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Associations between contraception and stunting in Guatemala: secondary analysis of the 2014–2015 Demographic and Health Survey

David Flood,[1,2] Ashley Petersen,[3] Boris Martinez,[1] Anita Chary,[1,4] Kirsten Austad,[1,5] Peter Rohloff[1,6]

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For numbered affiliations see end of article.

Correspondence to
Dr Peter Rohloff; prohloff@bwh.harvard.edu

ABSTRACT

Background There has been limited research on the relationship between contraception and child growth in low-income and middle-income countries (LMICs). This study examines the association between contraception and child linear growth in Guatemala, an LMIC with a very high prevalence of child stunting. We hypothesise that contraceptive use is associated with better child linear growth and less stunting in Guatemala.

Methods Using representative national data on 12 440 children 0–59 months of age from the 2014–2015 Demographic and Health Survey in Guatemala, we constructed multivariable linear and Poisson regression models to assess whether child linear growth and stunting were associated with contraception variables. All models were adjusted for a comprehensive set of prespecified confounding variables.

Results Contraceptive use was generally associated with modest, statistically significant greater height-for-age z-score. Current use of a modern method for at least 15 months was associated with a prevalence ratio of stunting of 0.87 (95% CI 0.81 to 0.94; p<0.001), and prior use of a modern method was associated with a prevalence ratio of stunting of 0.93 (95% CI 0.87 to 0.98; p<0.05). The severe stunting models found generally similar associations with modern contraceptive use as the stunting models. There was no significant association between use of a modern method for less than 15 months and the prevalence ratio of stunting or severe stunting.

Conclusions Contraceptive use was associated with better child linear growth and less child stunting in Guatemala. In addition to the human rights imperative to expand contraceptive access and choice, family planning merits further study as a strategy to improve child growth in Guatemala and other countries with high prevalence of stunting.

INTRODUCTION

Approximately 200 million women in low-income and middle-income countries (LMICs) wish to avoid pregnancy but do not use modern contraceptive methods.[1] Access to family planning averts maternal deaths[2] and is supported by rights-based frameworks.[3] Family planning also likely has important spillover effects for child growth, which have been explored in detail by the field of evolutionary anthropology.[4] One mechanistic pathway involves trade-offs between offspring quantity and child health, where larger family size dilutes parental investments, while another involves trade-offs between reproduction and maternal health in which high fertility diminishes maternal physiological resources directed to the growing child in the postnatal period.[5]

This study examines the relationship between contraception and child linear growth in Guatemala, an upper-middle-income country in Central America. Guatemala has Latin America's highest prevalence of stunting,[6] and rural children in Guatemala are among the most stunted populations in the world.[7] Stunting confers significant short-term and long-term health risks, and it is, thus, a critical child health issue in Guatemala and globally.

Understanding the relationship between contraception and child growth is relevant to policy-makers and programme implementers in Guatemala and other similar contexts seeking to address high levels of child stunting. In the authors' own community nutrition programme in Guatemala, we anecdotally have observed more rapid improvements in child growth in communities with higher utilisation of contraception.[8] In general, research in LMICs has demonstrated that pregnancy intention is variably associated with stunting[9–15] and that proxy markers of family planning utilisation such as maternal age, birth intervals and family size are associated with improved child linear growth.[4 16–19] However, retrospective assessments of pregnancy intention are subject to bias,[20 21] and the import of proxy markers of family planning utilisation are not always

intuitive to health policy decision-makers who must make concrete decisions about investments to expand contraceptive access or uptake. Few studies of child stunting have used direct measures of family planning such as modern contraceptive use or unmet need for family planning, which have emerged as critical metrics in the family planning movement.[22] Within this background, we examine contraception usage in Guatemala using direct measures, and we hypothesise that usage is associated with better child linear growth and less stunting.

