Home Visiting in Colombia: Impacts of a Scalable Intervention

Orazio Attanasio (UCL/IFS), Sarah Cattan (IFS), Emla Fitzsimons (IFS), Camila Fernandez (Mathematica), Sally Grantham-McGregor (UCL), Costas Meghir (Yale/IFS), Marta Rubio-Codina (IFS)
Promoting Human Capital: Early Years Interventions

- What happens in the early years has long lasting effects on the physical, emotional and economic wellbeing of individuals. Much evidence, including Walker et al (2005, 2006); Gertler et al (2012); Schweinhart et al. (2005); Hoddinott et al (2008); Maluccio et al (2009); etc.

- Research evaluating the impact of policies on adult outcomes suggests that early interventions yield higher returns. The idea was formalised by Cunha, Heckman and Schennach (2010).

- Well designed policies can have long lasting impacts.
  - Perry and Abecedarian
  - The Jamaica study
Home visits in Jamaica: long run impacts

IQ (or Griffiths developmental quotient) from enrolment (age 9–24 months) to age 17–18 years

Not stunted

Stunted (stimulation)

Stunted (no stimulation)

Griffiths on enrolment (9–24 months)

Griffiths (33–48 months)

Stanford-Binet (7–8 years)

WISC-R (11–12 years)

WAIS (17–18 years)

Test (age of participant)

ECD Interventions: Outstanding Issues

1. How to design scalable interventions that are both:
   ✓ cost effective?
   ✓ sustainable?

2. How do (can) these interventions affect household behaviour permanently, in terms of investments in children, crowding-in or crowding-out of resources?

3. What role do different inputs play – interactions?

4. Externalities in knowledge transmission: spillovers of these interventions in the family and the broader community?
A Colombian Intervention

• Design, implement and evaluate an intervention in Colombia, in collaboration with a Government Agency, including:
  1. Psycho-social stimulation via home visits;
  2. Micronutrient supplementation.

• Two new elements:
  1. **Intervention**: exploit the existence of a large conditional cash transfer program and use local resources (local women) for implementation
     → cost-effectiveness & scalability
  2. **Research Design**: collect detailed data to identify mechanisms:
     → Model the behavioural impact of the intervention
     → Characterize the process through which children develop as a function of different inputs
The Colombian Intervention: Main Innovative Element

• Since 2002, Colombia has had in place a Conditional Cash Transfer program, *Familias en Acción*, which is now the largest welfare program in the country.

• Beneficiary women elect a representative: *Madre Líder*

• *Madre Líderes* are distinguishable for their leadership skills and community networking abilities.

• We draw on these human resources available in the communities:
  → train and hire “*Madre Líderes*” to deliver the psycho-social stimulation curriculum through home visits
Using Community Resources

• Key Element for Scalability & Sustainability:
  1. Low(er) intervention costs
  2. Community mobilization and information spread: local women may become agents of change within their communities
  3. Communities may take ownership of the intervention
  4. Scheme easily replicable in other less developed contexts

• Challenges to Sustain Quality:
  1. Identify suitable women
  2. Adjust intervention to ability of home visitor and to delivery at scale
  3. Adequate training, continuous mentoring and supervision
The Colombian Intervention: Design

- Targeted to children aged 12-24 months in FeA beneficiary hhlds in 96 semi-urban communities in 3 regions
  - Poorest 20% of the population
  - Significant delays in development
  - 40% anaemic, 11% stunted

1. **Weekly Home Visits:**
   - lasting for 1 hour
   - delivered by specially trained “Madre Líderes”
   - based on the original Jamaican curriculum, adapted to the Colombian context and the intervention reality

2. **Micronutrient supplementation:**
   - Tasteless sprinkles, which are a mix of vitamins, iron and zinc
- The interventions lasted for 18 months, starting in Feb-May 2010
The Curriculum

