

Targeting Child Undernutrition in India: Empirical Evidence and Policy Insights

Intellectual Capacity Building and Faculty Development
13th February 2021

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Why Child Undernutrition?



- A chronic state of insecurity in the availability and accessibility to food can be considered a failure from an intrinsic human rights perspective.
- Adequate nutritional intake – at early stage – is an intrinsic requisite for a healthy life – but is also instrumental for human capital formation, productivity gains.
- *‘The National Nutrition Strategy of India emphasises on nutritional well-being as ‘one of the most effective entry points for human development, poverty reduction and economic development, with high economic returns’ (NITI Aayog, 2017, p.6).*
- Investing **1\$** in nutrition-related interventions will have economic gains of about **19 to 22\$**.

Child Undernutrition in India: Some Facts

- The nutritional status of children in India fares much worse in global comparisons, as is apparent from various international indices and rankings.
- Global Hunger Index 2020 rankings places India at 102nd position out of 109 countries.
- **Nine out of every ten** children (6-23 months) in India do not receive recommended diet (NFHS 2016)
- **Every second under-five child** in India suffers from some form of nutritional failure (stunting/underweight/wasting).
- Recently released first phase of NFHS 5 reports (for 22 states) also reflects a deteriorating situation – further intensified due to **COVID-19 related disruptions**.

At Policy Front



- Nutrition Programs: Special Nutrition Program (1970); *Balwadi Nutrition Programme (1970)*; Integrated Child Development Services (1975); Mid-day Meal Scheme (1995); National Food Security Mission (2007).
- **POSHAN *Abhiyaan*** – (previously National Nutrition Mission) launched in 2018.
- Applaudable for escalating momentum in policy efforts at all levels – Research, Policy, Political, Bureaucratic, Administrative, and Implementation-level.
- The flagship program takes explicit cognizance of longstanding barriers – primarily, governance and implementation.

At Policy Front

POSHAN *Abhiyaan* – *Strategies*

- Strengthening policy implementation (at central and state level)
- To improve targeting (identification of high burden districts),
- Enhance multi-sectoral convergence,
- Develop innovative service delivery models and
- Rejuvenate counselling and community-based monitoring.

POSHAN *Abhiyaan* – *Goals*

- Reduce child stunting, underweight and low birth weight by **2 percentage points per annum**
- Reduce Child Anemia (young females) by **3 percentage points per annum**

Why Evidence-based policy making?

- To translate such intent into action requires meaningful insights on a range of policy issues.
- Given the vast diversity in sociocultural contexts, analytical details can be instrumental for administrative planning and targeting.
- Programmatic concerns that require substantial local-level insights for strategic feedback and course corrections to achieve accelerated reductions
- Identifying source of reductions (Population sub-groups).

Policy Questions in Nutrition discourse – Targeting Strategies

- **Multisectoral Convergence** – What are the possible contributions from concerned sector/department?
- Does the **choice of metric** matters? (Prevalence/Absolute Headcount/Mixed Index)
- Which **Anthropometric Indicator** to target? (Stunting/Wasting/Underweight) - Is there a need to modify the measure/indicator for policy targeting?
- Which geographical-level to be considered as a policy target unit? (State/District/Villages/Blocks)

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Multisectoral Convergence – Unravelling sector-specific potential contributions



Child Undernutrition and Convergence of Multisectoral Interventions in India: An Econometric Analysis of National Family Health Survey 2015–16

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Background and Motivation

- Child undernutrition is a multifaceted problem.
- Individual diets and risk of infections are identified as the immediate causes.
- Shaped by household food insecurity, vulnerable living environment as well as poor health care access and practices.
- At meso-level - a range of social, economic and political factors and processes
- The task of addressing child undernutrition, therefore, calls for multisectoral response

Background and Motivation

- Currently, a strong commitment to integrate multisectoral convergence – POSHAN *Abhiyaan* and Aspirational Districts.
- The extent of synergistic effect that may arise remains unclear.
- Onus is usually entrusted to departments concerning health care or women and child development.
- Absence of empirical assessments of the prospective roles of relevant sectors for reinforced action and shared accountability.

Study Objectives

- Potential reduction in child undernutrition with successful convergence.
- Contribution of specific interventions classified six developmental sectors:
 - Health (MoHFW),
 - Women and child development (MoWCD),
 - Education (MoE),
 - Water, Sanitation and Hygiene (MoJS)
 - Clean Energy (MoPNG),
 - Growth Sector (Long Term)

Data and Methods

- National Family Health Survey, 2016, Government of India.
- The final analytic sample was 45288 singleton children aged 12-23 months.
- Outcomes –
 - Child Stunting – short height-for-age (z-scores less than -2SD)
 - Child Underweight – low weight-for-age (z-scores less than -2SD)
- Key Interventions/Covariates - **23 predictors** were identified to have a direct or indirect bearing on child nutritional outcomes in prior studies classified under 6 sectors

