

Home Visiting in Colombia: Impacts of a Scalable Intervention

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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
 idea formalised by Cunha, Heckman and Schennach (2010)
- Role of dynamic complementarities



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?



This Project

- 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 *Familias en Acción* and use local resources (local women) for implementation
 - \rightarrow cost-effectiveness & scalability
 - 2. Research Design: collect detailed data to
 - → identify mechanisms: model the behavioural impact of the intervention
 - \rightarrow estimate a human capital production function



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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
- **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



Intervention Design



Region 1

Region 2

Region 3

Implementation Details

- **1.** Hiring & Training of Supervisors
 - 6 weeks training in Bogota (+ 2 briefing sessions)
- 2. Identification of Home Visitors
 - Madre Líderes (60%)
 - Reading comprehension test, interest and time availability
- 3. Training of Home Visitors
 - 3 weeks (2 + 1) in the field
- 4. Monitoring & Supervision
 - Supervisor visits community once every 6 weeks (7 10 weeks)
 - Phone communication throughout, text messages, bulletins

The Curriculum

Programa de Desarrollo Infantil Temprano para Beneficiarios de Familias en Acción

- 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 homemade toys, rotating toys

Actividades	MES: 32
Canción	CEMANIA. 1
Muñeca con carro	SEIVIANA: 1
L6: "La camisa sucia"	
 Juego 7 – seguir las instrucciones III 	

Canción Cante al niño una canción que usted escoja

Muñeco de trapo con gorro y carro

<u>Objetivo:</u> 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: "<u>Para</u> el carro cuando llegues a la puerta", <u>"anda</u> otra vez", "maneja <u>rápido</u>, ahora <u>despacio</u>".



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 vistiéndose, 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 illustraciones 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 avanza 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 dígale al niño que ponga su pie DEBAJO de la cuerda y ENCIMA de ella. Con la misma cuerda, dígale al niño que SALTE sobre ella, que se DEVUELVA, que CORRA alrededor de ella.









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: Identify Sample of Children

- 1. Randomly drew 3 Madre Lideres (ML) per community
- 2. Randomly select 5 families with children 12-24 months at the start of the intervention and represented by selected ML
- 3. Offered the ML the possibility to participate, tested her ability and checked her availability
- 4. If the ML refused to participate or was not deemed suitable: we replaced the ML BUT kept the same families to avoid selection bias between treatment and control.
- Identical process across intervention arms



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

Outcome	Test	Direct Observation
Cognitive Development	Bayley-III	yes
Language: Expressive & Receptive	Bayley-III	yes
Motor Development: Fine & Gross	Bayley-III	Yes
Expressive Language	MacArthur-Bates	
Temperament	Bates	
Attention, Inhibitory Control, Sociability	Rothbart (follow up only)	
Health Status & Morbidity		
Weight, Height, Hb		yes
Child Care & Time Use		
Quality of Home Environment Toys & play activities, books adults	Family Care Indicator	yes
		Evaluation of Development at the Institute for Fiscal

Mother and Home Visitor Questionnaire

	Mother (Main Caregiver)	Home Visitor
Education	Х	Х
Labour Supply	Х	Х
Time Use	Х	Х
Health (incl. Reproductive)	Х	
Weight, Height, Hb	Х	
Depression (CES-D)	Х	
Vocabulary Range (~ Peabody)	Х	Х
Knowledge on Child Development (~ KIDI, own questions)	Х	Х



Sample Loss, Attrition & Precision

- Sample Loss between household survey and Bayley test
 - Baseline: 9 children (0.62%)
 - Follow Up : 55 children (4.13%)
- Attrition between survey rounds (18 months):
 - Household Survey: [1.89% 4.85%; mean = 3.52%]
 - Bayley Test: [6.78% 8.66%; mean =7.51%]
 small imbalance (under investigation...)
- **Precision:** spatial correlation once we condition on baseline characteristics is about 0.04 or less (depending on the outcome)
 - \rightarrow effective sample size ~220 per variant