METHODS

Study design and sample

To assess the association between contraception and child growth in Guatemala, we conducted a secondary analysis of survey data from the 2014–2015 Demographic and Health Survey (DHS). Details on survey design can be found in the DHS report.[23] We used the children's recode file, which comprises 12 440 children ages 0–59 months.

Patient involvement

Patients were not directly involved in the design of this study.

Dependent variables

The dependent variables related to child growth. Child length/height-for-age z-score (HAZ) was used as a continuous dependent variable, and the presence of stunting (HAZ≤−2.0) or severe stunting (HAZ≤−3.0) were used as binary dependent variables. HAZ was based on WHO reference standards.[24]

Independent variables

The independent variables related to contraception use including current use, prior use and duration of current use (dichotomised to more or less than the median period of use of 15 months). We used DHS definitions of contraceptive type (modern method, traditional method and no use) with the exception of classifying 'folkloric methods' (0.1% of sample) as no use. Modern methods included pills, intrauterine devices, injections, condoms, implant, sterilisation, lactational amenorrhoea and other modern methods. Traditional methods included periodic abstinence and withdrawal. Additionally, we included proxy markers of contraception including preceding birth interval (no preceding interval, less than 24 months or 24 months or greater) and birth order (defined as a continuous variable given observed linearity between HAZ and birth order). Details on the techniques used to collect data on contraceptive use and a full example questionnaire can be found as a technical appendix in the survey's final report.[23]

Confounding variables

Confounding variables were selected a priori for model inclusion based on a review of global stunting literature,[7 25] predictors of child stunting reported in previous research conducted in Guatemala,[26 27] and the authors' country-specific expertise.[28–30]

Continuous confounding variables included age of child in months, age of mother in years and household wealth index. Given known non-linearity between HAZ and these continuous variables, for each we prespecified restricted cubic splines with five knots at quantiles as recommended by Harrell.[31]

Categorical confounding variables included child sex, area of residence (urban, rural), maternal and partner education attainment (none, incomplete primary, primary, incomplete secondary, complete secondary and higher), maternal literacy (not literate, semiliterate, literate), maternal marital status (never in union, partnered or formerly partnered), region of country, ethnic group by self-identification, language spoken in the home and presence of diarrhoea in the last 2 weeks. Of note, variables relating to sanitation facilities and water access were controlled through their incorporation into the household wealth index.

Statistical analysis

We took into account survey weighting, clustering at the PSU level and sampling design using Stata's svyset command and estimated variance using the Taylor linearisation. We used Stata V.13 for all analyses and did not correct p values for multiple testing.

First, we generated population descriptive statistics and assessed the bivariate relationships between independent and dependent variables.

We then constructed a set of multivariable linear regression models to test the hypothesis that contraception is associated with HAZ. The same prespecified confounding variables were included in all models. The first set of models used independent variables related to contraceptive use: current contraceptive use (model 1A); adding prior contraceptive use to model 1A (model 1B); adding duration of current contraceptive use to model 1B (model 1C) and adding proxy variables of contraception of birth interval and birth order to model 1C (model 1D).

Next, in order to test whether contraception was associated with the presence of stunting and severe stunting, we specified two multivariable Poisson regression models with the same independent variables as in the most specified model that did not include proxy variables of contraception (model 1C); we made this decision based on our assumption that birth interval and birth order were assessing the same underlying concept as the independent variables of contraceptive use. Poisson rather than logistic regression was used in order to facilitate the interpretation of results as prevalence ratios rather than ORs.[32] The same prespecified confounding variables were included in the Poisson models.

