Enhancing the quality of an existing public parenting programme for disadvantaged families in rural Colombia: a cluster randomized controlled trial

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Aim of the study

Develop, *pilot* and *evaluate* an **integrated upgrade** of a public parenting program for disadvantaged families in rural Colombia known as FAMI, to promote young children's development.

With this aim, we designed a 2-arm cluster (town) RCT in 87 towns in central Colombia and assessed 1,460 children from 0-12 months of age at baseline. The intervention was introduced sequentially and ran for an average of 10.5 months.

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Families are crucial for the production of children's skills

Families contribute to their children's skill formation because:

- They invest time in their children (of different qualities)
- They invest monetary resources in the form of pedagogical materials, good nutrition, health services, early education, extracurricular activities, save neighborhoods, etc.
- They make decisions about their children's time use in their absence
- They make decisions about the environments in which children grow up (safe, healthy, that can be trusted, etc.).

Public policy and the investments of families

- Investment of families in their children depend upon household **time and financial constraints**, and the **knowledge** and **perceptions** that parents have about the process of formation of children's skills.
- The intervention of the State through a variety of public policies might relax some of these constraints which will, in turn, promote children's development
- Parenting programs, one of these initiatives, aim at improving parental knowledge and perceptions about the process of formation of children's skills and thus, actual parenting practices and the learning environment at home.

Contribution of this study

We implement various quality improvements of the only public parenting program in Colombia (FAMI).

- We add to the evidence on the importance of parenting programs on children's development. In particular: group sessions vs. home visits.
- We assess the relevance of a structured curriculum, and providers' training, supervision and coaching on children's development.
- Being an already existing public program (with about 18% enrollment rate country-wide) we can study the advantages and barriers of such quality enhancements at scale.
- We can determine the feasibility and cost-effectiveness of improving quality through already existing human and financial resources that can be allocated differently.

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FAMI program

- Serves ~200K children nationwide
- Units of 12-15 participants (75% parents of children younger than 2 yrs and 25% pregnant women)
- Targeted at socioeconomically vulnerable households by Colombia's proxy means test.
- Facilitated by a woman in the community that must be a high-school graduate but no other qualification requirement (*MCs*)
- Delivered through one weekly group meeting (1 hour) and one monthly home visit (1 hour).

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The intervention

Curriculum

- Inspired in Jamaica study /*Reach Up* (Grantham-McGregor et al, 1991).
- Promote child development – focus on cognition and language
- Promote mother-child interaction and maternal self-efficacy
- Provide best nutritional practices for young children

Training and coaching

- Average training for facilitators: 3.5 weeks and 85 hours
- Continuous support and coaching provided to program facilitators by our own group of tutors (1 tutor per approx. 19-20 FAMI facilitators) ~ every 6 wks.

Nutritional component

- Delivery of monthly nutritional supplement (41% of nutritional requirements.)
- Materials delivered to promote healthy nutritional habits
- Psychoeducation around feeding and nutrition during sessions

Pedagogical materials

- Puzzles, images/conversational scenes, books and building blocks
- Materials for home-made toys
- Delivery of toy making workshops

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How does FAMI look with the intervention?






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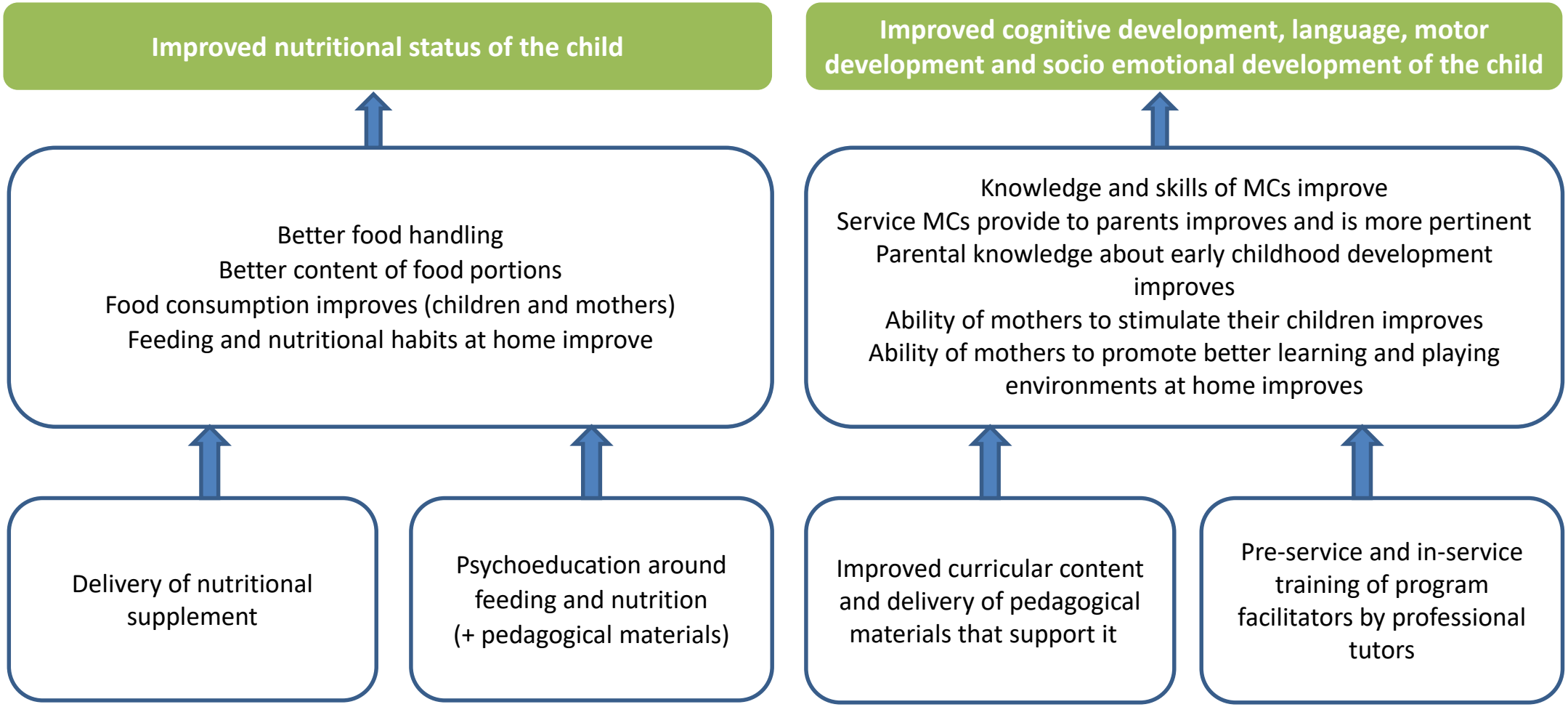
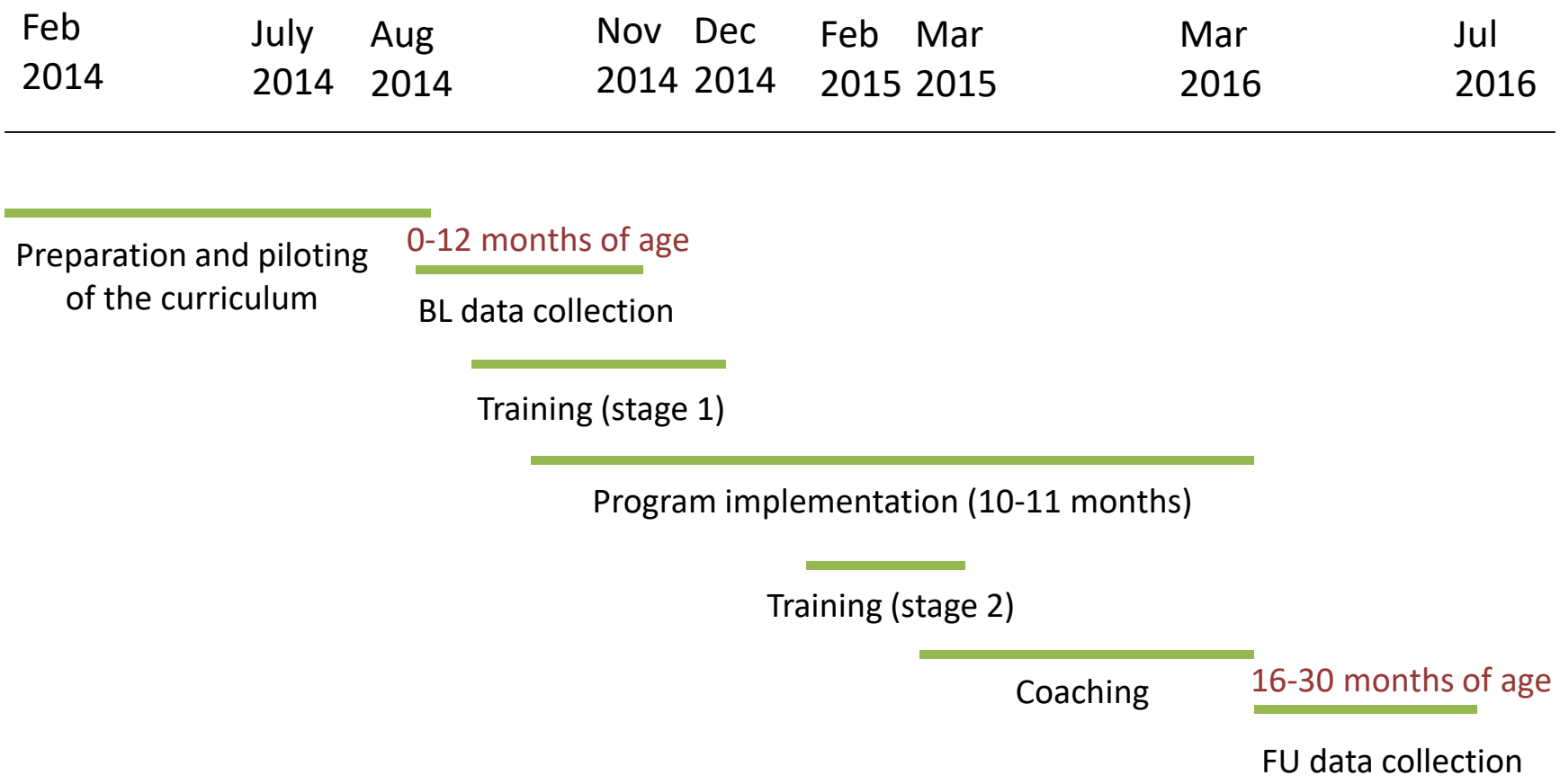
Theory of Change



