Dietary Diversity Score (for child/mom)	Helen Keller
Starchy Staple Ratio or the Fraction of household Calories Derived from Starchy Staples	
Notes: There are also population based measures such as the percent of households who cannot afford a balanced diet, and the percent of people lacking access to calories	

Components of adequate food

- Child's dietary diversity of 4 or more from 7 food types
- Household level food insecurity (Helen Keller)
- Minimum meal frequencies
- Minimum acceptable diet (6-24 months)

Table 3: Components of Care

IDEAL	AVAILABLE
Workload and time availability of caregiver	No
Social support for caregiver	No
Psychosocial care	No
Caring Behaviors: Breast-feeding	Yes
Caring Behaviors: Health seeking	No
Caring Behaviors: Complementary feeding	Yes
Caring Behaviors: Hygiene	No
Caring Behaviors: Child feeding index	No
Notes: Another important indicator of care is maternal education through there is no consensus about the threshold (or level of education) for adequate	

Components of adequate care (mostly behavioral)

- Exclusive breastfeeding under 6 months
- Initial breastfeeding within 1-3 hours of birth
 - (Bolivia & Peru DHS ≥ 3 hrs only)
- Intro of complementary feeding during 6-8 months (solid, semi-solid, or soft foods)
- Continued breastfeeding until 24 months

Table 4: Components of Environmental Health

IDEAL	AVAILABLE
Access to safe water	Yes
Access to improved sanitation	Yes (except Bolivia)
Community level sanitation	Yes (except Bolivia, Ethiopia, Indonesia, and HK)
Use of prenatal services	Yes (except Indonesia)
Age appropriate immunization status	Yes (except HK)
Vitamin A supplementation status (typically for children 6 months and older)	Yes (except Indonesia, Bolivia)
ORS use for treatment of diarrhea	No
Notes: A population-based measure is the percent of the populations receiving antibiotic treatment for pneumonia	

Components of adequate health & environment

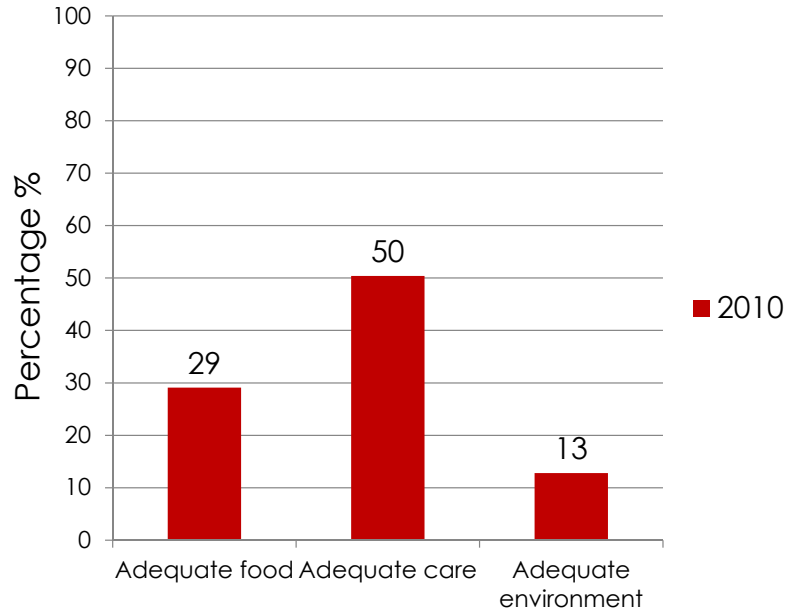
- Adequate household sanitation (see appendix)
- Adequate village level sanitation (> 75%)
- Safe drinking water source (see appendix)
- Complete vaccinations
- Prenatal check-ups 4 or more
- Vitamin A supplement for child (tablet, drops) [Peru?]

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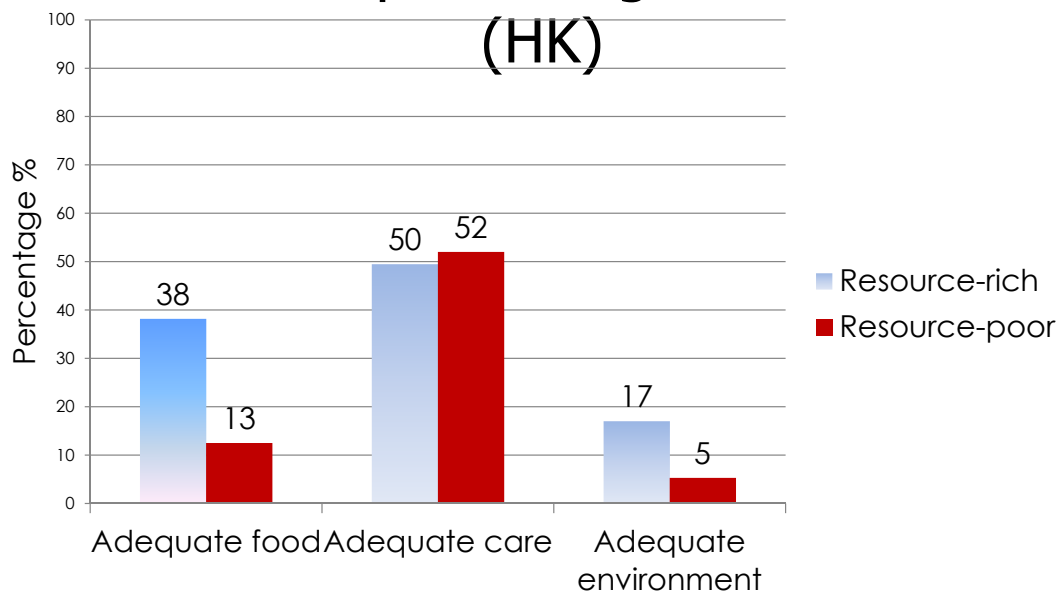
Message 1:

- There are major gaps in data collected by DHS and other nutrition-related surveys
 - Fewer data gaps for health & environment
 - but more data gaps for food and care

Adequacies Bangladesh (HK)



Adequacies Resource-rich vs. Resource-poor Bangladesh 2010 (HK)



➤ Adequacy in food

- Quite low and
- Improvements in Cambodia, Peru, Zimbabwe; Large increase in Bolivia (?)
- Decline in Bangladesh