Statistical Analysis

- Prevalence Estimates – Cross Tabs
- Relative risks based on post-estimations from multivariate logistic regression were used to compute *Population Attributable Risk (PAR)* for child stunting and underweight.
- PAR (expressed as percentage) shows the proportion of child stunting and underweight that can be attributed to the selected predictor(s).
- Based on Comparison between observed and counterfactual (ideal) scenarios.
- The estimations were carried out using Stata (15.0 version) and the package '**regpar**'

Prevalence of child stunting and underweight in India by selected intervention covariates, NFHS 2015-16

| Health Sector (MoHFW) | Stunting | | Underweight | |
|-------------------------------|----------------|--------------|----------------|--------------|
| | Prevalence (%) | 95% CI | Prevalence (%) | 95% CI |
| Institutional Delivery -Yes | 40.4 | [39.8; 40.8] | 32.5 | [32.1; 33.1] |
| Institutional Delivery -No | 53.1 | [52.1; 54.1] | 46.6 | [45.6; 47.6] |
| 4+ ANC Visits – Yes | 36.1 | [35.4; 36.7] | 28.9 | [28.2; 29.5] |
| 4+ ANC Visits – No | 49.1 | [48.4; 49.7] | 41.8 | [41.2; 42.4] |
| Full Immunization -Yes | 40.8 | [40.2; 41.3] | 33.5 | [32.9; 34.1] |
| Full Immunization -No | 45.9 | [45.1; 46.6] | 37.7 | [37.1; 38.4] |
| Vitamin-A Supplement - Yes | 40.9 | [40.2; 41.4] | 33.9 | [33.4; 34.5] |
| Vitamin-A Supplement -No | 46.1 | [45.3; 46.8] | 37.4 | [36.6; 38.1] |
| Breastfed within 1 hour - Yes | 41.6 | [40.9; 42.3] | 34.1 | [33.4; 34.7] |
| Breastfed within 1 hour – No | 43.6 | [42.9; 44.2] | 36.1 | [35.4; 36.7] |
| 100+ IFA -Yes | 36.2 | [35.4; 37.1] | 29.1 | [28.2; 29.8] |
| 100+ IFA - No | 43.2 | [42.5; 43.9] | 35.9 | [35.2; 36.5] |
| Deworming Dose – Yes | 40.8 | [39.9; 41.6] | 33.6 | [32.8; 34.5] |
| Deworming Dose – No | 43.5 | [42.9; 44.0] | 35.7 | [35.2; 36.2] |
| Diarrhoea – Yes | 44.6 | [43.4; 45.9] | 40.3 | [39.1; 41.5] |
| Diarrhoea – No | 42.3 | [41.8; 42.8] | 34.3 | [33.8; 34.7] |
| Cough – Yes | 41.7 | [40.5; 42.9] | 35.1 | [33.9; 36.3] |
| Cough – No | 42.8 | [42.3; 43.3] | 35.1 | [34.6; 35.6] |
| Birth Order > 3 – Yes | 50.9 | [50.1; 51.7] | 43.5 | [42.7; 44.3] |
| Birth Order > 3 – No | 39.3 | [38.7; 39.8] | 31.7 | [31.2; 32.2] |
| Maternal Anemia – Yes | 43.4 | [42.7; 44.0] | 36.5 | [35.9; 37.1] |
| Maternal Anemia – No | 39.9 | [39.1; 40.6] | 31.2 | [30.4; 31.9] |

Prevalence of child stunting and underweight in India by selected intervention covariates, NFHS 2015-16

| Women and Child Development Sector (MoWCD) | Stunting | | Underweight | |
|--|----------------|--------------|----------------|--------------|
| | Prevalence (%) | 95% CI | Prevalence (%) | 95% CI |
| Full Dietary Diversity -Yes | 37.1 | [36.0; 38.2] | 27.9 | [26.9; 28.9] |
| Full Dietary Diversity – No | 43.8 | [43.3; 44.5] | 36.6 | [36.1; 37.1] |
| Low Birth Weight - Yes | 49.9 | [48.6; 51.1] | 46.6 | [45.3; 47.8] |
| Low Birth Weight – No | 41.4 | [40.9; 41.9] | 33.1 | [32.6; 33.6] |
| ICDS Benefits - Mother – Yes | 43.7 | [43.1; 44.3] | 37.2 | [36.6; 37.8] |
| ICDS Benefits - Mother – No | 41.2 | [40.5; 41.9] | 32.2 | [31.5; 32.8] |
| ICDS Benefits - Child –` Yes | 43.5 | [42.9; 44.1] | 36.9 | [36.4; 37.5] |
| ICDS Benefits - Child – No | 41.1 | [40.4; 41.9] | 31.8 | [31.1; 32.5] |
| Child Marriage – Yes | 47.8 | [47.0; 48.5] | 40.3 | [39.5; 41.0] |
| Child Marriage – No | 39.6 | [39.0; 40.1] | 31.9 | [31.4; 32.5] |
| Low BMI - Yes | 48.7 | [47.8; 49.6] | 46.9 | [46.0; 47.8] |
| Low BMI - No | 40.2 | [39.6; 40.7] | 30.3 | [29.8; 30.8] |