Study timeline



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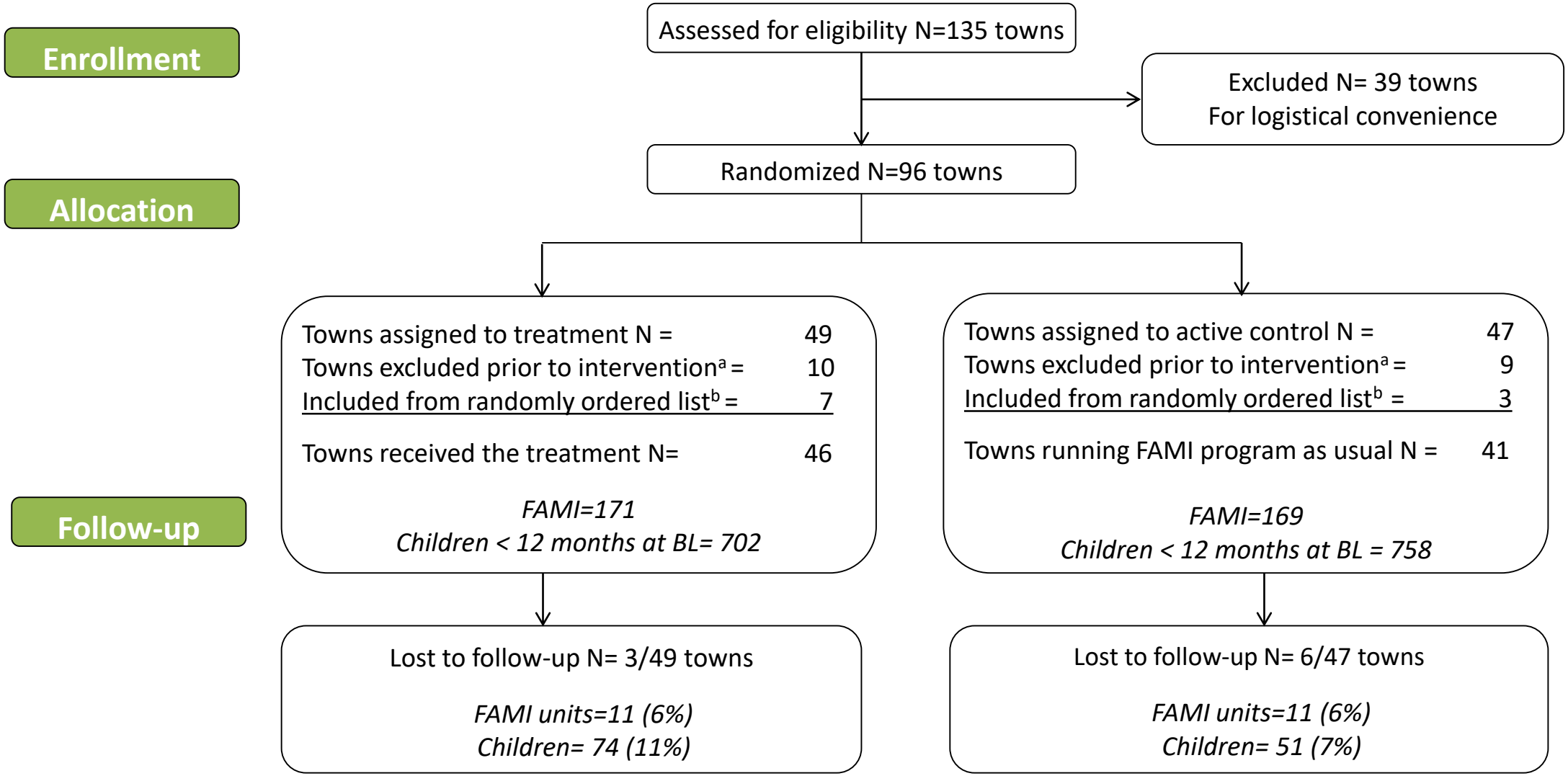
Study's flow chart



