Early Childhood Human Capital Formation at Scale

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1. Motivation

- **Policy problem:** How can developing countries deliver promising early childhood development (ECD) programs at scale?
- **ECD is critical for better long run social and economic outcomes (Almond & Currie 2011, Black et al. 2017)**
- **Efficacy trials of ECD parenting programs in Jamaica and US show notable improvements in employment, earnings, and health (Heckman et al. 2010, Gertler et al. 2021)**
- **Less is known about how to scale these programs, esp. in low-income settings with resource-poor governments**

2. The Early Childhood Stimulation Program

*Designed by Save the Children, integrated into the existing National Nutrition Services (NNS) program*

**ECD Materials:** Child Development Card, Household & Nature Picture Books, and Key Message Picture Book

**Counseling of parents/caregivers on stimulation practices**

**Delivery mechanism:** Home visits by NNS health-workers (no additional incentives)

3. The National Nutrition Services Program

*Flagship government program to address malnutrition:*

- **Promotion of positive nutrition practices**
- **Provision of micro-nutrient supplements + de-worming medication**
- **Growth monitoring sessions + malnutrition screening**
- **Referral services for maternal and child malnutrition**

4. Experimental Design

- **Location:** 3 districts in Barisal, Chittagong, and Syed
  - 30 unions with ≥ 2 community clinics → 78 community clinics
- **Eligibility:** Children aged 0-18 months
- **Sampling:** 33 eligible households from each of the 78 community clinic catchment areas → 2,574 households
- **Randomization:** Community clinic-level clustered randomization (treatment vs. “business as usual” control)

5. Empirical Strategy

**ITT analysis:** ANCOVA specification. For child i in community clinic catchment area j:

\[ Y_{ijt+1} = \beta_0 + \beta_T T_{ij} + \beta_Y Y_{ijt} + \beta_X X_{ijt} + \epsilon_{ijt+1} \]

- \( Y_{ijt+1} = \) Outcome variable of interest measured at endline
- \( T_{ij} = \) Treatment indicator
- \( Y_{ijt} = \) Outcome variable of interest measured at baseline
- \( X_{ijt} = \) Child-level, parent-level, household-level controls

6. Results

**Reallocations of service-provider time spent with households**

<table>
<thead>
<tr>
<th>Number of minutes spent on:</th>
<th>Number of topics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Child Development Card</td>
<td>(1) Mother Household received</td>
</tr>
<tr>
<td>(2) Household Picture Book</td>
<td>(2) Child Stimulation</td>
</tr>
<tr>
<td>(3) Nature Picture Book</td>
<td>(3) Household Key Message Book</td>
</tr>
<tr>
<td>(4) ECD Nutritional Guide</td>
<td>(4) Any of the four SC materials</td>
</tr>
</tbody>
</table>

**Control Mean**

<table>
<thead>
<tr>
<th>Observations</th>
<th>122</th>
<th>122</th>
<th>122</th>
<th>122</th>
<th>122</th>
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</thead>
<tbody>
<tr>
<td>Weight-For-High</td>
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<td>217</td>
<td>217</td>
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</tr>
<tr>
<td>Wasted</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
</tr>
<tr>
<td>Stunted</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
</tr>
<tr>
<td>Weight-For-age Underweight</td>
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<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
<td>217</td>
</tr>
</tbody>
</table>

**Notes:** * p < 0.10, ** p < 0.05, *** p < 0.01. Standard errors in parentheses and clustered by community clinic. Units for dependent variables: minutes per household visit in the last working day. Union (strata) fixed effects are included in all regressions.

**Effect size in SD of the endline control group**

- Child Development: 0.49***
- Language: 0.49***
- Cognitive Composite: 0.48***
- Stimulation Knowledge: 0.16***
- Child Stimulation: 0.07***

7. Mechanisms

- **Maternal Agency**
  - Money
  - Food
  - Child Health
  - Child Stimulation
  - ECS Knowledge & Practices
  - Stimulation Knowledge
  - HOME Inventory
- **NNS Program Take-up**
  - Number of Growth Monitoring Check-ups
- **Variety of Play Materials & Learning Activities**
- **Father’s Variety of Learning Activities**
- **Mother’s Variety of Learning Activities**

8. Cost-Benefit Analysis

**Cognitive skills:**
- Deming (2017): 1 SD ↗ cognitive skills → Wages ↑ 15.1%
- Program ITT impact: 0.17 SD ↗ in cognitive composite score

**Noncognitive skills:**
- Deming (2017): 1 SD ↗ social skills → Wages ↑ 3.7%
- Program ITT impact: 0.12 SD ↑ in Woko Index

Assuming additive separability → Wages ↑ 3%

Cost: $6.84 per child targeted

Program IRR: 19.6%

- Head Start: 7.9% (Deming, 2009)
- Perry Preschool Program: 7-10% (Heckman et al. 2010)

9. Policy Implications

- At-scale interventions can be highly cost-effective (IRR: 19.6%)
- Challenges pertaining to compliance and take-up remain

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I am a tenure-track assistant professor at the Lee Kuan Yew School of Public Policy at the National University of Singapore. I received my Ph.D. in Economics from New York University in 2019 and was a postdoctoral fellow at the University of California, Los Angeles from 2019 - 2020. My primary research interests are in development economics and applied microeconomics, particularly in the areas of human capital formation, migration, and digital financial services.

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