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Statistical Analysis Plan: Intrahousehold Spillovers in the iLiNS DYAD-G Randomized Controlled Trial: Sibling Nutritional Outcomes

Contents

1. Overview and Study Objectives

Many nutrition interventions target pregnant women and young children with the aim of improving their nutritional status, health, and development. Within a household, however, the effects of an intervention may extend beyond the targeted individuals, creating intrahousehold spillovers. Failing to account for spillovers may lead to an incomplete evaluation of an intervention's overall impacts.

The primary objective of this study is to assess whether, as part of the iLiNS DYAD-G randomized trial, maternal consumption of LNS-P&L during pregnancy and the first six months postpartum and her baby's consumption of LNS-Child from 6-18 months of age influenced the nutritional status of the youngest[1] under-five sibling[2] in the household. Specifically, we will assess the spillover effect of treatment on siblings' HAZ, WAZ, and BMIZ as well as the probability of being stunted. We will also test for heterogeneity in spillover effects by age, sibling gender, and baseline z-score.

If sibling spillover effects are demonstrated, a secondary objective will be to perform exploratory analyses to identify potential mechanisms driving the spillover effects. In particular, we will test for differences in maternal income, household food insecurity, household food[3] expenditures, and household expenditures on nutrient-dense foods[4] across treatment groups. Differences in any of these factors could, in theory, have a direct or indirect effect on the nutritional status of young children in the household and may provide suggestive evidence of the mechanisms generating sibling spillover effects.

2. Description of the Study

A more detailed description of the iLiNS DYAD-G randomized trial, including the study population, inclusions and exclusion criteria, etc. is available in the main statistical analysis plan (iLiNS-DYAD-G Statistical Analysis Plan Version 3, 2014-05-27). In short, screening, recruitment and enrollment of pregnant women into the randomized controlled trial were done on a rolling basis over a two-year period from December 2009 to December 2011. During this period, women attending select prenatal clinics in the Manya Krobo and Yilo Krobo districts in the Eastern Region of Ghana were screened for potential participation in the trial. Eligible and willing women were then recruited to participate in the study and randomized into one of the

[1] Anthropometric data were collected for all siblings under five at maternal enrollment into the iLiNS trial, and of all households with an under-five sibling, anthro data were collected for more than one sibling in approximately 8% of households. Given the infrequency of multiple siblings per household, this analysis will only use data on the youngest sibling under five in a household in order to help with convergence of the empirical models. In the case of twins, the included sibling will be randomly selected.

[2] Sibling refers to the brother or sister of the iLiNS baby.

[3] Excluding alcohol.

[4] Nutrient dense foods will include animal-source foods, fruits and vegetables (including dark yellow and orange-fleshed roots, tubers, etc. but excluding non-colored roots and tubers, plantains, and other starchy staples as categorized by WHO (2010)), pulses, and nuts.

trial's three equally-sized arms in which women received: (1) daily iron-folic acid tablets throughout pregnancy, the current standard of prenatal care in Ghana, and a placebo (low-dose calcium tablet) during the first six months of lactation, (2) daily multiple micronutrient tablets during pregnancy and the first six months of lactation, or (3) LNS-P&L during pregnancy and the first six months postpartum; the babies of women randomized into the LNS-P&L group also received LNS-Child from 6-18 months of age. The babies of the women randomized into the iron-folic acid and multiple micronutrient tablet groups did not receive any supplementation. At enrollment each woman received instructions on how to take her assigned supplement, and was told, "Do not forget to eat meat, fish, eggs, fruits and vegetables whenever you can. You still need these foods even if you take the capsules/Nkatepa we have given you."

For women with one or more children under 60 months at enrollment into the DYAD-G trial, age, gender and anthropometric data (length/height, weight) for those children were collected at approximately baseline, again at approximately six months after the birth of the woman's baby, and a final time at approximately 18 months after the birth of the baby. In cases where multiple children from the same household were measured, this analysis will use anthropometric data on the youngest child only (or a randomly selected child in the case of twins). Data on household socioeconomic characteristics, including the 'mechanisms' that will be considered in this analysis, were collected at baseline, six months after the birth of the iLiNS baby, and 12 or 18 months after the birth of the baby.