[a] Once in the field for data collection, we realized some towns did not have any FAMI units as they had made the transition to other models (MF)

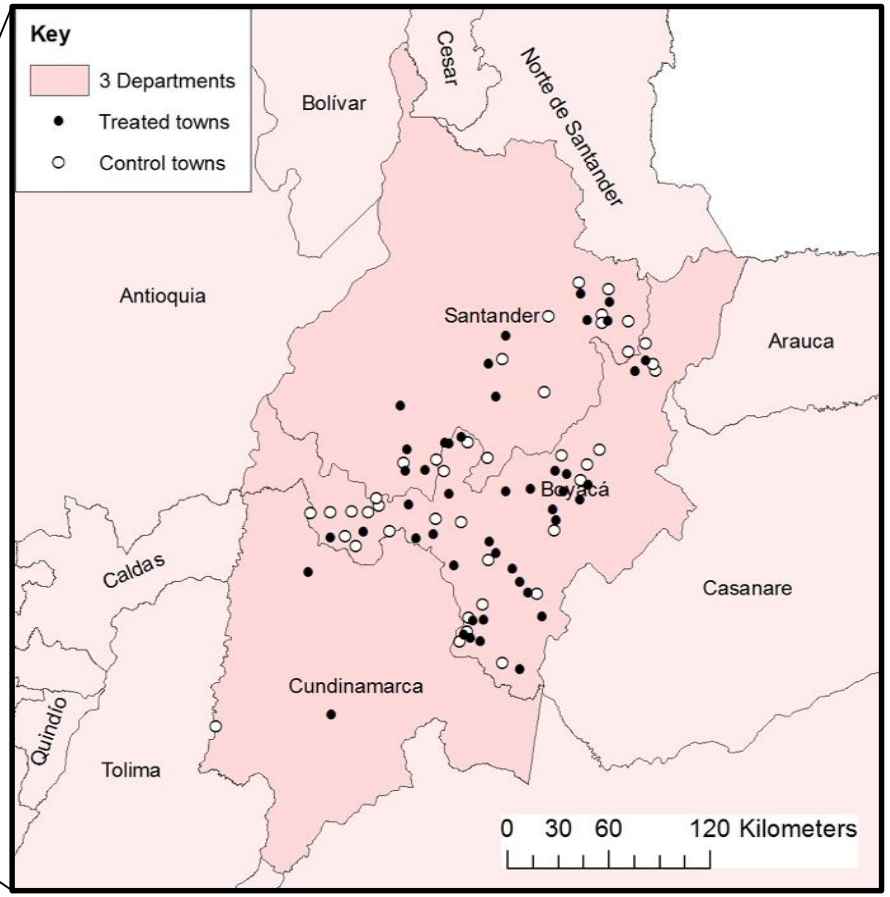
[b] Towns not originally assigned to the sample were randomly and used as replacements. However we did not have enough in all randomization strata.

Geographic location of the study

3 departments (states) in central Colombia

Treated towns: 46
FAMI units: 171
Treated children: 1,600
Pregnant women: 256
Study sample (<12 mo): 702

Control towns: 41
FAMI Units: 170
Control children: 1,730
Pregnant women: 293
Study sample (<12 mo): 758



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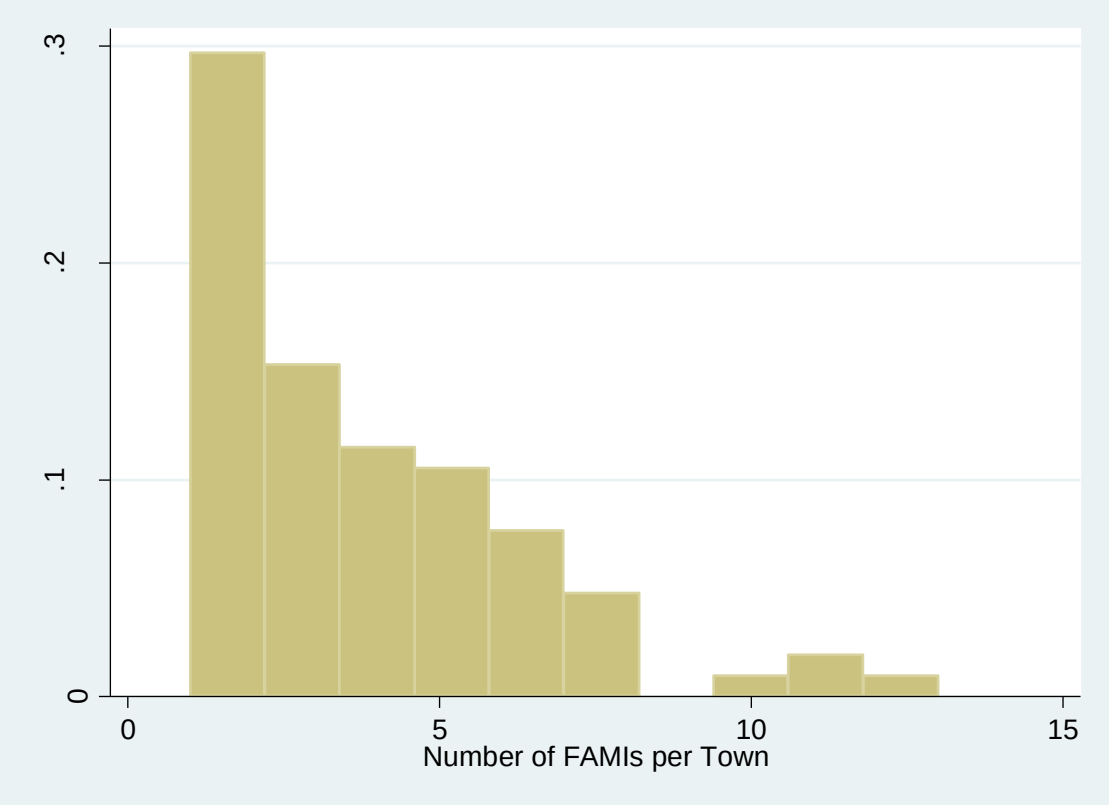
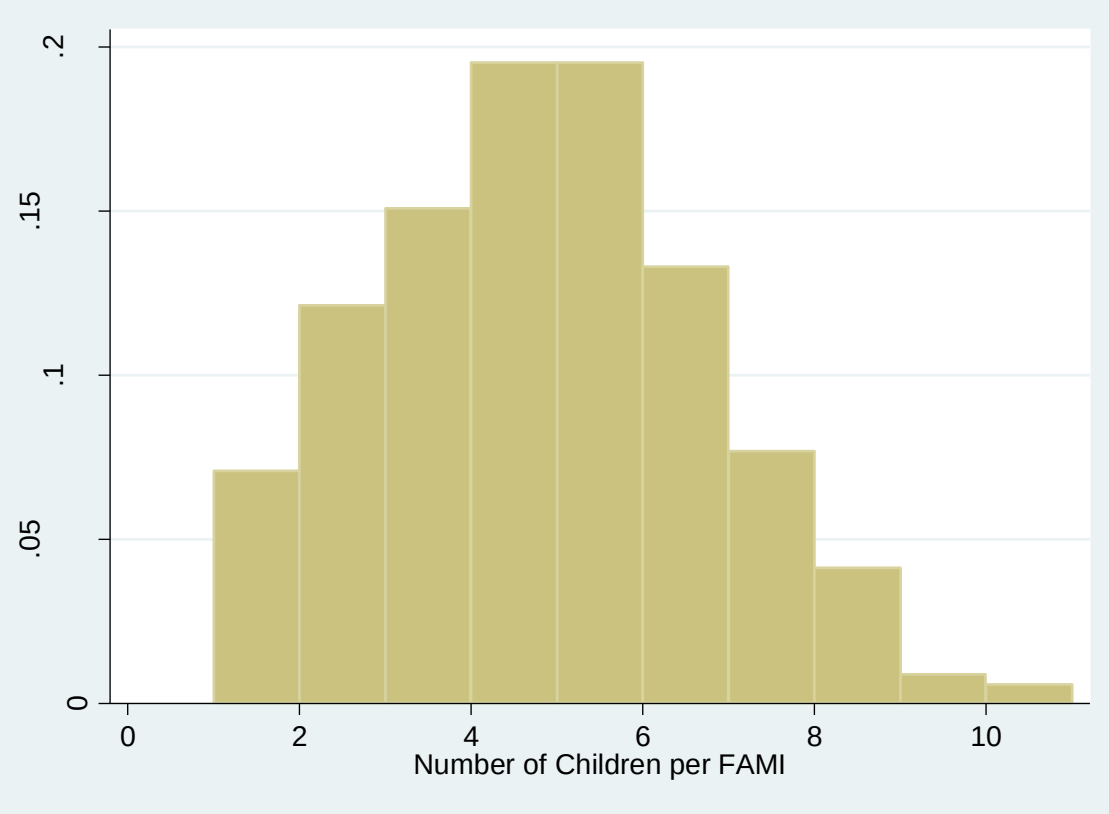
Description of clusters