Prevalence of child stunting and underweight in India by selected intervention covariates, NFHS 2015-16

| Water and Sanitation Sector (MoJs) | Stunting | | Underweight | |
|------------------------------------|----------------|--------------|----------------|--------------|
| | Prevalence (%) | 95% CI | Prevalence (%) | 95% CI |
| Improved Sanitary Facility – Yes | 35.0 | [34.3; 35.6] | 25.8 | [25.2; 26.3] |
| Improved Sanitary Facility – No | 49.4 | [48.8; 50.0] | 43.3 | [42.7; 43.9] |
| Safe Stool Disposal – Yes | 34.3 | [33.5; 35.1] | 25.8 | [24.9; 26.4] |
| Safe Stool Disposal – No | 46.2 | [45.6; 46.7] | 39.1 | [38.5; 39.6] |
| Education Sector (MoE) | | | | |
| Maternal Matriculation – Yes | 35.1 | [34.5; 35.6] | 27.5 | [26.9; 28.0] |
| Maternal Matriculation – No | 53.4 | [52.6; 54.1] | 45.8 | [45.1; 46.5] |
| Energy Sector (MoPNG) | | | | |
| Clean Cooking Fuel – Yes | 32.4 | [31.6; 33.2] | 23.5 | [22.7; 24.2] |
| Clean Cooking Fuel – No | 47.9 | [47.3; 48.4] | 41.1 | [40.5; 41.6] |
| Growth Sector – Long Term | | | | |
| Poor | 51.8 | [51.1; 52.4] | 45.8 | [45.1; 46.4] |
| Rich | 34.7 | [34.1; 35.3] | 25.8 | [25.2; 26.4] |
| Maternal Height > 145cm – Yes | 39.8 | [39.4; 40.3] | 25.8 | [25.3; 26.4] |
| Maternal Height > 145cm – No | 62.9 | [61.5; 64.2] | 52.3 | [50.9; 53.6] |

Population Attributable Risk (PAR) estimates for child stunting and underweight (12-23 months) associated with selected factors, India, NFHS 2015-16

| Health Sector (MoHFW) | Stunting | | Underweight | |
|---------------------------|-------------|---------------------|-------------|---------------------|
| | PAR (%) | 95% CI | PAR (%) | 95% CI |
| Institutional Delivery | 0.31 | [0.06; 0.51] | 0.29 | [0.07; 0.51] |
| 4+ ANC Visits | 1.19 | [0.68; 1.71] | 1.51 | [1.02; 2.01] |
| Full Immunization | 0.22 | [-0.06; 0.61] | -0.03 | [-0.40; 0.33] |
| Vitamin-A Supplement | 0.27 | [-0.10; 0.64] | -0.34 | [-0.69; 0.01] |
| Breastfed within 1 hour | 0.53 | [-0.09; 1.14] | 0.82 | [0.24; 1.14] |
| 100+ IFA | -0.01 | [-0.84; 0.67] | 0.70 | [-0.03; 1.43] |
| Deworming Dose | 0.03 | [-1.10; 0.490] | -0.36 | [-1.16; 0.42] |
| Diarrhea | 0.06 | [-0.16; 0.28] | 0.39 | [0.18; 0.61] |
| Cough | 0.01 | [-0.03; 0.01) | -0.18 | [-0.39; 0.03] |
| Birth Order > 3 | 1.14 | [0.77; 1.51] | 0.95 | [0.58; 1.31] |
| Maternal Anemia (Any) | 0.61 | [-0.07; 1.29] | 1.46 | [0.82; 2.11] |
| All | 3.71 | [1.81; 5.15] | 3.72 | [2.52; 6.43] |