3. Hypotheses to be Tested

3.1 Sibling Nutritional Status

The following null hypothesis (H_0) tests will be carried out to test for sibling spillover effects. Note that LNS households refer to households in which the mother/baby pairs were randomized into the LNS-P&L/LNS-Child treatment group. MMN households refer to households in which the mother was randomized to receive multiple micronutrient tablets, and IFA households refer to households in which the mother was randomized to receive iron-folic acid tablets.

$H_0$1: There is no difference in HAZ among under-five siblings at six and 18 months after the birth of the iLiNS baby in LNS households compared to under-five siblings in (combined) MMN and IFA households.

$H_0$2: There is no difference in WAZ among under-five siblings at six and 18 months after the birth of the iLiNS baby in LNS households compared to under-five siblings in (combined) MMN and IFA households.

$H_0$3: There is no difference in BMIZ among under-five siblings at six and 18 months after the birth of the iLiNS baby in LNS households compared to under-five siblings in (combined) MMN and IFA households.

$H_0$4: There is no difference in the probability of being stunted among under-five siblings at six and 18 months after the birth of the iLiNS baby in LNS households compared to under-five siblings in (combined) MMN and IFA households.

For each of these hypotheses, we will also test the null hypothesis of no difference among siblings in LNS households compared separately to siblings in MMN and siblings in IFA households.

3.2 Heterogeneity in Sibling Nutritional Status

For each of the hypotheses outlined in Section 3.1 above, we will also test for heterogeneity/effect modification in the spillover effect by (separately) sibling age at baseline, gender, and baseline anthropometric z-score.

3.3 Mechanisms

If we reject the null of no difference for any of the sibling nutritional outcomes, we will explore potential mechanisms driving the spillovers by testing the following null hypotheses:

$H_0$1: There is no difference in maternal income at the 35th week of pregnancy, six months after the birth of the iLiNS baby, and 18 months after the birth of the iLiNS baby in LNS households with siblings compared to (combined) MMN and IFA households.

$H_0$2: There is no difference in household food insecurity at the birth of the iLiNS baby, six months after the birth, and 12 months after the birth in LNS households with siblings compared to (combined) MMN and IFA households.

$H_0$3: There is no difference in per capita household food expenditures at six and 12 months after the birth of the iLiNS baby in LNS households with siblings compared to (combined) MMN and IFA households.

$H_0$3: There is no difference in per capita household expenditures on nutrient-dense food at six and 12 months after the birth of the iLiNS baby in LNS households with siblings compared to (combined) MMN and IFA households.

4. Variable Descriptions

4.1 Sibling Spillovers Analyses

4.1.1 Dependent Variables for Sibling Spillovers Analyses

Note that all anthropometric z-scores will be calculated using WHO Anthro and WHO2007[5], Stata macros from the World Health Organization based on the updated WHO child growth standards and WHO reference 2007, respectively. Because these macros do not calculate WHZ for children over 60 months (and therefore WHZ is missing for children who age past 60 months at the follow-up anthro visits), WHZ is not included in this analysis.

- HAZ: Height-for-age z-score at six and 18 months after the birth of the iLiNS baby.
- WAZ: Weight-for-age z-score at six and 18 months after the birth of the iLiNS baby.
- BMIZ: BMI-for-age z-score at six and 18 months after the birth of the iLiNS baby.
- Stunted: A binary variable indicating whether a sibling is stunted (HAZ < -2 SD) at six and 18 months after the birth of the iLiNS baby.

4.1.2 Covariates

- Baseline anthropometric z-score: For each dependent variable listed above, the associated baseline z-score (baseline HAZ will be included for the analysis of stunting).
- Age/Age^2/Age^3: Orthogonal polynomials[6] of sibling age, age squared, and age cubed in months at maternal enrollment into the DYAD-G trial.
- Change in Age: Difference in sibling age, in months, from enrollment to first and second follow-up sibling anthro measurements.[7]
- Gender: Sibling gender.
- Month of enrollment: Dummy variables indicating month mother was enrolled in iLiNS DYAD-G trial.