Number of FAMIs per town



Mean= 3.9, SD= 2.3

Number of children per FAMI



Mean= 4.3, SD= 1.9

Core final outcomes

Hypothesis 1: The treatment had positive average impacts on developmental outcomes for children assigned to the program. These effects might vary by child's gender, maternal education and household SES or initial developmental levels.

Domain	Construct	Metric
Physical	Physical growth Fine and gross motor skills	Height, weight at BL and FU Bayley-III at follow-up
Cognitive	General Cognition	Bayley-III at first follow-up
Language	Receptive Language Expressive Language	Bayley-III at follow-up
Socio-emotional	General socio-emotional development	Ages & Stages Socio-emotional at FU

Core intermediate outcomes

Hypothesis 2: The treatment had a positive average impact on mother's parenting abilities and the home environment on parents assigned to the program.

Domain	Construct	Metric
Parenting skills	1. Parental activities children at home (quality and frequency) 2. Maternal knowledge 3. Maternal Self-esteem and motivation	1. Subset of the Family Care Indicator (FCI) - Version 16 2. Ten item scale using selected KIDI items 3. Self-efficacy in the Caregiver Role Test – Modified DUKE-UNC Functional Social Support Questionnaire 11
Home environment	1. Quality of the home environment 2. Parental discipline strategies	1. Subset of UNICEF's home environment quality scale: The Family Care Indicator (FCI) - Version 16 2. Domain III of the UNICEF Care Indicator Questions

Statistical Analysis

Baseline specification:

$$Y_{isl,1} = \beta_o + \beta_1 T_{sl} + \gamma Y_{isl,o} + X'_{isl,0}\delta + D_{isl,0}\theta + F_{isl,0}\sigma + S_{isl,0}\tau + Z_{isl,1}\rho + \varepsilon_{isl,1} (1)$$

where $Y_{isl,1}$ is the outcome of interest for child i in FAMI unit *s* in municipality l at follow-up (*t*=1)

T_{sl} is a dummy equal to 1 if the FAMI unit *s* in municipality l receives the treatment

$Y_{isl,o}$ is the baseline (*t*=0) level of the outcome of interest (or level of the corresponding aggregate construct) for child i in FAMI unit *s* in municipality l

$X_{isl,0}$ is a set of basic child and household characteristics

$D_{isl,0}$, $F_{isl,0}$, $S_{isl,0}$ are fixed effects for variables used in stratification of randomization procedure

$Z_{isl,1}$ set of tester/interviewer dummies

$\varepsilon_{isl,1}$ is the random error term, clustered at the municipal level l (the unit of randomization)

We could estimate equation (1) by OLS given that the treatment was randomly assigned, however we find differential attrition by study group so estimate by ML to correct for possible selection into the follow-up sample.