- Promote cognitive and language development
- Mother focused: support the mother to promote her child’s development
- Teach through play:
  - rich in play materials
  - incorporate concepts/skills to be taught in daily routines
- Organised by weeks to match the developmental level of the child to the extent possible
- Keep costs down: use home-made toys, rotating toys

<table>
<thead>
<tr>
<th>Actividades</th>
<th>MES: 32</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEMANA: 1</td>
</tr>
<tr>
<td>Canción</td>
<td></td>
</tr>
<tr>
<td>Muñeca con carro</td>
<td></td>
</tr>
<tr>
<td>L6: “La camisa sucia”</td>
<td></td>
</tr>
<tr>
<td>Juego 7 – seguir las instrucciones III</td>
<td></td>
</tr>
</tbody>
</table>

**Canción**
Cante al niño una canción que usted escoja

**Muñeco de trapo con gorro y carro**

**Objetivo:** Que el niño disfrute de jugar con el juguete y aprenda los conceptos “parar” y “andar”, “rápido” y “despacio”, “cerca” y “lejos”.

**Instrucciones:** Deje que el niño juegue con el muñeco y el carro. Haga que el niño siga instrucciones como: “Para el carro cuando llegues a la puerta”, “anda otra vez”, “maneja rápido, ahora despacio”.

L6: “La camisa sucia”

**Objetivo:** Que el niño sea capaz de hablar acerca de las imágenes.

**Instrucciones:** Mire el libro con el niño y describa todo lo que el niño de las imágenes está haciendo (Por ejemplo “El niño se ensució su camisa” “El niño está abrazando a su mamá porque ella le lavó la camisa”). Enfóquese en nombrar la acción (por ejemplo viéndose, bañándose, comiendo, yendo a la cama). Luego pídale al niño que cuente qué está pasando en la historia (por ejemplo, que el niño está jugando en el charco o que la madre está lavando la camisa que el niño ensució). Pídale al niño que señale algunas ilustraciones como por ejemplo diciéndole “Dime ¿dónde está la camisa del niño? ¿dime cuál es el balde?”.

Haga que el niño represente lo que el niño de las imágenes está haciendo. Empiece a hacer preguntas sencillas al niño que le permitan hablar un poco más sobre la historia por ejemplo “¿por qué la mamá está lavando la camisa?”. A medida que se avance en el libro, tenga presente las situaciones en que se puedan utilizar las palabras de los diferentes grupos de conceptos del nivel 1 (húmedo, seco, grande, pequeño, encima, debajo, al lado, etc.).

**Juego de instrucciones III**

Usando una cuerda digale al niño que ponga su pie DEBAJO de la cuerda y ENCIMA de ella. Con la misma cuerda, digale al niño que SALTE sobre ella, que se DEVUELVA, que CORRA alrededor de ella.
TRAINING HOME VISITORS
Conversation Scenes & Books

![Image of a bus in Colombia with people and luggage]

![Image of a dog labeled "Perro"]

![Image of a woman doing laundry]

![Image of a book cover with "MI LIBRO DE ANIMALES"]
Evaluation: Randomised Control Trial

- 96 communities (*municipios*) of 5,000 – 50,000 inhabitants each (semi-urban) in 3 regions
- Randomly Assigned to 4 groups:
Evaluation Timeline

• Feb – May 2010: **Baseline Data Collection**
  – Socio-economic questionnaire (n = 1,429)
  – Child development outcomes
  – Information on mothers/carers & home visitors

• Phase-in intervention as baseline data were collected

• Collect **process data** on visits (frequency & quality) and intake of micronutrients (maternal reports) throughout the intervention

• Sept - Dec 2011: Intervention ends & **Follow Up Data Collection** (n = 1,330)

• Focus Groups with beneficiary mothers (Aug 2011)
## Child & Home Environment Information