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[5] WHO Anthro calculates z-scores for children under 60 months, and WHO2007 calculates z-scores for children 60 months and older. Since some siblings in the sample age past 60 months during the intervention, both macros will be necessary to generate z-scores for these children across all three rounds.

[6] See section 5.7.3 for a note on generating the orthogonal polynomials.

[7] There is quite a bit of variation in the sibling sample in the amount of time between maternal enrollment into the trial and the baseline sibling measurement as well as the amount of time between sibling measurements. Reasons for this variation include (a) different maternal gestational age at enrollment, (b) different maternal gestational age at delivery, and (c) anthro team visits off schedule for logistical reasons.

- Year of enrollment: Dummy variables indicating year mother was enrolled in iLiNS DYAD-G trial.

- Maternal height: Maternal height in centimeters at baseline.

- Maternal Education: Number of completed years of formal education by the iLiNS woman at baseline.

- HFIA Score: The Household Food Insecurity Access (HFIA) Score at baseline (Coates et al. 2007).

- Household Asset Index: A proxy measure of baseline household socioeconomic status based on baseline ownership of a set of assets (radio, television, refrigerator, cell phone, and stove), lighting source, drinking water supply in the dry season, sanitation facilities, and flooring materials. Household ownership of this set of assets is combined into an index (with a mean of zero and standard deviation of one) using principal components analysis (Vyas and Kumaranayake 2006).

- Small Tropical Livestock Units: A composite measure of baseline household ownership of 'small' livestock, which includes sheep, goats, pigs, chickens, and rabbits. Livestock units are a standardized animal unit calculated by generating a weighted sum of the number of small animals owned, where the weights are determined by "feeding requirement" (FAO 2003) relevant for sub-Saharan Africa as follows: sheep (0.1), goats (0.1), pigs (0.2), chickens (0.01), and rabbits (0.02).

4.2 Mechanisms Analyses

4.2.1 Dependent Variables for Mechanisms Analyses

- Maternal Income: Self-reported measure of the amount typically earned per day by the iLiNS woman in her primary work in 4^{th} quarter 2011 US dollars at the 35^{th} week of pregnancy, six months after the birth of the iLiNS baby, and 18 months after birth.

- HFIA Score: Household Food Insecurity Access (HFIA) Score at the birth of the iLiNS baby, six months after the birth of the iLiNS baby, and 12 months after birth.

- Household Per Capita Daily Food Expenditures (SES subsample): Per capita daily food expenditures in 4^{th} quarter 2011 US dollars at six months after the birth of the iLiNS baby and 12 months after birth.

- Household Per Capita Daily Expenditures on Nutrient-Dense Foods (SES subsample): Per capita daily expenditures on nutrient-dense foods in 4^{th} quarter 2011 US dollars at six months after the birth of the iLiNS baby and 12 months after birth. Nutrient-dense foods will include all animal-source foods, fruits and vegetables (including dark yellow and orange-fleshed roots, tubers, etc. but excluding non-colored roots and tubers, plantains, and other starchy staples as categorized by WHO (2010)), pulses, and nuts

4.2.2 Covariates

- Baseline value: For each dependent variable listed above, the associated baseline value of the variable.
- Month of enrollment: Dummy variables indicating the month the mother was enrolled in iLiNS DYAD-G trial.
- Year of enrollment: Dummy variables indicating the year the mother was enrolled in iLiNS DYAD-G trial.
- Months enrolled: Number of months from maternal enrollment to date of mechanisms data collection.
- Maternal Education: Number of completed years of formal education by the iLiNS woman at baseline.
- Household Asset Index: A proxy measure of baseline household socioeconomic status based on baseline ownership of a set of assets (radio, television, refrigerator, cell phone, and stove), lighting source, drinking water supply in the dry season, sanitation facilities, and flooring materials. Household ownership of this set of assets is combined into an index (with a mean of zero and standard deviation of one) using principal components analysis.

5. Statistical Methods

5.1 Data Cleaning

Cleaning of the data follows the same procedure outlined in the main analysis plan (iLiNS-DYAD-G Statistical Analysis Plan Version 3, 2014-05-27), with Katie Adams generating the queries and Emmanuel Ayifah resolving the queries.