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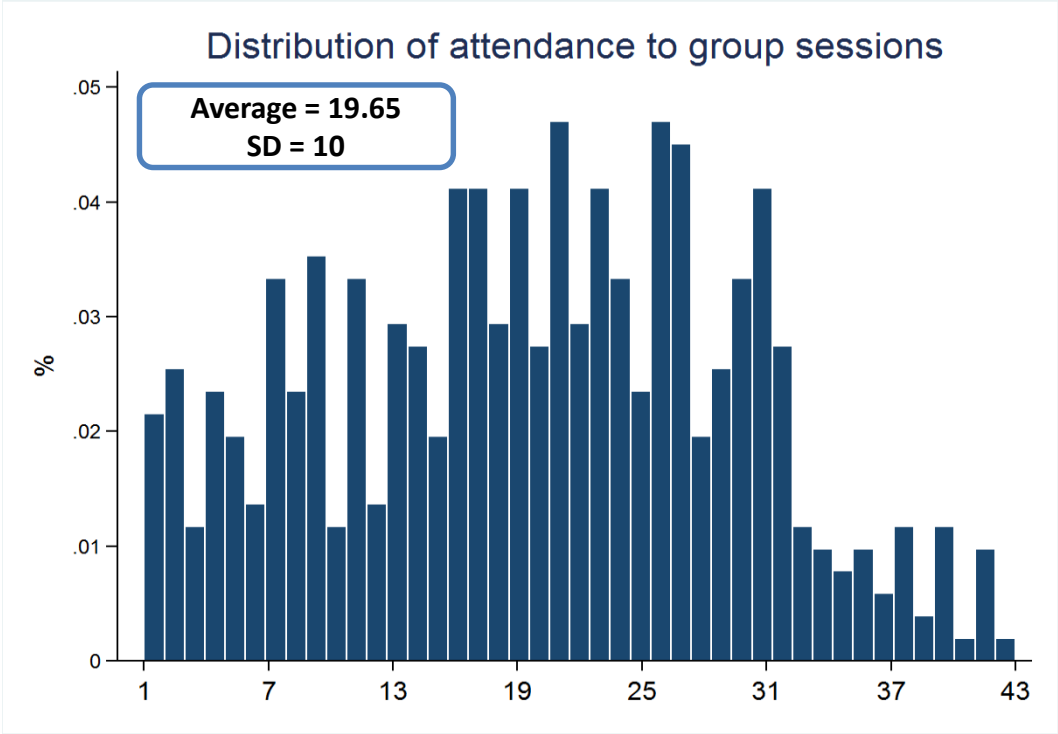
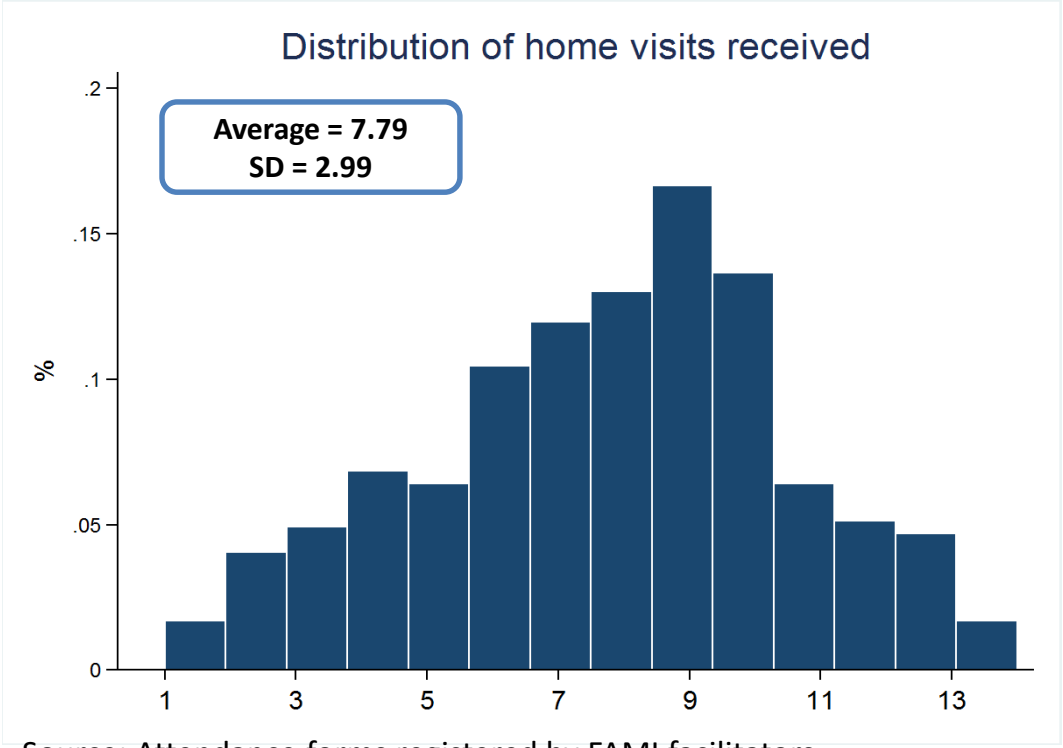
Actual program participation

Hypothesis 3: The duration of exposure to the treatment had increasing positive impacts on developmental outcomes and parental abilities and the home environment



Source: Attendance forms registered by FAMI facilitators.
Note: Subsample of children registered at least once in attendance lists (74% of children found at follow-up)
Full attendance during the intervention = 44 group sessions



Source: Attendance forms registered by FAMI facilitators.
Note: Subsample of children registered at least once in home visits lists (72% of children found at follow-up)
Full attendance during the intervention = 11 home visits

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Characteristics of children at baseline

	Treatment		Control		
	Mean	SD	Mean	SD	
Child's age in months	5,76	(3,44)	5,54	(3,29)	
Boys (%)	0,52	(0,50)	0,51	(0,50)	
First born (%)	0,47	(0,50)	0,45	(0,50)	
Child's birth weight (gr)	3,190	(572)	3,156	(500)	
Low birth weight (%)	0,07	(0,26)	0,07	(0,26)	
Mother's age (years)	26,16	(6,95)	26,48	(6,81)	
Mother's education (years)	8,85	(3,42)	8,40	(3,31)	
Father present (%)	0,70	(0,46)	0,75	(0,43)	**
Mother single	0,24	(0,430)	0,21	(0,407)	
Mother divorced	0,01	(0,106)	0,03	(0,156)	*
Teenage mother (%)	0,25	(0,44)	0,21	(0,41)	*
Household wealth index [a]	0,06	(0,96)	-0,06	(1,04)	**
Household size	4,08	(1,47)	4,10	(1,43)	
Weight-for-age z-score	0,25	(1,39)	0,27	(1,42)	
Height-for-age z-score	0,02	(1,70)	-0,20	(1,74)	
Chronic Malnutrition (Stunting)	0,10	(0,29)	0,14	(0,35)	
No. of observations	702		758		

Note: ***p<0,01; **p<0,05; *p<0,1

Standard errors clustered by town in parenthesis

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Results: nutritional status

VARIABLE	Beta (95% CI)	P Value	RW P Value [a]	D
Risk of Underweight	0.006	0.795	0.521	0.017
	(-0.038,0.050)			
Stunting	-0.020	0.540	0.521	-0.056
	(-0.086,0.045)			
Risk of Stunting	-0.058	0.037**	0.075*	-0.126
	(-0.113,-0.004)			
Risk of Overweight by weight for length	-0.004	0.882	0.521	-0.010
	(-0.057,0.049)			
Overweight by weight for length	-0.023	0.248	0.234	-0.086
	(-0.062,0.016)			
ELCSA Food Insecurity Status	-0.033	0.411	--	-0.068
	(-0.111,0.045)			

Note: ***p<0,01; **p<0,05; *p<0,1
95% confidence interval in parenthesis
ML estimation correcting for selection into follow-up sample (exclusion restriction: distance to town hall).
D=(ß/SD controls), where SD is standard deviation for control group within estimation sample
Underweight, wasting, risk of wasting and obesity are not included because incidence is lower than 8%
[a] P values are computed using Romano-Wolf (2005) step-down procedure. For nutritional status we consider 5 hypotheses.
Food insecurity is considered in a different construct.

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Results: child cognitive, language and motor development (Bayley-III)

VARIABLE: Bayley-III scales	Beta (95% CI)	P Value	RW P Value [a]	D
Cognitive Scale (age-standardized Z-score)	0.154	0.020**	0.057*	0.154
	(0.008,0.299)			
Receptive Language Scale (age-standardized Z-score)	0.115	0.036**	0.057*	0.115
	(-0.010,0.240)			
Expressive Language Scale (age-standardized Z-score)	0.138	0.029**	0.057*	0.138
	(-0.005,0.281)			
Gross Motor Scale (age-standardized Z-score)	0.141	0.044**	0.087*	0.141
	(-0.021,0.302)			
Fine Motor Scale (age-standardized Z-score)	0.046	0.260	0.257	0.046
	(-0.094,0.187)			
Total Bayley Score (age-standardized Z-score)	0.136	0.037**	--	0.136
	(-0.013,0.285)			

Note: ***p<0,01; **p<0,05; *p<0,1 (one-tailed test); standard errors clustered by town
95% confidence interval in parenthesis
ML estimation correcting for selection into follow-up sample (exclusion restriction: distance to town hall).
Scores have been non-parametrically age-standarized
D=(ß/SD controls), where SD is standard deviation for control group within estimation sample
[a] P values are computed using Romano-Wolf (2005) step-down procedure (one-tailed). We consider 3 hypotheses for cognitive development and 2 for motor development. Total Bayley score is excluded.