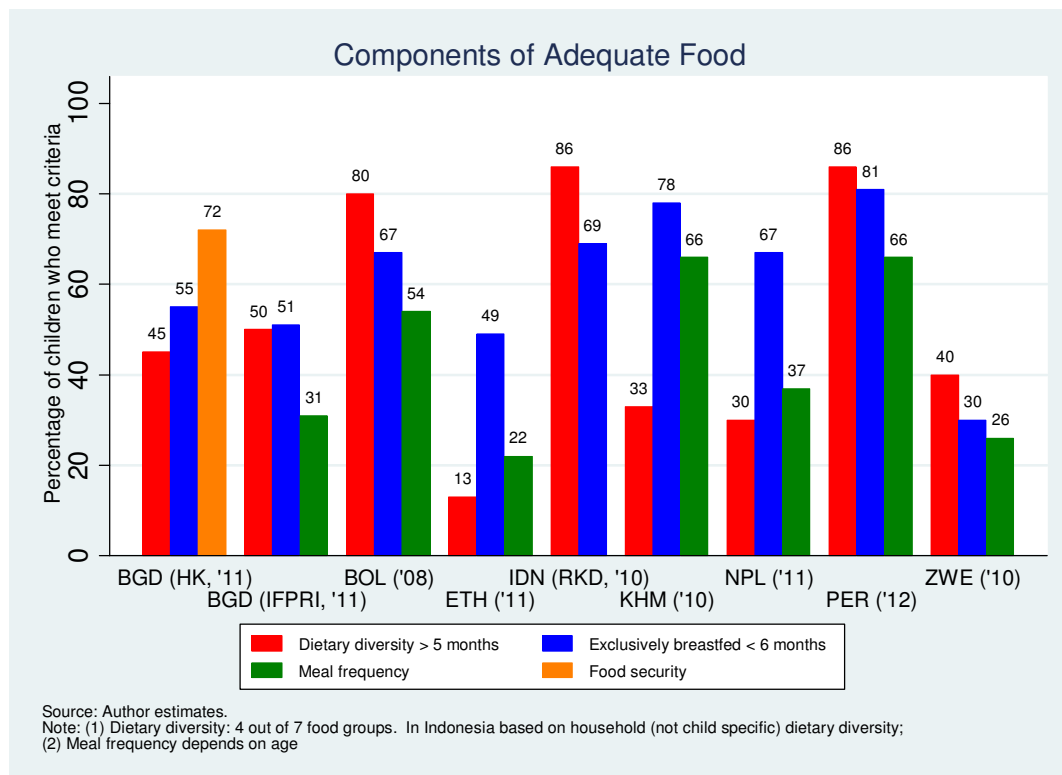


Figure 5b: The Evolution of Access to Adequate Food Security

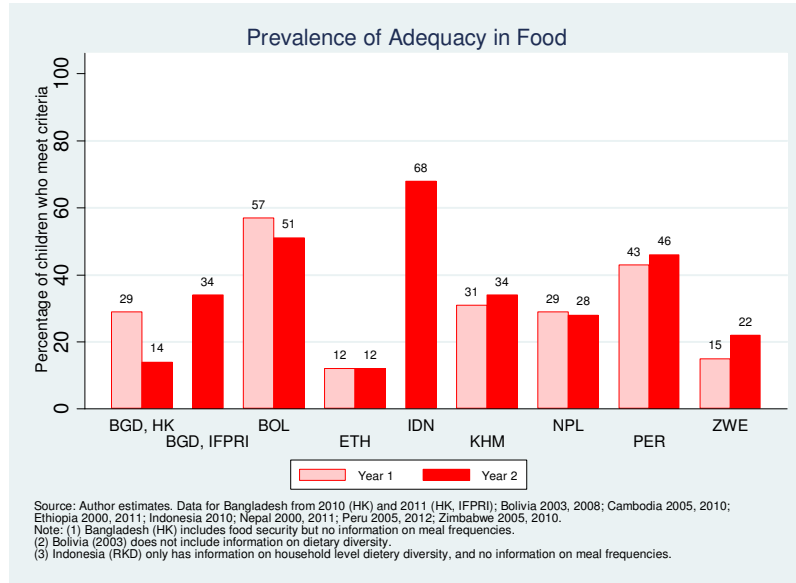
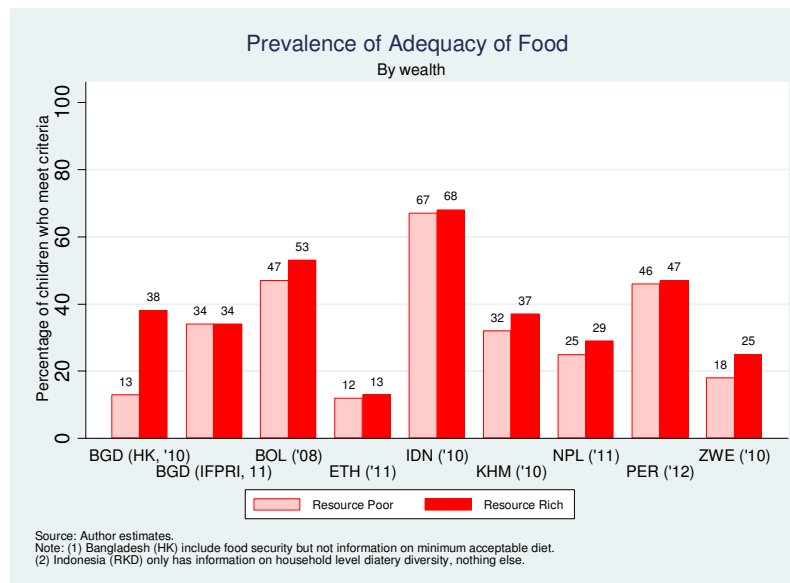


Figure 5c: Adequate Food Security by Household Wealth



➤ Adequacy in care:

- High overall and
- increased significantly over time
 - e.g. Cambodia, Ethiopia, Nepal, Peru, Bangladesh