5.2 Outliers

Identification and treatment of outliers in the sibling anthro and SES data will follow the treatment described in the main statistical analysis plan (iLiNS-DYAD-G Statistical Analysis Plan Version 3, 2014-05-27) and in consultation with Jan Peerson and Mary Arimond.

5.3 Software

All statistical analyses will be performed with Stata 13 statistical package.

5.4 Basis for the Analysis

The basis for the analysis is an intent-to-treat framework whereby treatment spillover effects and heterogeneity in spillover effects will be estimated based on assigned treatment of the sibling's mother regardless of violations to study protocol with respect to supplement consumption. Siblings who were lost to follow-up because of death, travel from the study site, or refusal to continue with the study will be included in the analysis if available.

5.5 Analysis

5.5.1 Summary baseline characteristics

For the subsample of women in the iLiNS trial with at least one child under age five years at enrollment, summary statistics, including mean (count for dichotomous variables), standard deviation (percentage for dichotomous variables), minimum, and maximum for maternal, household, and sibling characteristics will be presented in one column of Table 1. For comparison purposes, a second column will present the same statistics, except for sibling characteristics, for the iLiNS women (and their households) without a child under five at enrollment.

For the subsample of iLiNS women with a child under two at baseline, Table 2 will present results of a t-test (t-statistics and p-values) for difference in mean baseline maternal, household, and sibling characteristics across the LNS and non-LNS treatment groups.

5.5.2 Sibling Spillover Effects

Table 3 will present summary statistics and results of two-tailed t-tests for raw (without covariate adjustment) difference in mean sibling anthropometrics between the LNS and non-LNS treatment groups at six and 18 months after birth of the iLiNS baby. The distributions of HAZ, WAZ, and BMIZ by treatment group will also be shown using kernel density estimates in Figures 1, 2, and 3.

Linear mixed effects models will be used to estimate the sibling spillover effect on HAZ, WAZ, and BMIZ (results presented in Table 4). In particular, we will estimate the following mixed model using Stata's 'mixed' command with an unstructured covariance matrix:

$$y_{it} = \alpha + u_i + \beta_1 LNS_i + \beta_2 T2_{it} + \beta_3 (T2_{it} * LNS_i) + \beta_4 y_{i0} + \delta X_{it} + \varepsilon_{it}$$

for $i = 1, \dots N$ siblings and $t = 1, 2$ time points of follow-up data collection (anthropometric measurements taken at six and 18 months after the birth of the iLiNS baby). LNS_i is an indicator variable equal to one if sibling $i's$ mother was randomized into the LNS arm of the trial and zero otherwise. $T2_{it}$ is an indicator variable for time of follow-up anthropometric data collection. A control for the baseline anthropometric z-score is included as y_{i0}, and the matrix X_{it} contains all other covariates specified in section 4.1.2. Finally, the term u_i is a sibling-level random effect, and ε_{it} is an idiosyncratic error term.

We will estimate a parallel non-linear mixed effects model (results presented in Table 4) using Stata's meprobit or melogit command to estimate the sibling spillover effect on the probably of being stunted.

5.5.3 Heterogeneity in Sibling Spillover Effects

We will extend the linear and non-linear mixed effect models to test for heterogeneity in the spillover effect by sibling age at maternal enrollment into the DYAD-G trial, gender, and baseline anthropometric z-score. For sibling age, for example (results in Table 5), we will interact age, age^2, and age^3 with the LNS variable, the time indicator variable, and the LNS treatment variable crossed with the time indicator variable. Sibling gender (Table 6) and baseline anthropometric z-scores (Table 7) will similarly be interacted with the LNS variable, the time indicator variable, and the LNS treatment variable crossed with the time indicator variable.

5.5.4 Mechanisms

If a sibling spillover effect is detected, the exploratory analyses into the mechanisms generating the spillover effect will be undertaken. First, Table 8 will present summary statistics and results of two-tailed t-tests for raw (without covariate adjustment) difference in mean maternal income, household food insecurity access score, per capita daily expenditures food, and per capita daily expenditures on the subset of nutrient-dense foods for the LNS and non-LNS treatment groups at their respective follow-up periods. The distributions of these variables by treatment group will also be shown using kernel density estimates in Figures 4, 5, and 6.