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Results: socio-emotional development (ASQ-SE)

VARIABLE	Beta (95% CI)	P Value	RW P Value [a]	D
Total AS:SE score (age-standardized Z-scores)	0.046	0.780	--	0.046
	(-0.070,0.161)			
Self-Regulation (age-standardized Z-scores)	0.017	0.608	0.934	0.017
	(-0.102,0.135)			
Compliance (age-standardized Z-scores)	0.015	0.595	0.934	0.015
	(-0.109,0.140)			
Communication (age-standardized Z-scores)	0.066	0.791	0.934	0.066
	(-0.094,0.226)			
Adaptive functioning (age-standardized Z-scores)	-0.044	0.283	0.725	-0.044
	(-0.192,0.105)			
Autonomy (age-standardized Z-scores)	-0.083	0.149	0.529	-0.083
	(-0.239,0.073)			
Affect (age-standardized Z-scores)	0.022	0.666	0.934	0.022
	(-0.080,0.125)			
Interaction (age-standardized Z-scores)	-0.131	0.034**	0.195	-0.131
	(-0.272,0.010)			

Note: ***p<0,01; **p<0,05; *p<0,1 (left one-tailed test); standard errors clustered by town
95% confidence interval in parenthesis
ML estimation correcting for selection into follow-up sample (exclusion restriction: distance to town hall).
Scores are non-parametrically age-standardized. Higher scores imply more behavioral problems.
D=(ß/SD controls), where SD is standard deviation for control group within estimation sample
[a] P values are computed using Romano-Wolf (2005) step-down procedure (one-tailed). We consider 7 hypotheses.
Total ASQ:SE score is excluded.

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Results: intermediate outcomes

VARIABLE	Beta (95% CI)	P Value	RW P Value [a]	D
No. of Toy Sources	0.229	0.000***	0.001***	0.359
	(0.138,0.319)			
No. of varieties of play materials	0.495	0.000***	0.001***	0.281
	(0.281,0.709)			
No. of varieties of care activities over past 3 days	0.018	0.499	0.484	0.042
	(-0.033,0.069)			
No. of varieties of play activities over past 3 days	0.427	0.014**	0.034**	0.170
	(0.086,0.767)			
FCI Home Environment Quality (PCA)	0.378	0.000***	--	0.378
	(0.248,0.508)			
Parental Knowledge (Raw Score)	0.025	0.927	0.999	0.007
	(-0.502,0.551)			
Uses Violent Discipline	-0.027	0.331	0.864	-0.081
	(-0.081,0.027)			
Self-Efficacy Score Above Median	-0.041	0.090*	0.464	-0.096
	(-0.089,0.006)			
Presence of Depressive Symptoms (CESD-10)	0.003	0.919	0.864	0.007
	(-0.052,0.057)			

Note: ***p<0,01; **p<0,05; *p<0,1; standard errors clustered by town; 95% confidence interval in parenthesis

D=(ß/SD controls), where SD is standard deviation for control group within estimation sample

[a] P values are computed using Romano-Wolf (2005) step-down procedure. We consider 4 hypotheses for home environment by FCI and 5 hypothesis for all other intermediate outcomes. FCI principal component is excluded.

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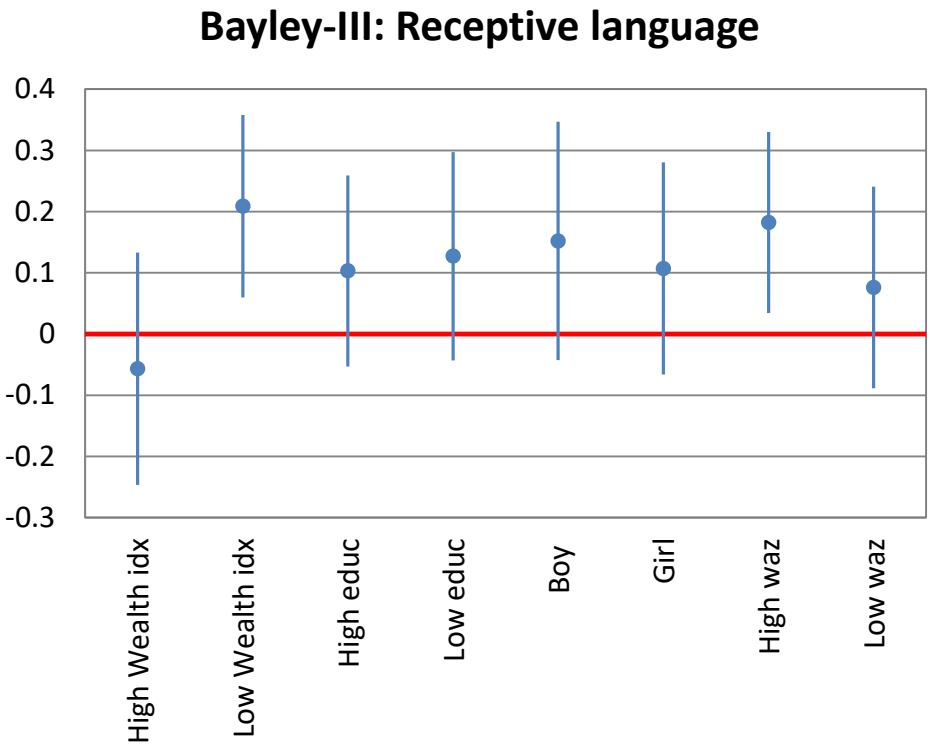
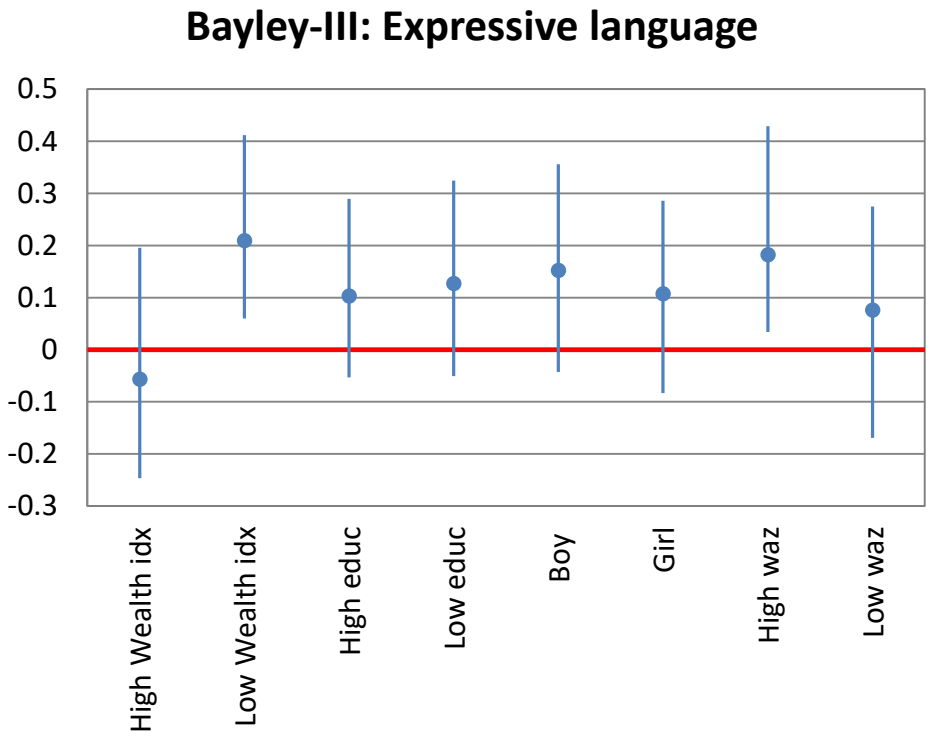
Heterogeneous effects