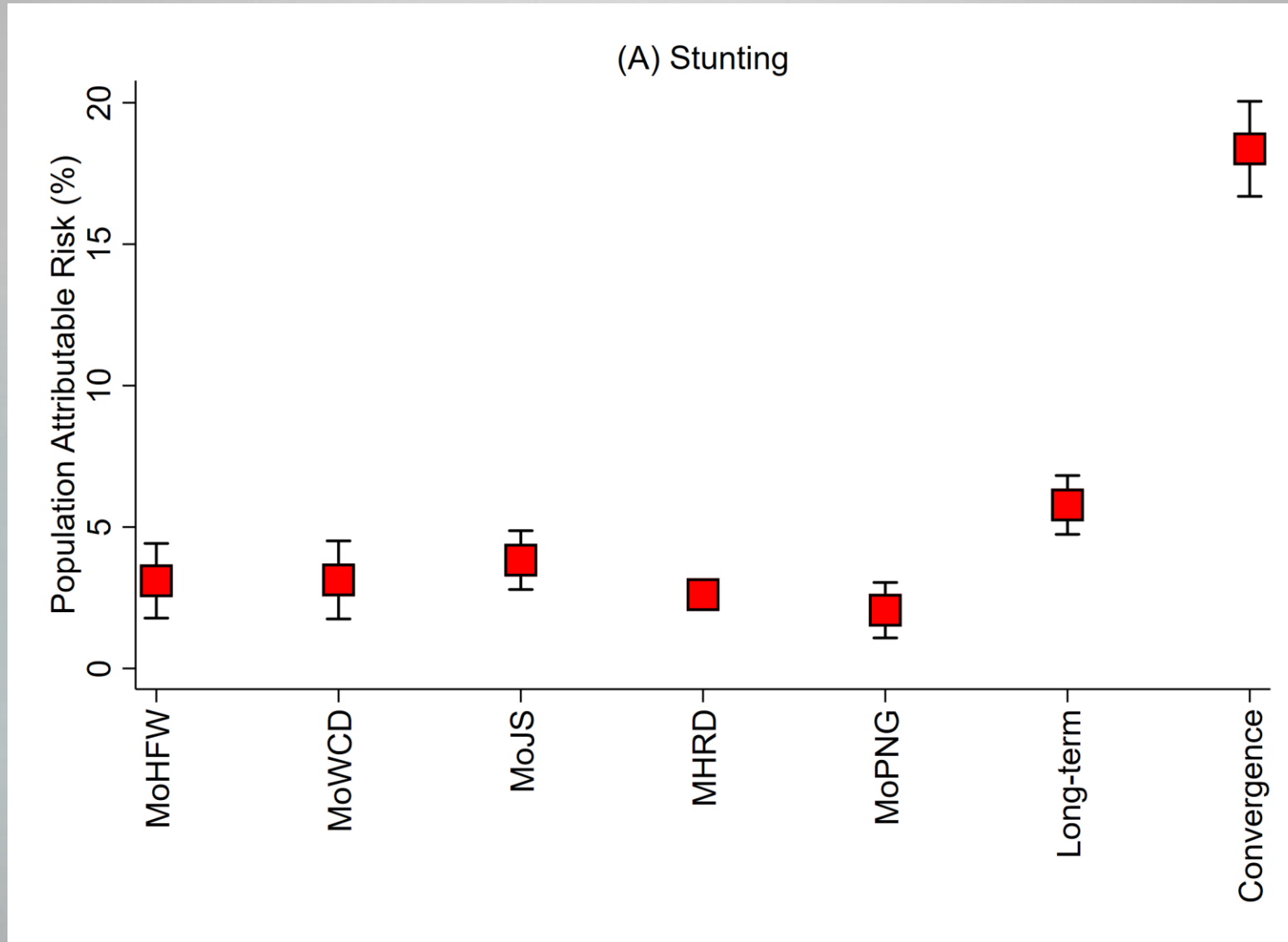
Population Attributable Risk (PAR) estimates for child stunting and underweight (12-23 months) associated with selected factors, India, NFHS 2015-16

| Women and Child Development Sector (MoWCD) | Stunting | | Underweight | |
|---|-------------|---------------------|-------------|----------------------|
| | PAR (%) | 95% CI | PAR (%) | 95% CI |
| Full Dietary Diversity | 1.35 | [0.17; 2.53] | 3.53 | [2.42; 4.64] |
| Low Birth Weight | 1.46 | [1.21; 1.70] | 2.12 | [1.88; 2.36] |
| ICDS Benefits - Mother | -0.04 | [-1.10; 1.11] | -0.88 | [-1.38; -0.39] |
| ICDS Benefits - Child | -0.01 | [-0.51; 0.47] | -0.31 | [-0.75; 0.12] |
| Child Marriage | 0.78 | [0.32; 1.23] | 0.71 | [0.27; 1.15] |
| Maternal Low BMI | 1.83 | [1.44; 2.22] | 3.98 | [3.60; 4.36] |
| All | 4.94 | [3.56; 6.33] | 8.92 | [7.69; 10.14] |
| Water, Sanitation and Hygiene Sector (MoJS) | | | | |
| Improved Sanitary Facility | 1.69 | [0.97; 2.41] | 3.35 | [2.65; 4.05] |
| Safe Stool Disposal | 2.15 | [1.23; 3.08] | 2.03 | [1.12; 2.94] |
| All | 3.83 | [2.81; 4.86] | 5.29 | [4.31; 6.27] |