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Test</th>
<th>Direct Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Development</td>
<td>Bayley-III</td>
<td>yes</td>
</tr>
<tr>
<td>Language: Expressive &amp; Receptive</td>
<td>Bayley-III</td>
<td>yes</td>
</tr>
<tr>
<td>Motor Development: Fine &amp; Gross</td>
<td>Bayley-III</td>
<td>Yes</td>
</tr>
<tr>
<td>Expressive Language</td>
<td>MacArthur-Bates</td>
<td></td>
</tr>
<tr>
<td>Temperament</td>
<td>Bates</td>
<td></td>
</tr>
<tr>
<td>Attention, Inhibitory Control, Sociability</td>
<td>Rothbart (follow up only)</td>
<td></td>
</tr>
<tr>
<td>Health Status &amp; Morbidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, Height, Hb</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Child Care &amp; Time Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Home Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toys &amp; play activities, books adults</td>
<td>Family Care Indicator</td>
<td>yes</td>
</tr>
</tbody>
</table>
## Mother and Home Visitor Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Mother (Main Caregiver)</th>
<th>Home Visitor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Labour Supply</strong></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Time Use</strong></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Health (incl. Reproductive)</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Weight, Height, Hb</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Depression (CES-D)</strong></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Vocabulary Range (~ Peabody)</strong></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Knowledge on Child Development (~ KIDI, own questions)</strong></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Results

• Measures of child development in treated communities were significantly higher than in control communities:
  – Cognitive development (0.26 of a st.dev. of a z-score)
  – Language (0.22 of a st.dev. of a z-score)
  – Socio-emotional dev. (0.18 of a st.dev. of a z-score)

• No impact of the nutrition intervention

• Significant impacts on ‘parental investments’
  – Time spent with children
  – Toys, play materials, books
## Effects by Treatment Group – All Children

<table>
<thead>
<tr>
<th></th>
<th>COGNITION (Bayley)</th>
<th>RECEPTIVE LANGUAGE (Bayley)</th>
<th>EXPRESSIVE LANGUAGE (Bayley)</th>
<th>NUMBER WORDS (MacArthur)</th>
<th>DIFFICULT CHILD (Bates)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stimulation</strong></td>
<td>0.251**</td>
<td>0.188**</td>
<td>0.0592</td>
<td>3.830+</td>
<td>-0.541+</td>
</tr>
<tr>
<td></td>
<td>(0.073)</td>
<td>(0.080)</td>
<td>(0.073)</td>
<td>(2.008)</td>
<td>(0.288)</td>
</tr>
<tr>
<td><strong>Stim + Micronutrients</strong></td>
<td>0.205**</td>
<td>0.163*</td>
<td>0.0826</td>
<td>4.238*</td>
<td>-0.161</td>
</tr>
<tr>
<td></td>
<td>(0.070)</td>
<td>(0.073)</td>
<td>(0.083)</td>
<td>(2.116)</td>
<td>(0.251)</td>
</tr>
<tr>
<td><strong>Micronutrients</strong></td>
<td>0.0467</td>
<td>0.0393</td>
<td>0.0836</td>
<td>3.634+</td>
<td>-0.0597</td>
</tr>
<tr>
<td></td>
<td>(0.059)</td>
<td>(0.084)</td>
<td>(0.087)</td>
<td>(1.911)</td>
<td>(0.262)</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>1,267</td>
<td>1,267</td>
<td>1,267</td>
<td>1,325</td>
<td>1,325</td>
</tr>
</tbody>
</table>

+ significant at 10%, *significant at 5%, **significant at 1%

- Impacts of combined interventions ("stim+micronutrients") not significantly different from "stimulation" intervention alone.
- No impact of micronutrient supplementation on cognition, language, difficult child
Effects on cognitive factors
Effects on socio-emotional factor.
Comparison with Bogota Study Data on Wealth Gradient

Bayley cognitive score (standardised) vs. Age in months for:
- Bogota - poorest quartile
- Bogota - richest quartile
- Control Group
- Stimulation Group

Graph showing trends over time with four distinct lines representing different groups and quartiles.
First Hint at Mechanisms: Increased Parental Investment in Children