Two-tailed test. 95% confidence interval shown.
Standard errors clustered by town
Impact presented in terms of SD with respect to the control group

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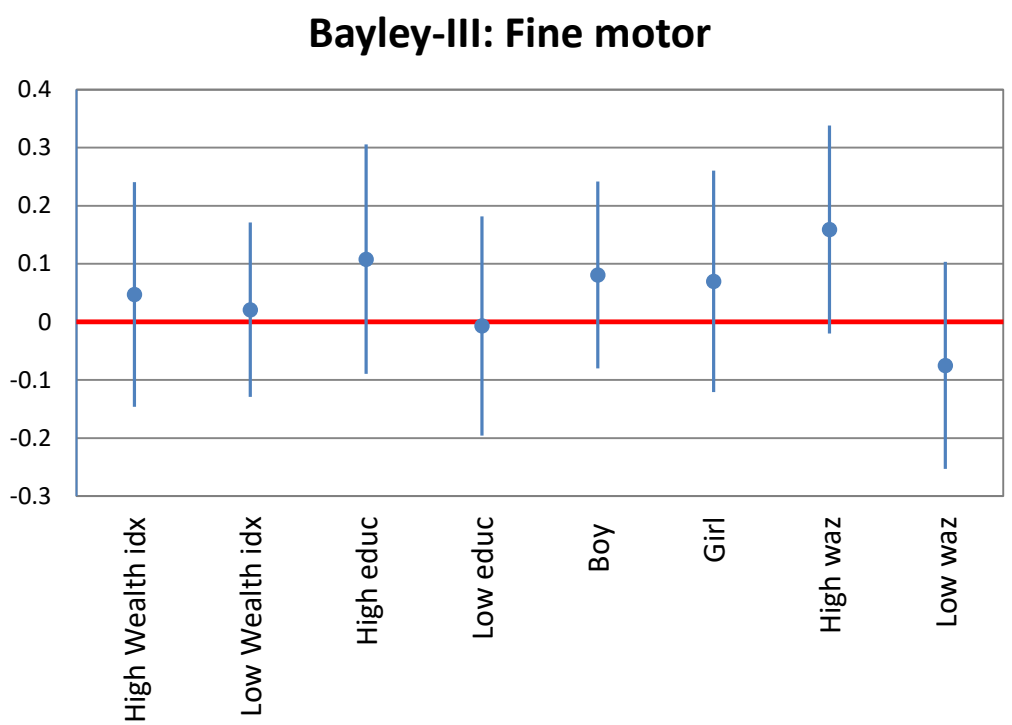
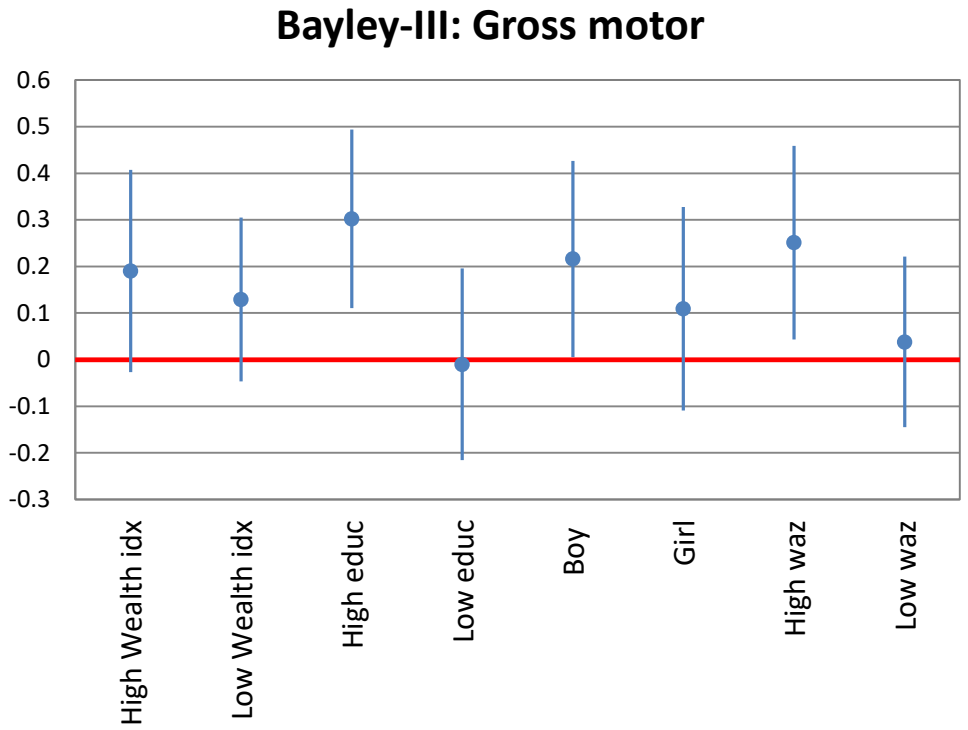
Heterogeneous effects