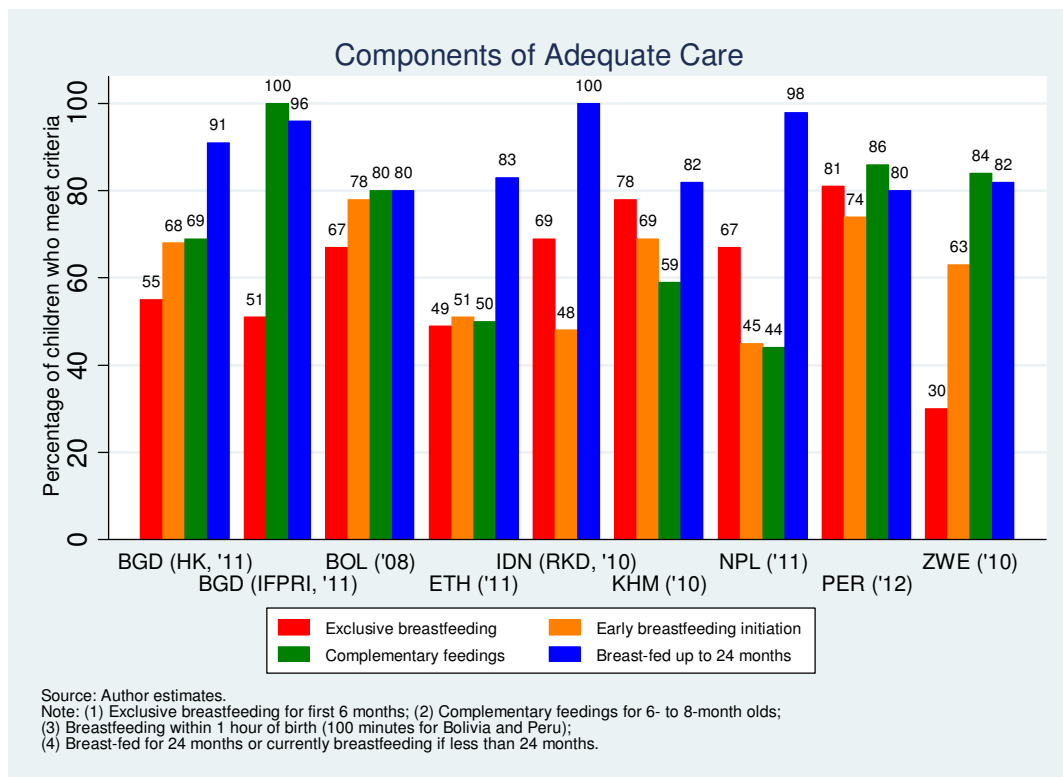


Figure 6b: The Evolution of Access to Adequate Care

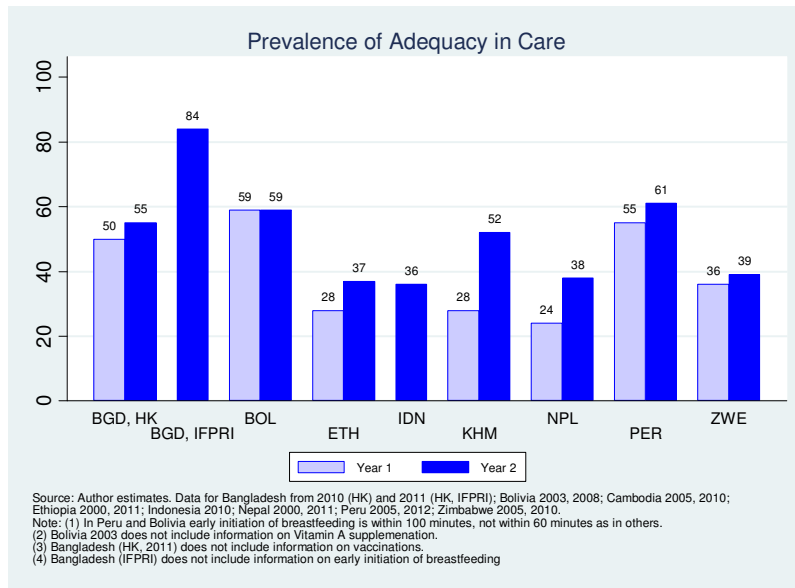
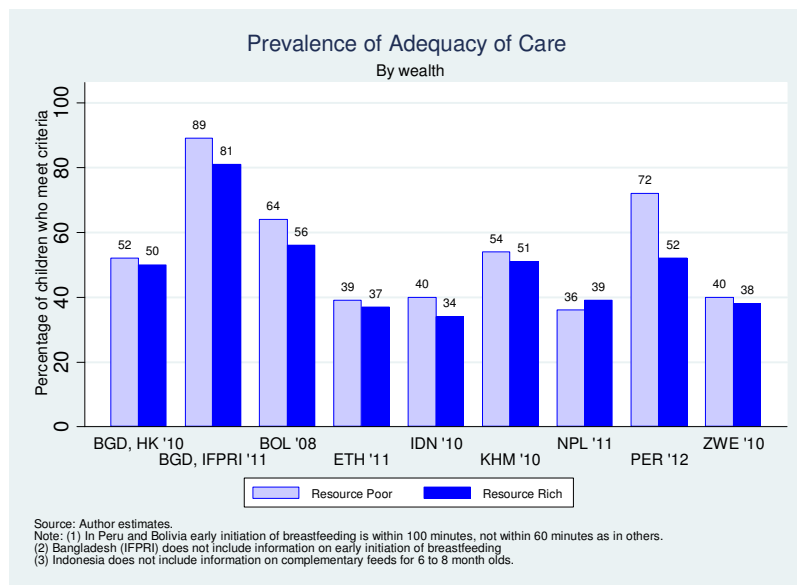


Figure 6c: Access to Adequate Care by Household Wealth



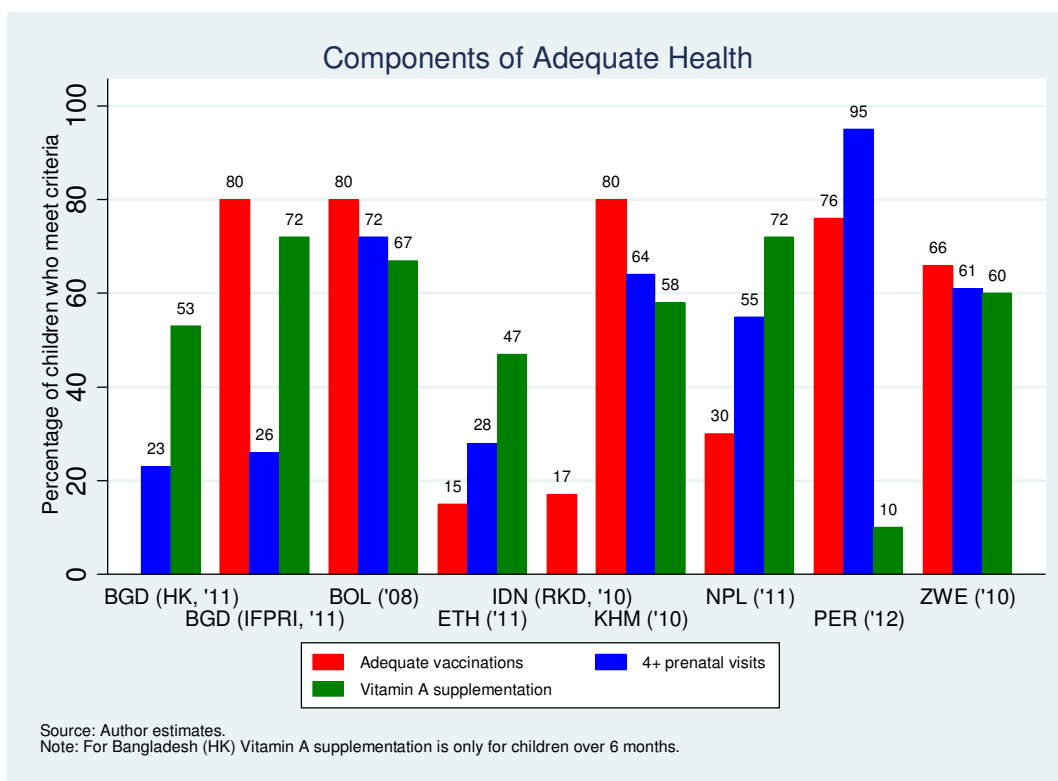
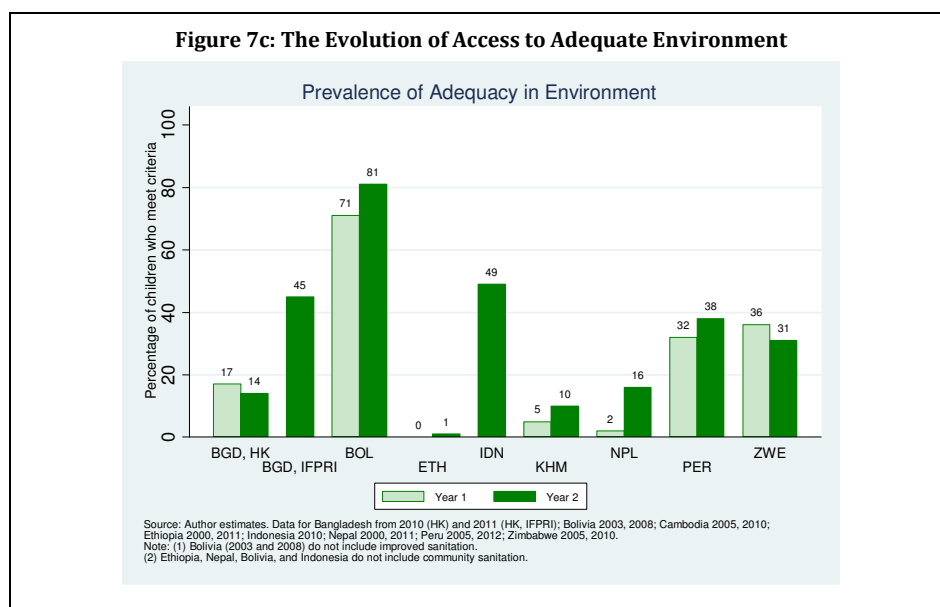