<table>
<thead>
<tr>
<th></th>
<th>Home Made Toys</th>
<th>Bought Toys</th>
<th>Play Materials</th>
<th>Play Activities (previous 3 days)</th>
<th>Books for Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stimulation</strong></td>
<td>0.914**</td>
<td>0.284*</td>
<td>0.556**</td>
<td>0.564**</td>
<td>0.0188</td>
</tr>
<tr>
<td></td>
<td>(0.180)</td>
<td>(0.134)</td>
<td>(0.128)</td>
<td>(0.152)</td>
<td>(0.081)</td>
</tr>
<tr>
<td><strong>Stim + Micronutr</strong></td>
<td>0.719**</td>
<td>0.167</td>
<td>0.452**</td>
<td>0.731**</td>
<td>0.140</td>
</tr>
<tr>
<td></td>
<td>(0.189)</td>
<td>(0.133)</td>
<td>(0.137)</td>
<td>(0.153)</td>
<td>(0.087)</td>
</tr>
<tr>
<td><strong>Micronutrients</strong></td>
<td>0.0886</td>
<td>0.337*</td>
<td>0.213</td>
<td>0.217</td>
<td>0.104</td>
</tr>
<tr>
<td></td>
<td>(0.187)</td>
<td>(0.151)</td>
<td>(0.167)</td>
<td>(0.153)</td>
<td>(0.087)</td>
</tr>
</tbody>
</table>

n =1329; *significant at 5%; **significant at 1%

- Suggestive evidence of “crowding-in” of resources
Effects on time investment factor

![Graph showing the effects on time investment factor]

- Density
- Treated
- Control
Effects on material investment factor
Intervention Costs & Scalability

• Cost of the intervention is $491 USD per child per year

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>USD child/year</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisors</td>
<td>265.2</td>
<td>54%</td>
</tr>
<tr>
<td>Materials Stimulation</td>
<td>13.1</td>
<td>2.6%</td>
</tr>
<tr>
<td>Wages Home Visitors &amp; Training</td>
<td>186.1</td>
<td>37.8%</td>
</tr>
<tr>
<td>Micronutrients</td>
<td>15.4</td>
<td>3.1%</td>
</tr>
<tr>
<td>Wages MLs Micronutrients &amp; Training</td>
<td>11.3</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

491.11

• At scale, supervision costs could be reduced substantially if supervisors were selected from neighbouring towns.

• Colombian government ECD Strategy (0 a 5iempre) ~ $1,300 USD per child per year budgeted
Mechanisms behind the impact

• We model the process of child development (both cognitive and socio-emotional) as a function of existing level and inputs.

• Within this framework there are two ways the intervention can be effective:
  – By making parents more efficient; improving the productivity of the inputs.
  – By increasing parental investment.
Mechanisms behind the impact

• We find that most of the impact is explained by an increase in parental investment.

• No evidence of improved efficiency.

• Much evidence of increased investments (toys, materials, time spent)

• We find that time is relevant for non cognitive outcomes and materials for cognitive outcomes
Mechanisms behind the impact

• Then the question becomes:
  – Why do parents change investment behaviour.
  – Maybe the intervention changes perceptions about the usefulness of intervention.
  – We need to test this explicitly.
Conclusions

• Well designed *cost-efficient large scale* interventions can have significant impacts on child development in the short run:

1. Impacts of 25% and 20% of a SD increase in cognition and receptive language
   • These effects are sizeable if maintained.
2. No impact of the nutrition intervention.
3. Increased parental investments in children seems what determines the impacts
What Next?

- Understand better the decisions parents make and the child production function (substitutability of different inputs)

- Understand better the role of micronutrients

- We are also going to collect more evidence:
  1. Further follow-ups of the study sample
  2. New experiment to address externalities in knowledge transmission in Orissa, India
  3. Study the complementarities between home- and center-based interventions → design integrated 1 to 5 intervention
Thank you