Two-tailed test. 95% confidence interval shown.
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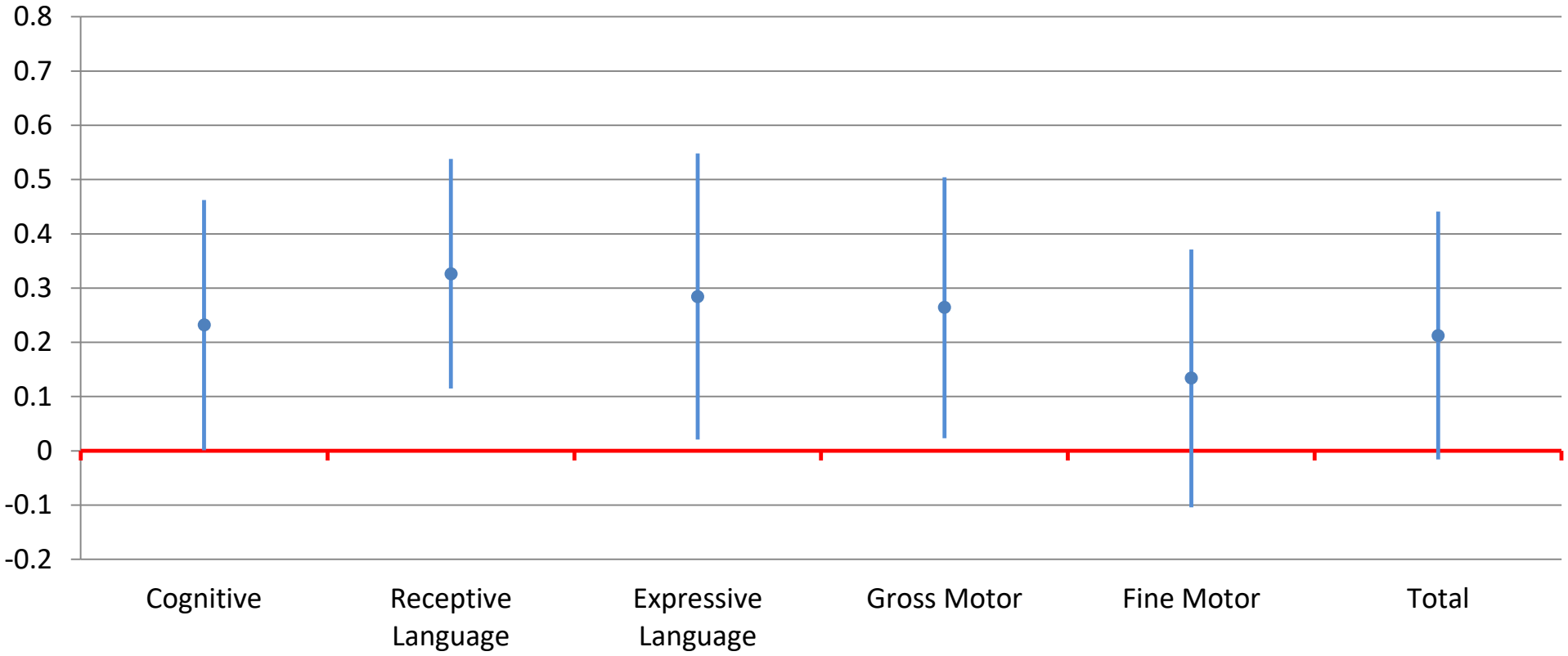
Effects by exposure: at least one contact



Fraction of treated children contacted at least one time: 74.36%.
2SLS using randomized assignment as IV and ML for correction of self-selection into follow-up sample
Shows 95% CI for two-tailed test
Standard errors clusters by town.
Impact presented in terms of SD with respect to the control group

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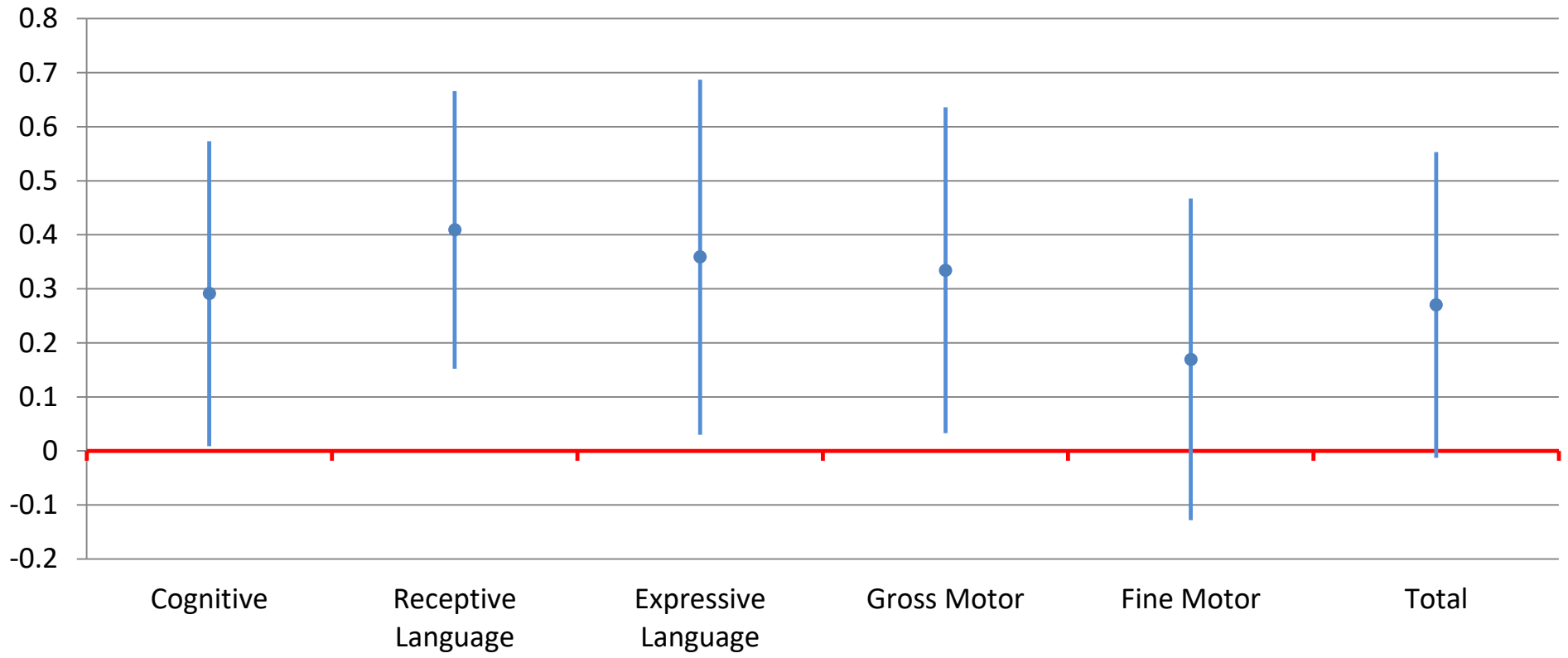
Effects by exposure: total contacts ≥ median



Median = 21 contacts.
2SLS using randomized assignment as IV and ML for correction of self-selection into follow-up sample
Shows 95% CI for two-tailed test
Standard errors clusters by town.
Impact presented in terms of SD with respect to the control group

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Conclusions

- We report positive and statistically significant effects on cognitive development, receptive and expressive language, and gross motor development of around 0.11-0.15 SDs. These effects are significantly higher for children that attended at least half of the sessions.
- We report a reduction in the risk of stunting (0.13 SD). And we do not find any statistically significant effects on social-emotional development.
- We report positive and statically significant effects on toy materials, varieties of play materials and varieties of play activities with adults at home (0.23-0.49 SDs).
- We find positive effects of the program on cognitive development and nutrition despite: low duration of exposure to the program, the fact that the control had access to the unenhanced version of the program (as opposed to receiving nothing) and the fact that the sample was not as vulnerable as initially expected.
- The results presented indicate that the curriculum in addition to pre-service and in-service training provided to front line workers was effective in attaining positive effects on children's development at a reasonable cost (One-time pre-service training= USD 11 child; in-service training= USD 8 child/month; pedagogical materials= USD 27 child/yr; nutritional supplement = USD 26 child/month).

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Thank you