Figure 7e: Access to Adequate Environment by Household Wealth

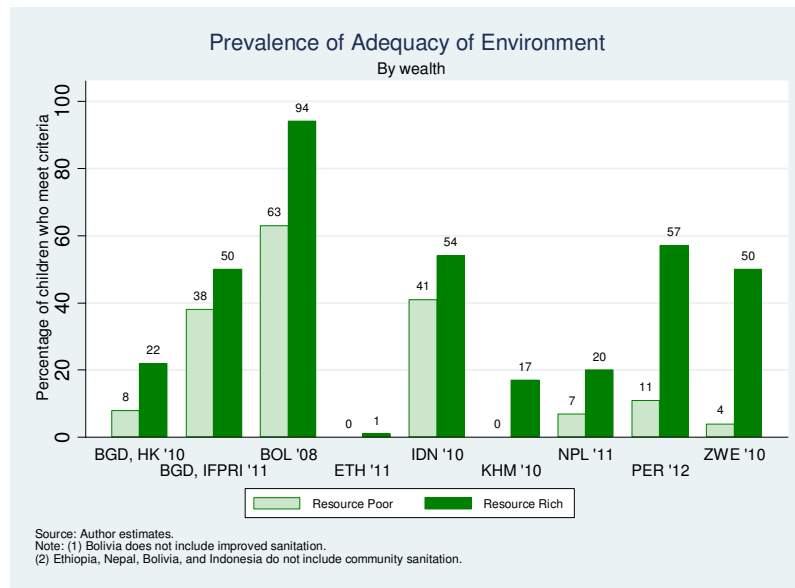


Figure 7d: The Evolution of Access to Adequate Health Services

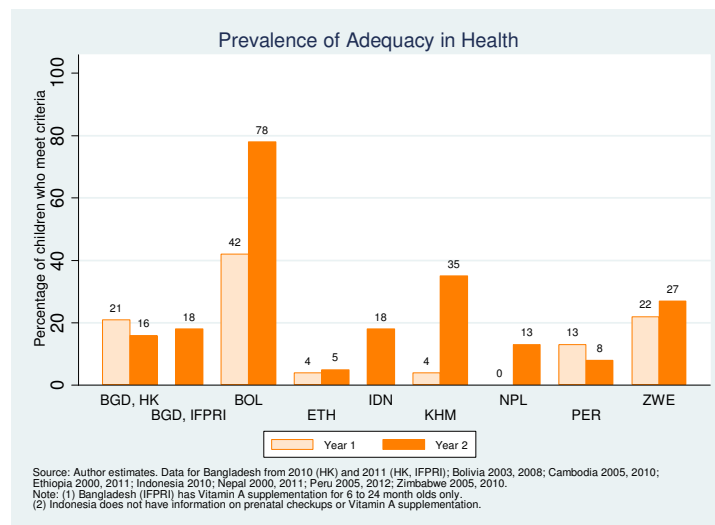
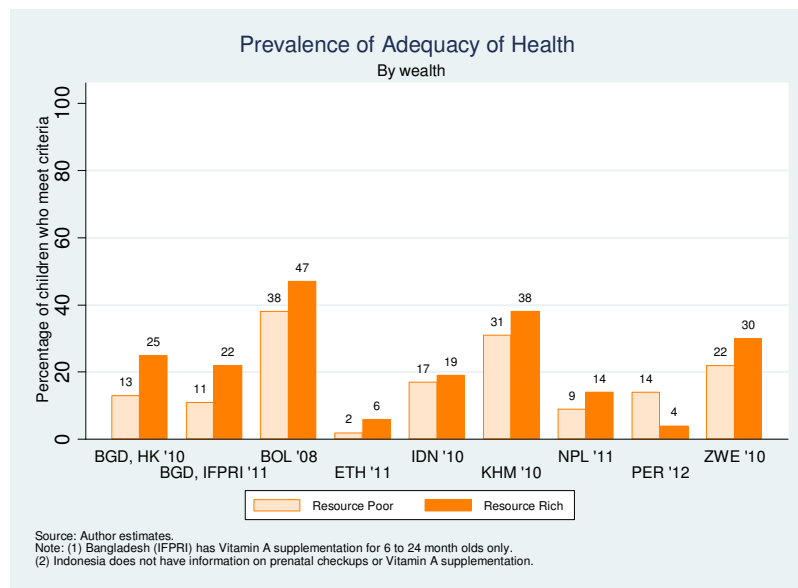


Figure 7f: Access to Adequate Health Services by Household Wealth



Message 2

- Ranking (in most countries) of % of pop w/ adequate:
 1. Care
 2. Food Security
 3. Health & Environment

The low ranking of Health & Environment is not due to poor data or bad measurements

- Community level of sanitation is the most lagging component of adequate Health and Environment in ALL countries

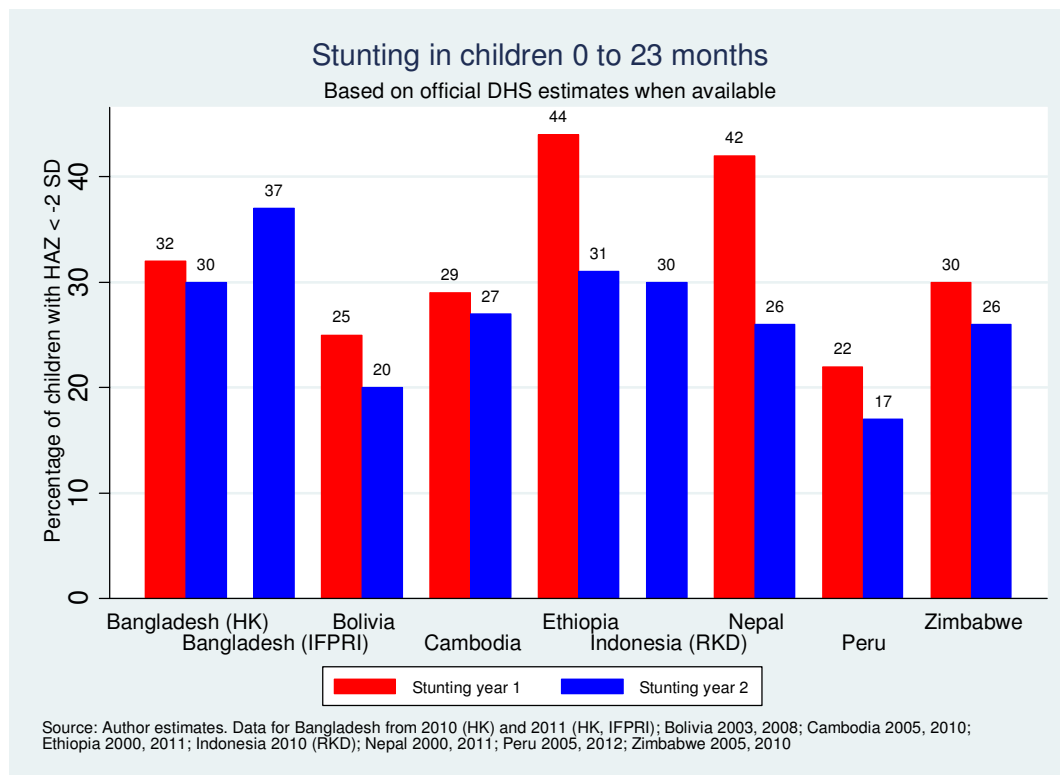
Evolution of Chronic Malnutrition & Adequacies in F, C, & EH

➤ Stunting

➤ High but

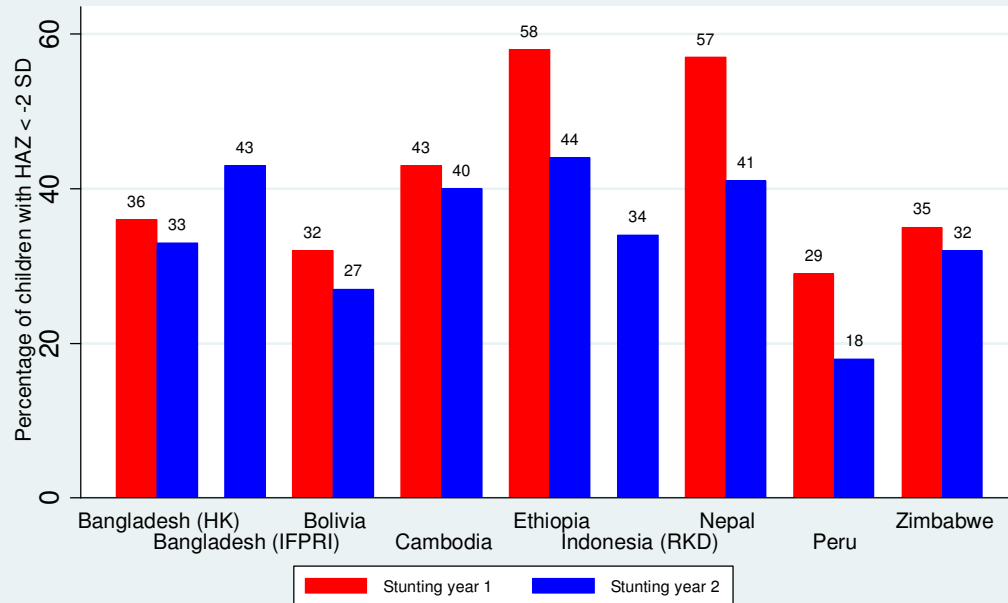
➤ has decreased significantly over time for both 0-5 yr old children and 0-2 yr olds