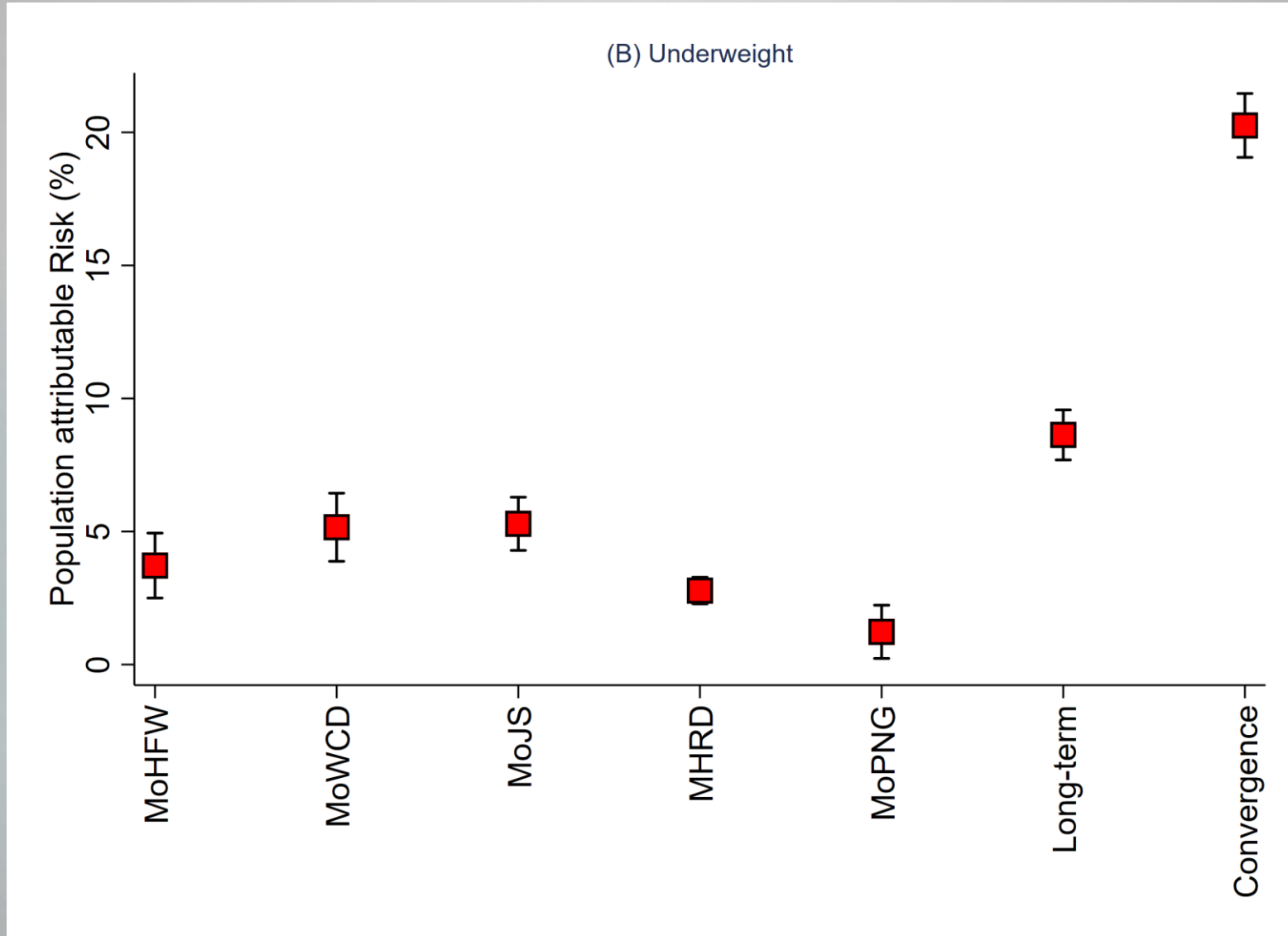
Population Attributable Risk (PAR) estimates for child stunting and underweight (12-23 months) associated with selected factors, India, NFHS 2015-16

| Education Sector (MoE) | Stunting | | Underweight | |
|--|--------------|-----------------------|--------------|-----------------------|
| | PAR (%) | 95% CI | PAR (%) | 95% CI |
| Maternal Matriculation | 2.61 | [2.11; 3.11] | 2.78 | [2.29; 3.27] |
| All | 2.61 | [2.11; 3.11] | 2.78 | [2.29; 3.27] |
| Energy Sector | | | | |
| Clean Cooking Fuel | 2.06 | [1.08; 3.03] | 1.23 | [0.24; 2.21] |
| All | 2.06 | [1.08; 3.03] | 1.23 | [0.24; 2.21] |
| Growth Sector / Long term factors | | | | |
| Richer | 1.48 | [0.78; 2.17] | 1.76 | [1.07; 2.45] |
| Maternal Height > 145cm | 1.85 | [1.63; 2.06] | 1.61 | [1.40; 1.82] |
| All | 3.34 | [2.63; 4.06] | 3.37 | [2.66; 4.07] |
| Convergence of All Sectors | 18.37 | [16.77; 19.95] | 20.26 | [19.13; 21.39] |