Comparison with Bogota Study Data on Wealth Gradient



Empirical Strategy

$$y_{ij} = \alpha + \beta_t \sum_{t=1}^{3} (T_{tj}) + \gamma(y_o) +$$

+ $\delta_1(age \ polynomial_i) + \delta_2(sex_i) + \lambda_e + \varepsilon_{ij}$

- i: child, j: community, Tt = {stim, stim+micronutr, micronutr}, follow up data

 ß
 : estimate of impact, "equivalent" to comparison of means (RCT)
- Control for age (flexibly), sex, initial level of outcome at baseline
- (λe): tester effects (also a proxy for region)
- Cluster SE at the community level



Effects on Cognition (Bayley) by Age at Intervention Start



Impacts on Cognitive scores, increasing with age

Effects on Receptive Language (Bayley) by Age at Start



Impacts on Expressive Language, increasing with age

Effects on Expressive Language (Bayley) by Age at Start

	All	12-18 mths	18-24 mths
Stim (in SD)	0.059	0.023	0.191
	(0.073)	(0.122)	(0.159)

n =1267; +significant at 10%, *significant at 5%, **significant at 1%



No significant effects on Expressive Language, assessed on the Bayley

Effects on Expressive Language : MacArthur-Bates (maternal report)

	NUMBER WORDS CHILD CAN SAY					
	All 12-18 mths 18-24 mths					
Stimulation Only	4.238*	1.232	5.266*			
	(2.116)	(2.754)	(2.592)			
Mean Dep Var (Controls)	55.46	48.04	61.20			
n =1325; *significant at 5%						

	NUMBER OF COMPLEX SENTENCES						
	All 12-18 mths 18-24 mt						
Stimulation Only	0.365	0.0582	0.275				
	(0.381)	(0.526)	(0.533)				
Mean Dep Var (Controls)	5.43	4.53	6.69				
n =1325							



Some Heterogeneity in Impacts

	COGNITION			RECE	PTIVE LANG	UAGE
Stim =1	-5.829*	0.718*	1.039**	-3.835	0.424	0.630*
	(2.764)	(0.341)	(0.329)	(2.755)	(0.273)	(0.296)
Stim*Age Child (mths)	0.188*			0.122+		
	(0.075)			(0.075)		
Stim*Low Edu Mother =1		1.091+			0.620	
		(0.564)			(0.502)	
Stim*Hh Wealth Index			-0.414			-0.0297
			(0.348)			(0.305)
Age Child (mths)	0.0699	0.178**	0.171**	2.193**	2.268**	2.376**
	(0.075)	(0.053)	(0.054)	(0.439)	(0.445)	(0.450)
Age Child Sq (mths)				-0.028**	-0.028**	-0.030**
				(0.006)	(0.006)	(0.006)
Low Edu Mother =1		-1.663**			-1.133**	
		(0.439)			(0.362)	
Hh Wealth Index			0.856**			0.463*
			(0.248)			(0.222)

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n =1267; +significant at 10%, *significant at 5%, **significant at 1%

Effects by Treatment Group – All Children

		RECEPTIVE	EXPRESSIVE	NUMBER	DIFFICULT
	COGNITION	LANGUAGE	LANGUAGE	WORDS	CHILD
	(Bayley)	(Bayley)	(Bayley)	(MacArthur)	(Bates)
Stimulation	0.251**	0.188**	0.0592	3.830+	-0.541+
	(0.073)	(0.080)	(0.073)	(2.008)	(0.288)
Stim + Micronutr	0.205**	0.163*	0.0826	4.238*	-0.161
	(0.070)	(0.073)	(0.083)	(2.116)	(0.251)
Micronutrients	0.0467	0.0393	0.0836	3.634+	-0.0597
	(0.059)	(0.084)	(0.087)	(1.911)	(0.262)
Ν	1,267	1,267	1,267	1,325	1,325