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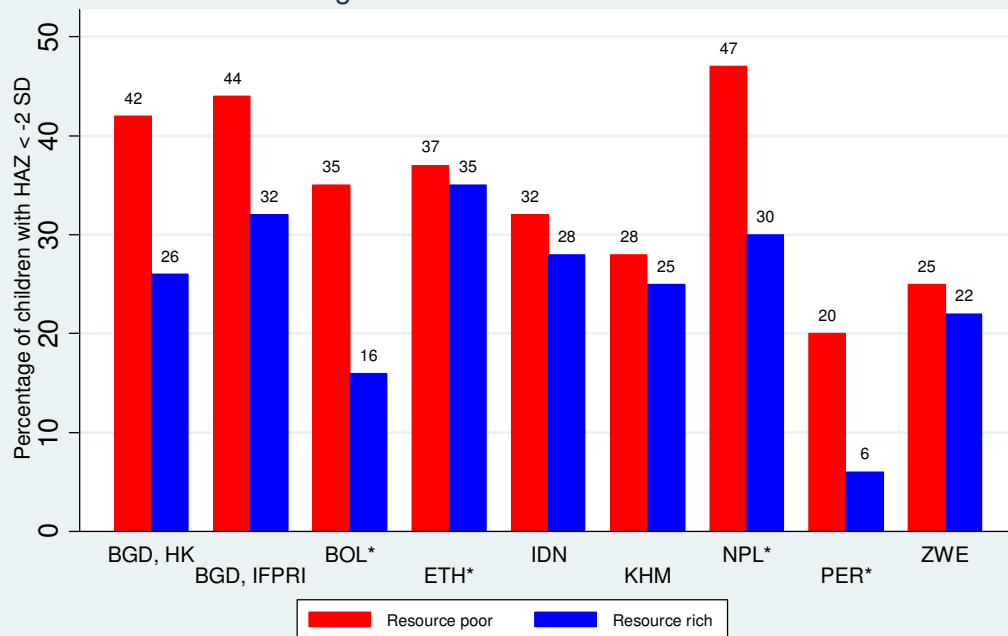
Stunting in children 0 to 59 months

Based on official DHS estimates when available



Source: Author estimates. Data for Bangladesh from 2010 (HK) and 2011 (HK, IFPRI); Bolivia 2003, 2008; Cambodia 2005, 2010; Ethiopia 2000, 2011; Indonesia 2010 (RKD); Nepal 2000, 2011; Peru 2005, 2012; Zimbabwe 2005, 2010

Stunting in children 0 to 23 or 35 months



Source: Author estimates. Data for Bangladesh from 2010 (HK) and 2011 (IFPRI); Bolivia 2008; Cambodia 2010; Ethiopia 2011; Indonesia 2010 (RKD); Nepal 2011; Peru 2012; Zimbabwe 2010. *Stunting for under 36 month olds. The rest under 24 month olds.

Message 3:

- Correlation (and likely causation) between decline in stunting and increases in prevalence of inadequacies in F, C, and H&E
- In the past few years efforts on reducing malnutrition have concentrated on care (C)
- Hardly any progress towards improving health & environment (H&E)
- Mixed/spotty record on improving food adequacy

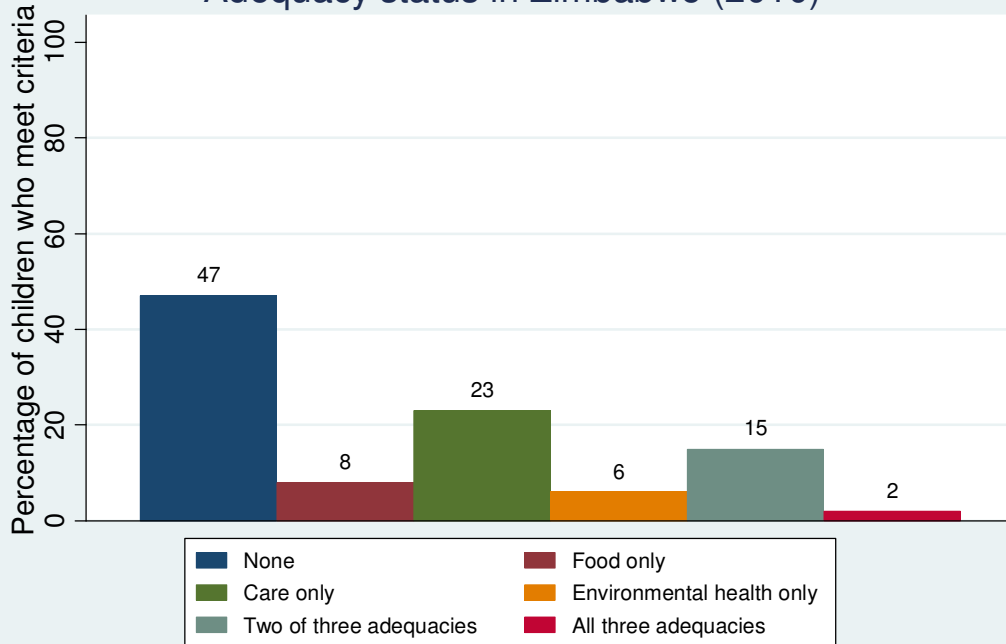
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Synergies

Some background

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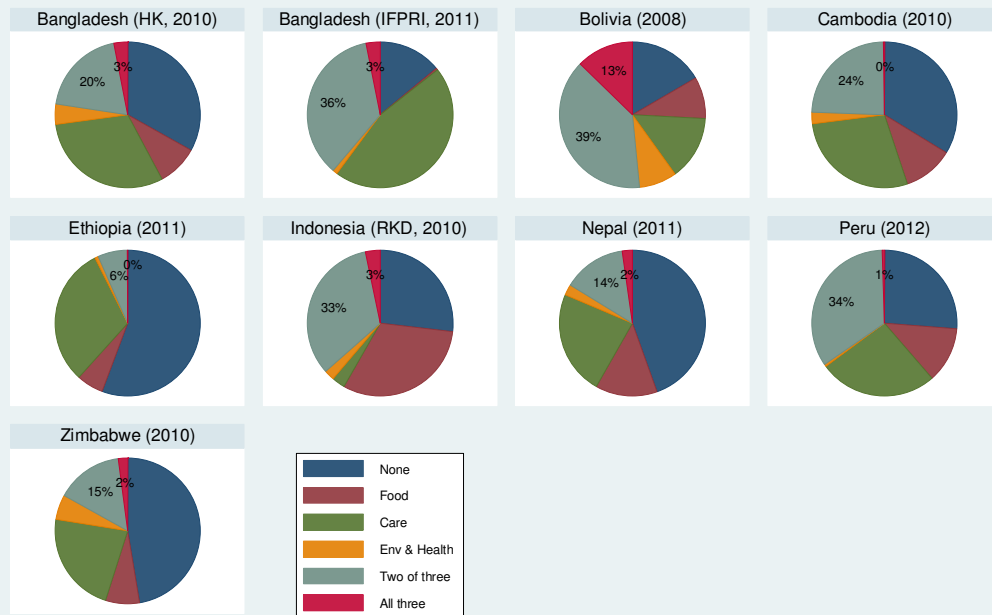
Adequacy status in Zimbabwe (2010)



Source: Author estimates.

Figure 9: Adequacy status

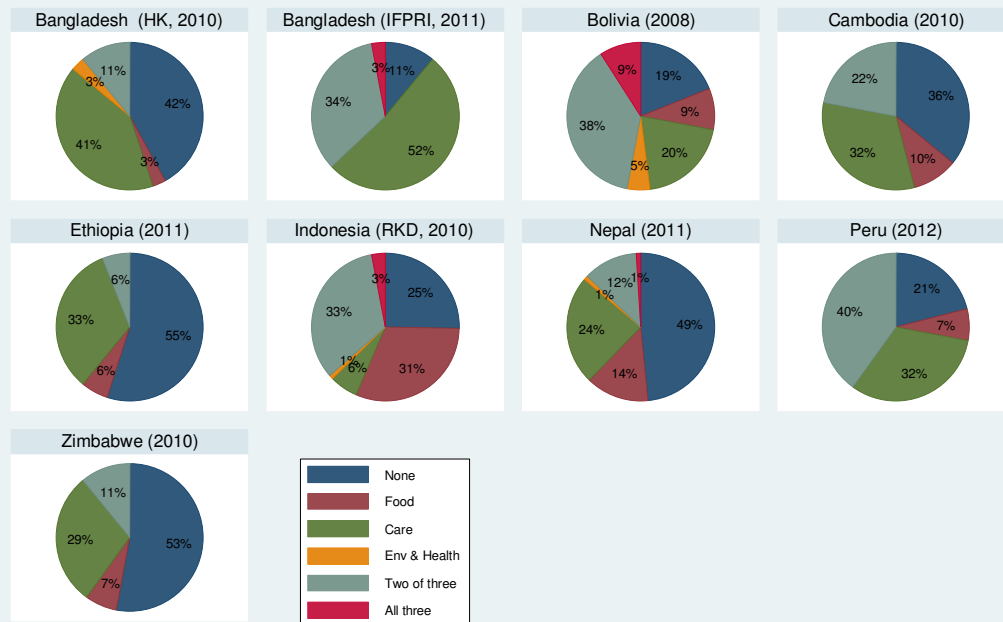
Recent year



Source: Author estimates.