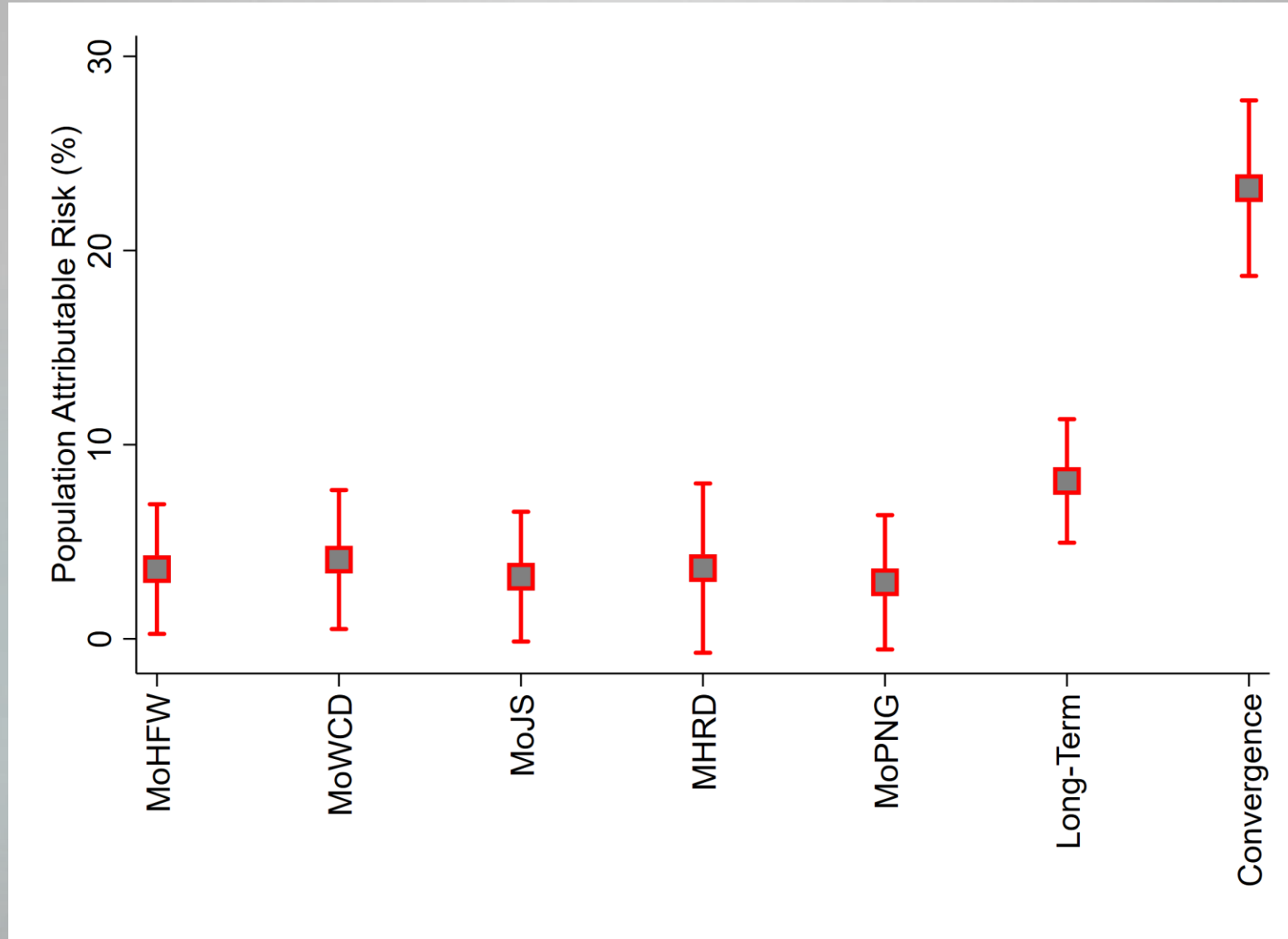
Population Attributable Risk (PAR) estimates for child stunting (12-23 months) associated with selected factors, India, NFHS 2015-16



Population Attributable Risk (PAR) estimates for child underweight (12-23 months) associated with selected factors, India, NFHS 2015-16



Population Attributable Risk (PAR) estimates for child stunting (12-23 months) associated with selected factors for 115 Aspirational Districts, India, NFHS 2015-16



Key Findings

- Convergent action can substantially reduce the burden of child undernutrition levels – **about 18 and 20 percentage points** in stunting and underweight, respectively.
- Sectors with less salience in policy discourse have the greatest potential - **successful scaling up of water, sanitation and hygiene initiatives can contribute significantly**
- Growth sector is instrumental to bring about improvements in child undernutrition via long-term factors like household health and economic well-being.
- Contributions are higher among 115 aspirational districts than for all districts combined, thus indicating greater relevance of **convergence in resource-poor settings**.