The effect of treatment on the mechanisms will then be modeled using a random effects model, presented in Table9. These data are at the household level and are therefore not sibling specific. Therefore, for $j = 1, \ldots H$ households and $t = 1, 2, 3$ time points of follow-up data collected (birth,[8] six months after the birth of the iLiNS baby and 12 months after the birth of the iLiNS baby), we will estimate

$$y_{jt} = \alpha + u_j + \beta_1 LNS_j + \beta_2 T2_{jt} + \beta_3 T3_{jt} + \beta_4 (T2_{jt} * LNS_j) + \beta_5 (T3_{jt} * LNS_j) + \beta_6 y_{j0} + \delta X_{jt} + \varepsilon_{jt}$$

The regression equation includes indicator variables $T2_{jt}$ and $T3_{jt}$ for time of follow-up data collection. The baseline value of the dependent variable, y_{j0}, is included as a control, and the matrix X_{jt} contains the set of covariates specified in section 4.2.2. The term u_j captures household-level random effects, and ε_{jt} is an idiosyncratic error term.

To the extent possible, we will also address/discuss alternative explanations for any sibling spillover effect, including sharing of supplements, differences in the number of unscheduled

[8] This time point is only relevant for the household food insecurity access score equation.

visits to LNS and non-LNS households, other forms of differential treatment of groups by iLiNS staff, etc.

5.6 Other Statistical Notes

5.6.1 *Missing Data*

Except for missing data on individual food expenditures (which will be imputed as described in section 5.7.2 below), all missing data, including impossible/improbable outliers coded as missing, will be treated as missing (i.e., not imputed) in all analyses.

5.6.2 *Imputation*

Multiple imputation using Stata's 'mi impute chained' command will be used to impute missing food expenditure observations (if missing for single foods only as opposed to completely missing data for the food expenditure module). The pmm (predictive means matching) option will be used to impute the missing observations.

5.6.3 *Covariate adjustment*

To help improve the precision of estimated effects, covariates listed in section 4.1.2 and 4.2.2 will be included in the regressions. To eliminate collinearity between age, age^2 and age^3, Stata's 'orthpoly' command will be used to generate orthogonal age polynomials.

All analyses will also be performed without covariates to ensure the results are robust to covariate inclusion.

5.6.4 *Adjustment for Multiple Hypothesis Tests*

Because this analysis will involve multiple tests, the proposed analyses run the risk of detecting statistically significant treatment effects by chance alone. To guard against such spurious findings, the Type 1 error rate will be adjusted (specific methodology still to be determined) for multiple tests. Both adjusted and unadjusted p-values will be reported.

6. Design of Tables

Table 1. Baseline Maternal, Household, and Sibling Characteristics

	Variable	Definition	With Sibling Under 5		Without Sibling Under 5	
			Mean [Std. Dev]	Min, Max	Mean [Std. Dev]	Min, Max
Maternal Chars.	Age	Age in years	xx.x	xx, xx	xx.x	xx, xx
	Education	Years of education				
	Height	Height in centimeters				
	Adjusted BMI	Body mass index adjusted for gestational age				
	Monthly Income	Income per month in fourth quarter USD				
Household Chars.	Household Size	Number of household members*				
	Children Under 5	Number of household members who are children under five years				
	Asset Index	Proxy measure of socioeconomic status based on asset ownership				
	HFIA Score	Household Food Insecurity Access Score				
	Per Capita Food Expenditures	Per capital daily expenditures on food in fourth quarter 2011 USD				
	Per Capita Expenditures on Nutrient-Dense Foods**	Per capital daily expenditures on nutrient-dense foods in fourth quarter 2011 USD				
Sibling Chars.	Age	Age in months at maternal enrollment into DYAD-G trial			-	-
	Female	= 1 if female (= 0 if male)			-	-
	HAZ	Height-for-age z-score			-	-
	WAZ	Weight-for-age z-score			-	-
	BMIZ	Body mass index z-score			-	-
	Stunted	= 1 if sibling is stunted at baseline (= 0 otherwise)			-	-
	N		xxx		Xxx	

* A household member is defined as anyone who has been regularly sleeping in the household's dwelling and sharing food from the same cooking pots for at least the last three months.