Figure 10a: Adequacy status - Resource-poor

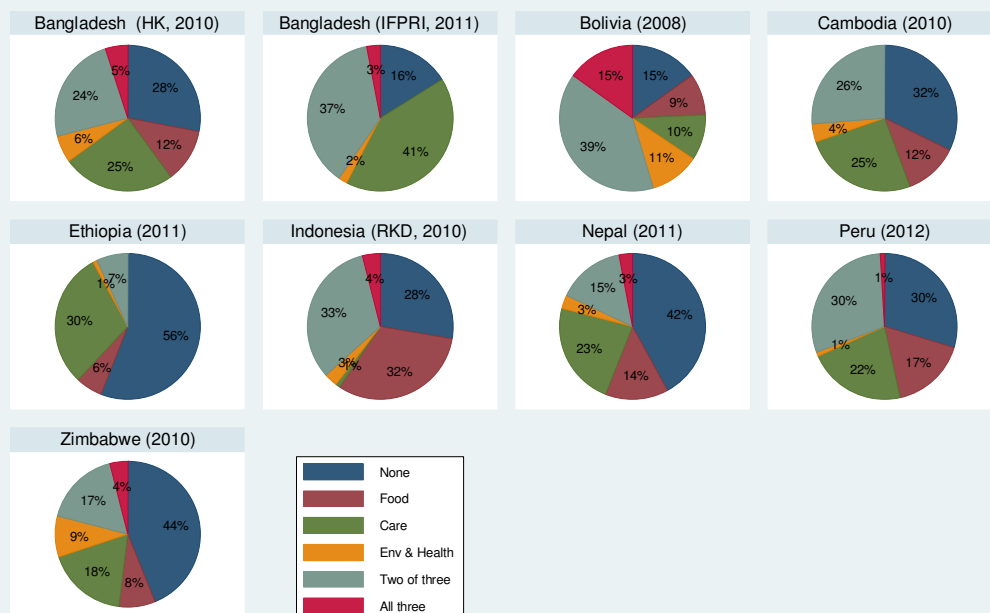
Recent year



Source: Author estimates.

Figure 10b: Adequacy status - Resource-rich

Recent year



Source: Author estimates.

C, F, HE, Synergies, and HAZ

Regression Model Estimated:

$$HAZ_i = \alpha + \beta_1 C + \beta_2 F + \beta_3 HE + \gamma_{12}(C * F) + \gamma_{13}(C * HE) + \gamma_{23}(F * HE) + \gamma_{123}(F * C * HE) + \varepsilon_i$$

Interpretation of coefficients: conditional mean of HAZ given adequate access to

$$E(HAZ_i | C = 1, F = 0, HE = 0) = \alpha + \beta_1$$

$$E(HAZ_i | C = 0, F = 1, HE = 0) = \alpha + \beta_2$$

$$E(HAZ_i | C = 0, F = 0, HE = 1) = \alpha + \beta_3$$

$$E(HAZ_i | C = 1, F = 1, HE = 0) = \alpha + \beta_1 + \beta_2 + \gamma_{12}$$

$$E(HAZ_i | C = 1, F = 0, HE = 1) = \alpha + \beta_1 + \beta_3 + \gamma_{13}$$

$$E(HAZ_i | C = 0, F = 1, HE = 1) = \alpha + \beta_2 + \beta_3 + \gamma_{23}$$

$$E(HAZ_i | C = 1, F = 1, HE = 1) = \alpha + \beta_1 + \beta_2 + \beta_3 + \gamma_{12} + \gamma_{13} + \gamma_{23} + \gamma_{123}$$

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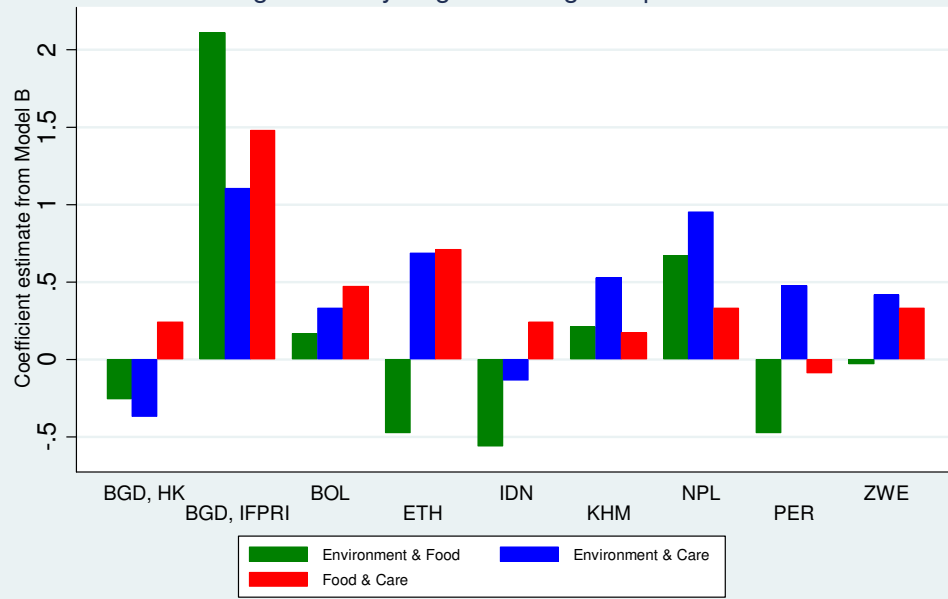
Synergies

The coefficient γ_{12} yields information on whether there are additional (extra) gains (or losses) in HAZ scores derived from access to adequate care only or access to adequate food only.

A significant and positive value of the coefficient implies **synergies** from the simultaneous access to adequate care and adequate food security in the production of child nutrition.

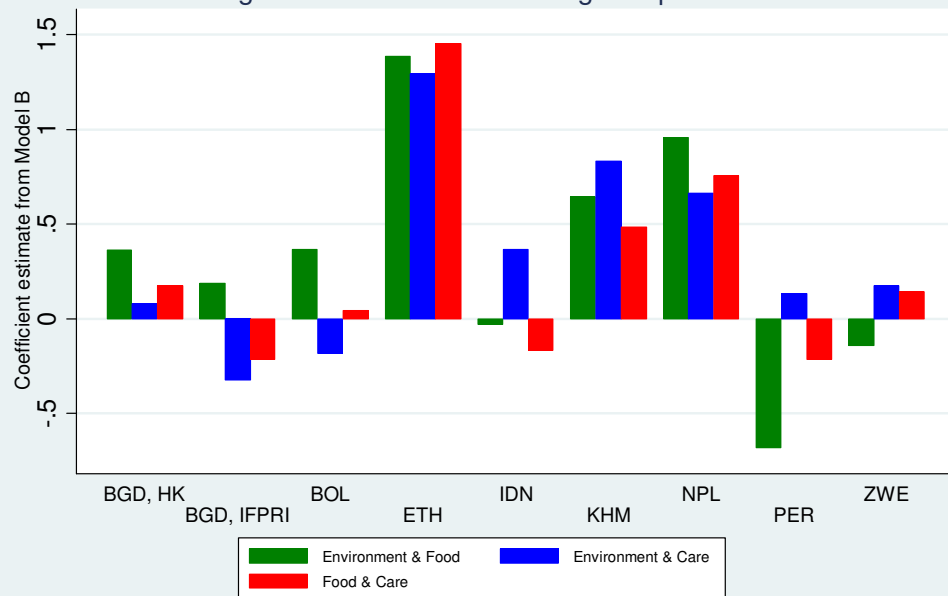
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Figure 11: Synergies among adequacies



Source: Author estimates. Data for Bangladesh (HK) 2010; Bangladesh (IPRI) 2011; Bolivia 2008; Cambodia 2010; Ethiopia 2011; Nepal 2011; Peru 2012; Zimbabwe 2010