Further Concerns and Way Forward

- Challenge to ensure a coordinated response at higher levels of decision making - convenient at village-level activities and meetings with frontline workers.
- Substantial role of the water, sanitation and hygiene sector, education sector, and energy sector.
- Addressing other supply-side bottlenecks - access to water in toilets, geographical access to community toilets which are far from households – especially for female adults and girls.
- Liquified Petroleum Cylinders (LPG) to low-income households is welcoming (*Pradhan Mantri Ujjawala Yojana*) - **the policy should be expanded with provisions for ensuring sustained use among the new beneficiaries.**

Further Concerns and Way Forward

- Robust economic environment - improvements in real wage, and income inequality - must complement convergence efforts.
- Limitations –
 - Cross sectional nature of data - restrict causality – but association
 - Analytical limitations – sample restricted to 12-23 months
 - Absence of information on various supply-side bottlenecks
 - Data Specific limitations – contribution of food subsidies – PDS, MGNREGA

Key Takeaways

- Empirical evidence supporting that multisectoral convergence is critical to bring together nutrition-specific and nutrition-sensitive interventions across different sectors.
- Improvements in programmatic design is required to ensure convergent action from key line departments such as education and clean energy.
- Contributions from education and hygiene sector are notable.
- All-encompassing growth sectors to ensure greater action in boosting nutrition well-being.

Thank You !

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Does the choice of metric matters? (Prevalence/Absolute Headcount)

Social Indicators Research

<https://doi.org/10.1007/s11205-020-02467-9>

ORIGINAL RESEARCH



Does the Choice of Metric Matter for Identifying Areas for Policy Priority? An Empirical Assessment Using Child Undernutrition in India

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Accepted: 7 August 2020

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Background and Motivation

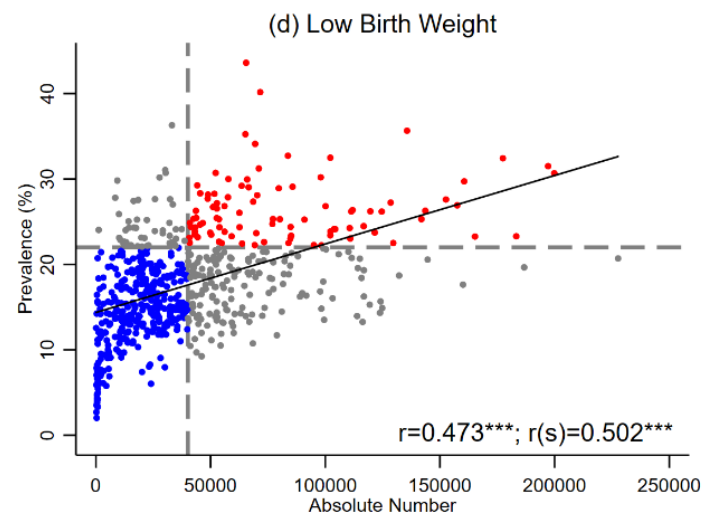
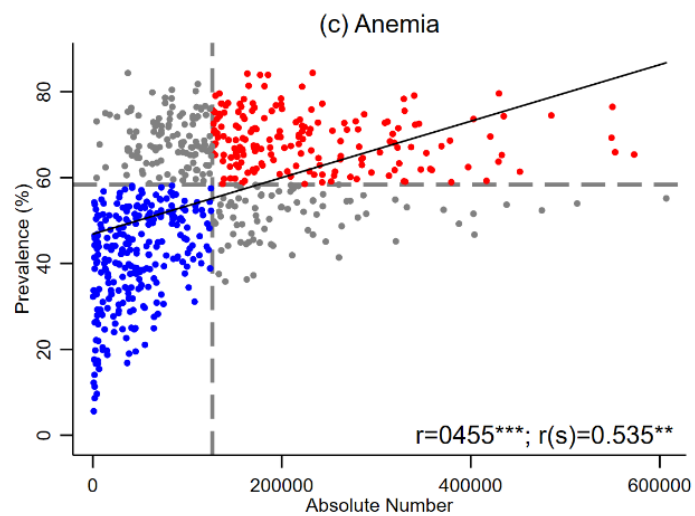
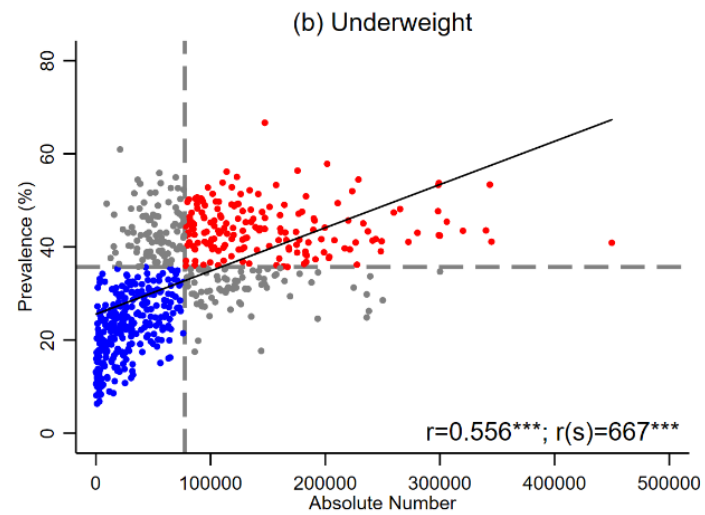
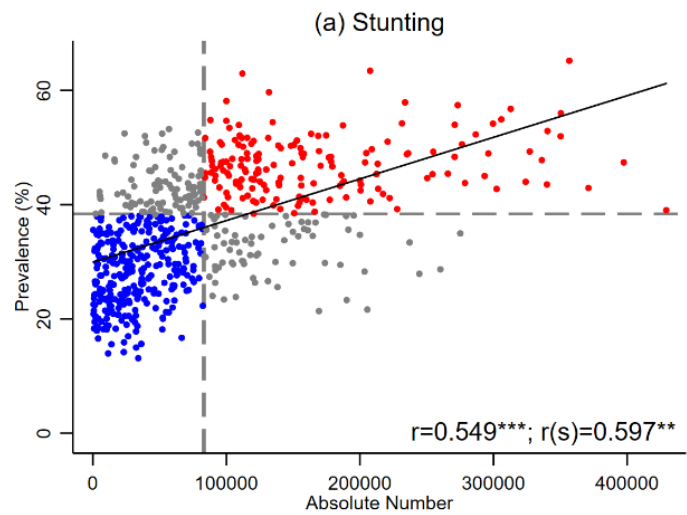
- Ratio-based prevalence - by far the most widely used metric to rank the burden across different populations, often defined in terms of geographical areas.
- Global Hunger Index is primarily derived from P of child undernutrition – other prioritizations as well.
- Two Fundamental problems
 - Does not consider the absolute size of the total population
 - Violates the ‘constituency principle’ - (Broome 1996)
- Absolute headcount - does not comply with “*probability Principle*”