**Nutrient dense foods include animal-source foods, fruits, vegetables, pulses, and nuts.

Table 2. Baseline Characteristics by Treatment Group

	Variable	Mean (Standard Error) LNS	Mean (Standard Error) Non-LNS
Maternal Characteristics	Age (years)	xx.xx (x.xx)	xx.xx (x.xx)
	Education (years)		
	Height (cm)		
	Adjusted BMI		
	Monthly Income (US$)		
Household Characteristics	Household Size		
	Children Under 5		
	Asset Index		
	HFIA Score		
	Per Capita Food Expenditures (US$)		
	Per Capita Expenditures on Nutrient-Dense Foods (US$)		
Sibling Chars.	Age (months)		
	Female		
	HAZ		
	WAZ		
	BMIZ		
	Stunted		
	N	xxx	Xxx

Significance codes for difference in means between the treatment groups: *** (p < .01), ** (p < .05), * (p < .1).

Table 3. Average Sibling Anthropometric Z-Scores and Percent Stunted at First and Second Follow-up Measurements

		Follow-Up 1†			**Follow-Up 2†**		
		N	Mean (Std Error)	Std Deviation	N	Mean (Std Error)	Std Deviation
HAZ	Overall	xxx	x.xx (x.xx)	x.xx	xxx	x.xx (x.xx)	x.xx
	LNS						
	Non-LNS						
WAZ	Overall						
	LNS						
	Non-LNS						
BMIZ	Overall						
	LNS						
	Non-LNS						
Stunted (%)	Overall						
	LNS						
	Non-LNS						

†The first and second follow-up measurements were taken approximately six and 18 months after the birth of the iLiNS baby, respectively.
Significance codes for difference in means between the treatment groups: *** (p < .01), ** (p < .05), * (p < .1).

Table 4. Sibling Spillover Effects

	HAZ	WAZ	BMIZ	Pr(stunted)
LNS	x.xx	x.xx	x.xx	x.xx
	(x.xx)	(x.xx)	(x.xx)	(x.xx)
Follow-up 2				
LNS X Follow-up 2				
Constant				
N				
Log Likelihood				
Wald Chi^2 (df)				

Significance codes: *** (p < .01), ** (p < .05), * (p < .1).

Note: Controls for baseline anthropometric z-score (baseline HAZ for stunted model), sibling age, age-squared and age-cubed at maternal enrollment into the DYAD-G trial, change in sibling age (in months) from maternal enrollment to the anthro measurement, sibling gender, month and year of maternal enrollment into the trial, maternal height, maternal education, baseline household food insecurity access score, and baseline household asset index are included in the model (unreported).

Table 5. Heterogeneity in Sibling Spillover Effects by Age at Enrollment

	HAZ	WAZ	BMIZ	Pr(stunted)
LNS	x.xx (x.xx)	x.xx (x.xx)	x.xx (x.xx)	x.xx (x.xx)
Follow-up 2				
LNS X Follow-up 2				
Age				
Age^2				
Age^3				
LNS X Age				
LNS X Age^2				
LNS X Age^3				
Follow-up 2 X Age				
Follow-up 2 X Age^2				
Follow-up 2 X Age^3				
LNS X Follow-up 2 X Age				
LNS X Follow-up 2 X Age^2				
LNS X Follow-up 2 X Age^3				
Constant				
N				
Log Likelihood				
Wald Chi^2 (df)				

Significance codes: *** (p < .01), ** (p < .05), * (p < .1).
Note: Controls for baseline anthropometric z-score (baseline HAZ for stunted model), change in sibling age (in months) from maternal enrollment to the anthro measurement, sibling gender, month and year of maternal enrollment into the trial, maternal height, maternal education, baseline household food insecurity access score, and baseline household asset index are included in the model (unreported).