Figure 12: Total effects among adequacies



Source: Author estimates. Data for Bangladesh (HK) 2010; Bangladesh (IPRI) 2011; Bolivia 2008; Cambodia 2010; Ethiopia 2011; Nepal 2011; Peru 2012; Zimbabwe 2010

Message 4:

- Synergies among C, F, and HE, are strong.
 - 18 out of 25 coefficients on synergy are positive
 - 10 out of 18 positive coefficients are statistically significant
- Countries with malnutrition problems have a great potential in exploiting such synergies
- A renewed and perhaps more determined effort is needed in exploiting such synergies

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Take-aways

- In most countries % of pop w/ adequate Care is the highest and H&E the lowest:
 1. Care
 2. Food Security
 3. Health & Environment
- Correlation (and likely causation) between decline in stunting and increases in prevalence of adequacies in F, C, and HE
- In the past few years efforts on reducing malnutrition have concentrated on care
- Hardly any progress towards improving health & environment(E&H)
- Mixed/spotty record on improving food adequacy

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Policy considerations

- Synergies among C, F, and HE, are strong.
- Countries with serious chronic malnutrition problems have a great potential in exploiting such synergies
- Need for more systematic data collection (closing the gaps in data collected by DHS and other nutrition-related surveys)
- Renewed effort is needed in exploiting such synergies on the policy arena
- Sector-specific nutrition-sensitive interventions are one way to take advantage of synergies present within specific sectors. BUT one must also ensure that the stronger synergies (highlighted in this study) derived from interactions across sectors are realized, (e.g. increases in the level of adequate Food or H&E).
 - WHO within the World Bank or within countries?
 - And HOW?
- Challenges posed for “prioritization” among broad sectoral policies
 - Perhaps it is best to raise adequacy in C, F, and H&E, to some minimum level before prioritization among interventions against malnutrition becomes a meaningful concern

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Thank you

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Appendix

Thresholds for water and sanitation

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Improved Sources of drinking water

"Improved" sources water

Piped water into dwelling
Piped water to yard/plot
Public tap or standpipe
Tubewell or borehole
Protected dug well
Protected spring
Rainwater collection

"Unimproved" sources water

Unprotected spring
Unprotected dug well
Cart with small tank/drum
Tanker-truck
Surface water (river, dam, lake, pond, stream, canal, irrigation channels)
Bottled water; bottled water is improved only if a secondary source of improved water for other uses (personal hygiene and cooking)-- DHS does not distinguish so put it in "unimproved"

Source: WHO and UNICEF (2006) "Core questions on drinking-water and sanitation for household surveys"

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Improved Sanitation *

"Improved" sanitation facilities

Flush toilet

- Piped sewer system
- Septic tank
- Pit latrine
- Special case "flush/pour flush to unknown place/not sure/DK where" as respondents might not know if their toilet is connected to a sewer or septic tank

Ventilated improved pit latrine (VIP)

Pit latrine with slab

Composting toilet

"Unimproved" sanitation facilities

Flush/pour flush to elsewhere

Pit latrine without slab

Bucket

Hanging toilet or hanging latrine

No facilities or bush or field

* Lack of data on shared facilities status

Source: WHO and UNICEF (2006) "Core questions on drinking-water and sanitation for household surveys"

Table 5: Comparability of indicators across years and countries pl

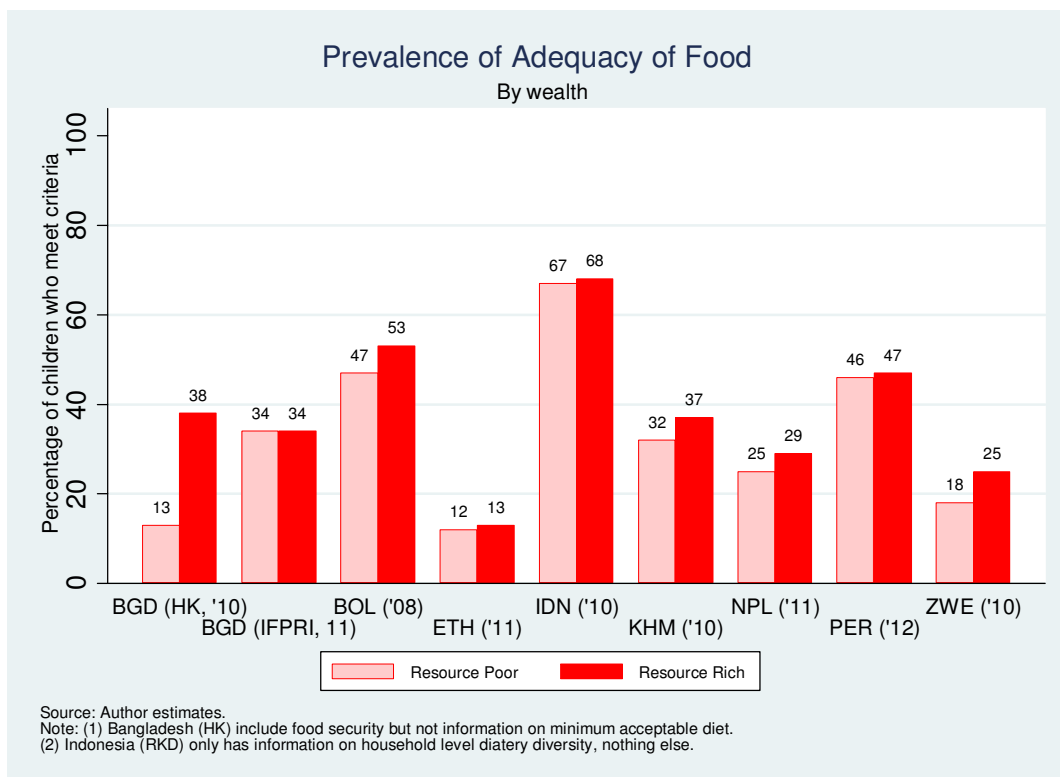
Table 5: Comparability of indicators across years and countries pl																					
Country and data year	Maximum age (months)	Food					Environmental health						Care								
		Dietary diversity	Food security	Meal frequency	Acceptable diet	Second round comparable to first round	Comparable across countries	Improved sanitation	Community sanitation	Access to safe water	Vaccinations	Prenatal checkups	Vitamin A supplementation	Second round comparable to first round	Comparable across countries	Exclusive breastfeeding	Immediate skin-to-skin contact	Complementary feeding (6-8 months)	Breastfeeding for 24 months	Second round comparable to first round	Comparable across countries
Cambodia (2005)	24	Y	N	Y	Y		A	Y	Y	Y	Y	Y	Y		A	Y	Y	Y	Y		A
Cambodia (2010)	24	Y	N	Y	Y	Y	A	Y	Y	Y	Y	Y	Y	Y	A	Y	Y	Y	Y	Y	A
Ethiopia (2000)	36	Y	N	Y	Y		B	Y	Y ²	Y	Y	Y	Y		C	Y	Y	Y	Y		B
Ethiopia (2011)	36	Y	N	Y	Y	Y	B	Y	Y ²	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	Y	B
Nepal (2000)	36	Y	N	Y	Y		B	Y	Y ²	Y	Y	Y	Y		C	Y	Y	Y	Y		B
Nepal (2012)	36	Y	N	Y	Y	Y	B	Y	Y ²	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	Y	B
Bolivia (2003)	36	Y	N	N	N			N	N	Y	Y	Y	N			Y	Y ⁴	Y	Y		C
Bolivia (2008)	36	Y	N	Y	Y	Y	B	N	N	Y	Y	Y	Y	N		Y	Y ⁴	Y	Y	Y	C
Peru (2005)	36	Y	N	Y	Y		B	Y	Y	Y	Y	Y	Y		B	Y	Y ⁴	Y	Y		C
Peru (2012)	36	Y	N	Y	Y	Y	B	Y	Y	Y	Y	Y	Y	Y	B	Y	Y ⁴	Y	Y	Y	C
Zimbabwe (2005)	24	Y	N	Y	Y		A	Y	Y	Y	Y	Y	Y		A	Y	Y	Y	Y		A
Zimbabwe (2010)	24	Y	N	Y	Y	Y	A	Y	Y	Y	Y	Y	Y	Y	A	Y	Y	Y	Y	Y	A
Bangladesh (HK, 2010)	24	Y	Y	N	N			Y	Y ²	Y	Y	Y	Y ³			Y	Y	Y	Y		A
Bangladesh (HK, 2011)	24	Y	Y	N	N	Y		Y	Y ²	Y	N	Y	Y ³	N		Y	Y	Y	Y	Y	A
Bangladesh (IFPRI, 2011)	24	Y	N	Y	Y	n/a	A	Y	Y	Y	Y	Y	Y	n/a	A	Y	N	Y	Y	n/a	
Indonesia (RKD, 2010)	24	Y ¹	N	N	N	n/a		Y	N	Y	Y	N	N	n/a		Y	Y	Y	Y	n/a	

NOTES: Y = yes, N = no; ¹At the household level instead of child-specific; ²Community sanitation not included in the environment adequacy measure used in the regressions (only in summary statistics); ³Vitamin A supplementation information asked for only 6 to 24 month olds; ⁴Within first 100 minutes (not 60 minutes) as is used in the other countries.