+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
 EDePo @ IFS____

at the Institute for Fiscal Studies

First Hint at Mechanisms: Increased Parental Investment in Children

	Home Made Toys	Bought Toys	Play Materials	Play Activities	Books for Adults
		10y3			
Stimulation	0.914** (0.180)	0.284* (0.134)	0.556** (0.128)	0.564** (0.152)	0.0188 (0.081)
Stim + Micronutr	0.719** (0.189)	0.167 (0.133)	0.452** (0.137)	0.731** (0.153)	0.140 (0.087)
Micronutrients	0.0886 (0.187)	0.337* (0.151)	0.213 (0.167)	0.217 (0.153)	0.104 (0.087)

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

Suggestive evidence of "crowding-in" of resources



Intervention Costs & Scalability

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

Budget Item	USD child/year	%
Supervisors	265.2	54%
Materials Stimulation	13.1	2.6%
Wages Home Visitors & Training	186.1	37.8%
Micronutrients	15.4	3.1%
Wages MLs Micronutrients & Training	11.3	2.3%
	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



Conclusions

- Well designed *cost-efficient large scale* interventions can have significant impacts on child development in the short run:
 - 1. Impacts of 25% and 19% of a SD increase in cognition and receptive language
 - 2. Impacts tend to increase with age of the child: larger impacts for children 18 to 24 mths at the start: 36% of a SD in cognition and 26% of a SD in language

[age at start of intervention or age at the time of testing?]

- 3. Smaller impacts on expressive language and child temperament (mother reports)
- 4. Increased parental investments in children



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 centerbased interventions \rightarrow design integrated 1 to 5 intervention



Thank you



Other stuff



Characteristics Well Balanced at Baseline

	Controls	Stimulation	Stim + Micronutr	Micronutrients
Child				
Age (months)	18.266	18.003	17.790	18.067
Male =1	0.491	0.461	0.524	0.497
Premature =1	0.198	0.135	0.161	0.120
Birthweight	3230.8	3252.2	3240.9	3238.4
Mother				
Age Mother	26.09	26.56	26.01	26.42
Education Years Mother	7.715	7.194	7.426	7.490
Mother Work =1	0.472	0.439	0.448	0.462
Household				
Dirt Floors =1	0.034	0.075*	0.078+	0.034
Crowding Index	0.598	0.577	0.589	0.598
Computer =1	0.043	0.047	0.050	0.043
Fridge =1	0.537	0.578	0.619	0.586
Wealth Index	-0.076	0.026	0.049	0.002
Home Environment				
Books for Adults	1.117	1.061	1.022	1.031
Bought Toys =1	0.786	0.739	0.782	0.763
Nb Play Activities	3.706	3.706	3.709	3.579
Home Environment Score	7.060	7.094	6.863	6.624 <u>EDePo@</u> I

Evaluation of Development Policies at the Institute for Fiscal Studies

Baseline Balance: Dependent Variables

	Controls	Stimulation	Stim + Micronutr	Micronutrients
Cognition (Bayley)	52.152	51.542	51.493	51.824
Receptive Language (Bayley)	20.487	20.348	19.885	20.011
Expressive Language (Bayley)	20.436	20.379	19.675	19.944
Fine Motor (Bayley)	34.805	34.534	34.127	34.078
Gross Motor (Bayley)	50.441	50.919	50.424	50.291
Nb Words Says (McArthur)	22.948	22.894	21.441	22.073
Nb Words Unders (McArthur)	40.620	39.448	40.233	41.754
Unstoppable (Bates)	10.551	10.275	10.843	10.630
Unadaptable (Bates)	4.780	4.872	5.048	5.117
Unsociable (Bates)	7.980	8.058	7.969	8.050
Difficult (Bates)	18.451	18.294	19.056	18.708

No significant differences in the levels of the main outcomes between groups at baseline



Profiling Home Visitors – can i fit this somewhere?

- All are literate (requirement)
- 60% are "Madre Lideres"
- 56% work
- 70% are married/cohabiting
- Kids <6...53% have no children; 35% have 1 child; 12% have 2-4 children
- Compared to mums:
 - 15% of mums are the same age or older than home visitor
 - 47% of mums have the same or more years of education than home visitor
 - 37% of mums score higher on the Peabody Test than home visitor