Background and Motivation

- Tension between Prevalence and Absolute headcount is seldom discussed in public health and allied discourse. – **No empirical work to underline the discordance.**
- Prevalence based Prioritization - Aspirational Districts; POSHAN *Abhiyaan*.
- To assess the differentials in district ranking (policy priority) by three metrics of Prevalence Absolute, and Mixed Index.

Methods

- Prevalence = $P_j = \frac{q_j}{n_j} * 100$)
- Absolute Headcount= q (i.e., total number of children with nutrition failures)
- Mixed index - $M = PA^{(\frac{1}{2})}$
- Districts were ranked based on all three metrics



Target Coverage of Undernourished Children by Different Metrics, India, NFHS, 2016

| Target | Prevalence (%) ¹ | Percentage Share in Total Undernourished Children (N – in Millions) |
|---------------------------------|-----------------------------|--|
| Stunting | | |
| Aspirational Districts | | |
| AD 115 Districts | 44.2 | 20.4 (10.9) |
| Bottom 115 (by P) | 50.7 | 31.4 (16.7) |
| Bottom 115 (No. of Stunted) | 42.7 | 45.8 (24.3) |
| Bottom 115 (by M) | 46.6 | 44.5 (23.7) |
| POSHAN Abhiyaan | | |
| 315 Districts (in Phase 1) | | |
| Bottom 315 (by P) | 45.2 | 69.4 (36.9) |
| Bottom 315 (by A) | 43.1 | 81.5 (43.4) |
| Bottom 315 (by M) | 43.8 | 81.0 (43.1) |
| Underweight | | |
| Aspirational Districts | | |
| AD 115 Districts | | |
| Bottom 115 (by P) | 49.0 | 26.0 (12.8) |
| Bottom 115 (No. of Underweight) | 40.9 | 45.5 (22.5) |
| Bottom 115 (by M) | 43.4 | 44.7 (22.2) |
| POSHAN Abhiyaan | | |
| 315 Districts (in Phase 1) | | |
| Bottom 315 (by P) | 42.3 | 71.9 (35.6) |
| Bottom 315 (No. of Underweight) | 41.6 | 82.2 (40.6) |
| Bottom 315 (by M) | 42.0 | 81.6 (40.4) |

Key Findings

- Moderate correlation between child undernutrition estimates based on *Prevalence (risk)* and *Absolute (burden)* – Metric does matter.
- Substantial variations in district ranking between *Prevalence* and *Absolute* - reinforces the need to consider both metrics for policy setting.
- A strong correlation of *Mixed Index* with both the metrics *Prevalence* and *Absolute* - *Mixed Index* captures relatively higher burden.
- Typology - I) high risk / high burden II) high risk / low burden III) low risk / high burden and IV) low risk / low burden

Way Forward

- Utility of any metric depends on the purpose for which it is employed.
- Developing countries like India – along with other development concerns – critical to adopt appropriate metric for targeting and prioritize.
- Local Area Variation within macro policy units.
- Ranking also varies across indicators.