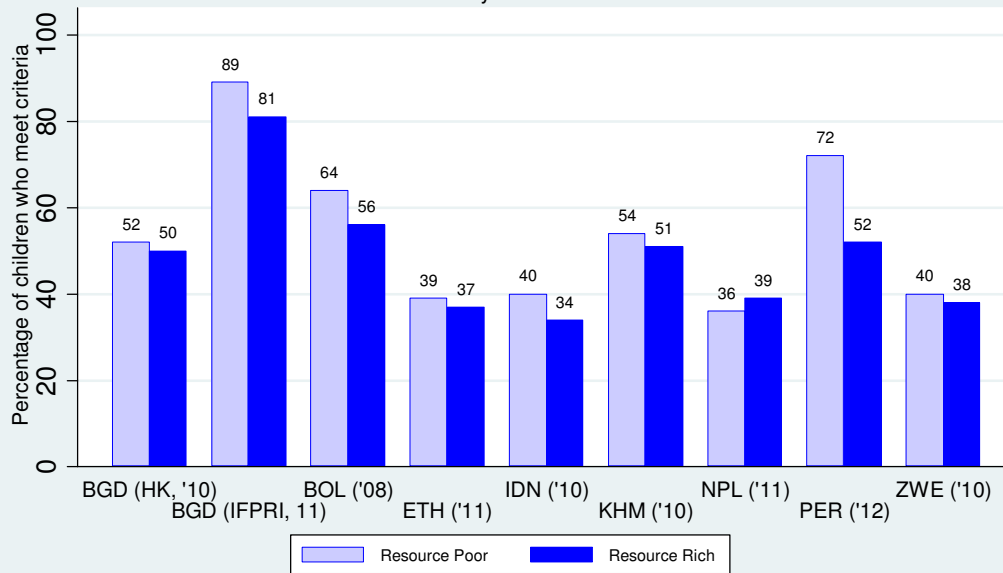
Adequacies by wealth group

- **Adequate food** is slightly higher among resource-rich children,
 - with larger differences in Bangladesh HK and Zimbabwe.
- In most countries the prevalence of adequate care is higher among resource-poor children
 - Resource rich mothers working → compromises care
 - breastfeeding and care is easier to intervene than other sectors such as water and sanitation.
- Most countries have very low prevalence of **adequate environmental health**

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Prevalence of Adequacy of Care By wealth



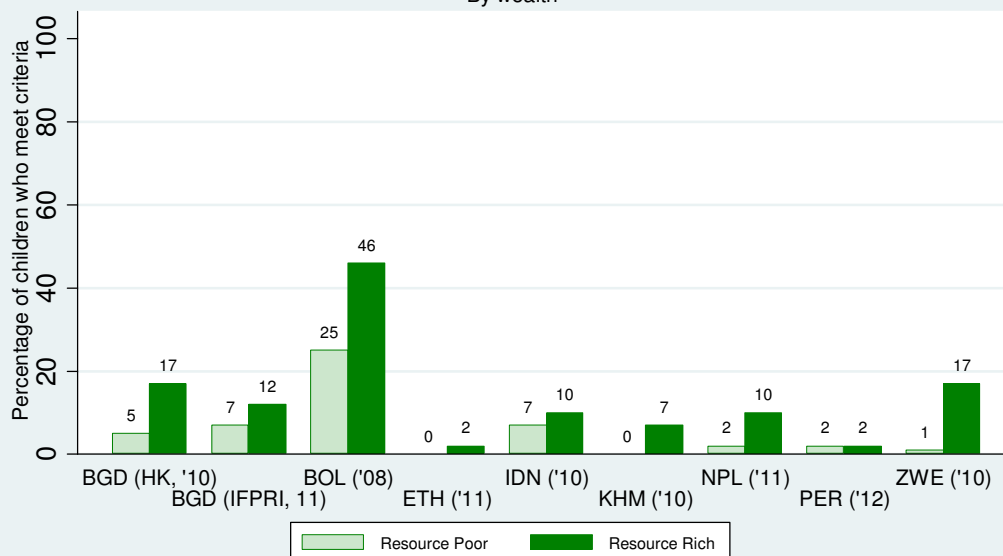
Source: Author estimates.

Note: (1) In Peru and Bolivia early initiation of breastfeeding is within 100 minutes, not within 60 minutes as in others.

(2) Bangladesh (IFPRI) does not include information on early initiation of breastfeeding

(3) Indonesia does not include information on complementary feeds for 6 to 8 month olds.

Prevalence of Adequacy of Environmental Health By wealth



Source: Author estimates.

Note: (1) Bolivia does not include improved sanitation.

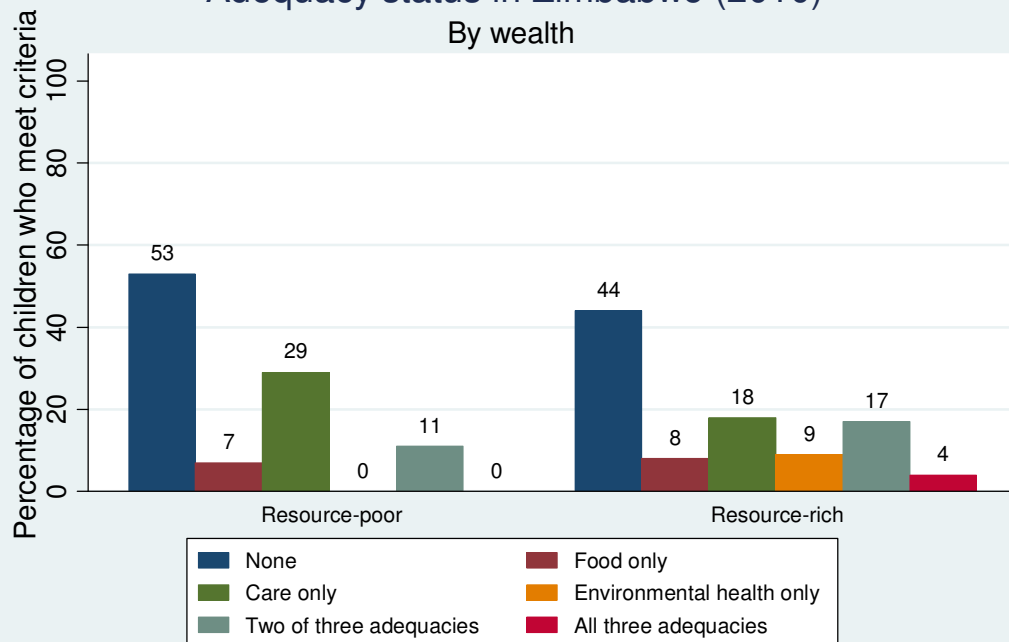
(2) Ethiopia, Nepal, Bolivia, and Indonesia do not include community sanitation.

(3) Bangladesh (IFPRI) has Vitamin A supplementation for 6 to 24 month olds only.

(4) Indonesia does not have information on prenatal checkups or Vitamin A supplementation.

Adequacy status in Zimbabwe (2010)

By wealth



Source: Author estimates.