Table 6. Heterogeneity in Sibling Spillover Effects by Sibling Gender

	HAZ	WAZ	BMIZ	Pr(stunted)
LNS	x.xx	x.xx	x.xx	x.xx
	(x.xx)	(x.xx)	(x.xx)	(x.xx)
Follow-up 2				
LNS X Follow-up 2				
Female				
LNS X Female				
Follow-up 2 X Female				
LNS X Follow-up 2 X Female				
Constant				
N				
Log Likelihood				
Wald Chi^2 (df)				

Significance codes: *** (p < .01), ** (p < .05), * (p < .1).
Note: Controls for baseline anthropometric z-score (baseline HAZ for stunted model) for sibling age, age-squared and age-cubed at maternal enrollment into the DYAD-G trial, change in sibling age (in months) from maternal enrollment to the anthro measurement, month and year of maternal enrollment into the trial, maternal height, maternal education, baseline household food insecurity access score, and baseline household asset index are included in the model (unreported).

Table 7. Heterogeneity in Sibling Spillover Effects by Baseline Anthropometric Z-Score

	HAZ	WAZ	BMIZ	Prob(Stunted)†
LNS	x.xx	x.xx	x.xx	x.xx
	(x.xx)	(x.xx)	(x.xx)	(x.xx)
Follow-up 2				
LNS X Follow-up 2				
Baseline Z-Score				
LNS X Baseline Z-Score				
Follow-up 2 X Baseline Z-Score				
LNS X Follow-up 2 X Baseline Z-Score				
Constant				
N				
Log Likelihood				
Wald Chi^2 (df)				

† Heterogeneity in stunting is assessed via baseline HAZ.

Significance codes: *** (p < .01), ** (p < .05), * (p < .1).

Note: Controls for age, age-squared and age-cubed at maternal enrollment into the DYAD-G trial, change in sibling age (in months) from maternal enrollment to the anthro measurement, month and year of maternal enrollment into the trial, maternal height, maternal education, baseline household food insecurity access score, and baseline household asset index are included in the model (unreported).

Table 8. Average Maternal Income, HFIA Score, and Food Expenditures at Follow-up Measurements

		Follow-Up 1†			Follow-Up 2†			Follow-Up 3†		
		N	Mean (Std Error)	Std Deviation	N	Mean (Std Error)	Std Deviation	N	Mean (Std Error)	Std Deviation
Maternal Income	Overall									
	LNS									
	Non-LNS									
Household Food Insecurity Access Score	Overall									
	LNS									
	Non-LNS									
Per Capita Food Expenditures	Overall									
	LNS									
	Non-LNS									
Per Capita Expenditures on Nutrient-Dense Foods*	Overall									
	LNS									
	Non-LNS									

*Nutrient dense foods include animal-source foods, fruits, vegetables, pulses, and nuts.

†For maternal income, the first and second follow-up measurements were taken approximately six and 18 months after the birth of the iLiNS baby. Food security follow-ups occurred at approx. birth, six months, and 12 months after the birth of the iLiNS baby. Follow-up expenditure data was collected at approx. six and 12 months after the birth of the iLiNS baby.

Significance codes for difference in means between the treatment groups: *** (p < .01), ** (p < .05), * (p < .1).

Table 9. Potential Mechanisms Generating Sibling Spillover Effects

	Maternal Income (2011 USD)	Household Food Insecurity Access Score	Per Capita Food Expenditures (2011 USD)	Per Capita Expenditures on Nutrient-Dense Foods* (2011 USD)
LNS	x.xx (x.xx)	x.xx (x.xx)	x.xx (x.xx)	x.xx (x.xx)
Follow-up 2				
Follow-up 3				
LNS X Follow-up 2				
LNS X Follow-up 3				
Constant				
N				
Log Likelihood				
Wald Chi^2 (df)				

*Nutrient dense foods include animal-source foods, fruits, vegetables, pulses, and nuts.
Significance codes: *** (p < .01), ** (p < .05), * (p < .1).
Note: Controls for month and year of maternal enrollment into the trial, number of months from maternal enrollment to date of mechanisms data collection maternal education, and baseline household asset index are included in the model (unreported).

6. List of Figures

References

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