Finally, we carried out sensitivity analyses. First, we added maternal height as a continuous variable to the models with listwise deletion of records with missing data. A powerful predictor of child growth both globally[33 34]

and in Guatemala,[27 35] maternal height was excluded from the primary models due to the degree of missing data (8.0% records missing). Second, we respecified the models to include proxy variables of family healthcare access including place of delivery, money and distance as a problem in accessing medical care and the number of antenatal visits (categorised into fewer than four visits, four or more visits, or missing data). We opted not to include these variables in the main models as we assumed they were measuring a similar underlying concept as access to contraception. Third, given widespread food insecurity in Guatemala[30] and the previously reported association between dietary indicators and growth,[36] we included minimum meal frequency (if a child receives meals the minimum number of times per day, adjusted for breast feeding and age) and minimum dietary diversity (if a child consumes food from four or more food groups per day) as dichotomous variables based on WHO definitions and ran the models on applicable children ages 6–23 months (n=3520).[37] In addition to main results reported in the manuscript, full regression results from all models and sensitivity analyses are includes as online online supplementary files 1; 2.

We followed STROBE Strengthening the Reporting of Observational Studies in Epidemiology guidelines in reporting our research.[38]

RESULTS

Sample characteristics and bivariate analyses

The characteristics of children included in the analyses are shown in table 1 and bivariate relationships in table 2. Child height data were available for 11 674 of the 12 440 records available in the DHS file (missing data of 6.2%). Among these children, the mean HAZ was −1.68 (SD 1.14), the prevalence of stunting was 39.1% (95% CI 37.4% to 40.8%) and the prevalence of severe stunting was 12.1% (95% CI 11.0% to 13.4%). Among the mothers of these children, the prevalence of current modern contraceptive use less than 15 months was 22.9% (95% CI 21.7% to 24.2%) and greater than 15 months of 21.9% (95% CI 20.8% to 23.1%). Among users of less than 15 months, the most common methods were short-acting hormonal injections (47.9%), sterilisation (21.1%) and condoms (12.6%); among users of more than 15 months, the most common methods similarly were short-acting hormonal injections (42.6%), sterilisation (38.3%) and condoms (5.5%). Among all users, the overall prevalence of prior modern contraceptive use was 38.8% (95% CI 37.3% to 40.3%). In the bivariate analysis, the use of modern and traditional contraceptive types was generally associated with better HAZ and lower prevalence of stunting and severe stunting.

Multivariable regression with dependent variable of HAZ

Table 3 shows the results of the independent variables in multivariable linear regression models 1A–1D. Full results of models are provided in the online supplementary file 1. Current and prior use of contraceptive methods were associated with statistically significant better HAZ (overall p<0.001 for these categorical variables in all models). When duration of current modern use was included (model 1C), use for ≥15 months was associated with a 0.20 (95% CI 0.13 to 0.26, p<0.001) higher in HAZ, but modern use for <15 months was not statistically significant. The addition of variables of birth interval and birth order (model 1D) did not significantly change the coefficient estimates for the contraceptive variables.

Multivariable regression with dependent variable of stunting and severe stunting

Table 4 shows the results of the multivariable Poisson regression models assessing stunting and severe stunting. Full results of models are provided in the online supplementary file 1. The independent variables of current and prior use of contraception both were statistically significant for the outcomes of stunting and severe stunting (overall p<0.05). Compared with no contraceptive use, current use of a modern contraceptive method for ≥15 months was associated with a prevalence ratio of stunting of 0.87 (95% CI 0.81 to 0.94, p<0.001) and severe stunting of 0.61 (95% CI 0.50 to 0.73, p<0.001). Prior use of either traditional or modern contraceptive types also was associated with statistically significantly lower prevalence of stunting and severe stunting.

Sensitivity analyses

Selected regression output for the sensitivity analyses is included in online supplementary file 2. The results of the sensitivity analyses with maternal height and dietary covariates were similar to the main analysis. When variables relating to healthcare access were included, the same significant associations of HAZ with contraceptive use were observed in the linear models though the estimate sizes appeared smaller. In the Poisson models, inclusion of healthcare access variables made the associations between modern contraceptive use and stunting non-significant; the significant association between modern contraceptive use and severe stunting persisted.

DISCUSSION

This study was a secondary analysis of contraception and child growth using 2014–2015 Guatemala DHS data. In the multivariable linear regression models, contraceptive use and need were associated with statistically significant changes in child linear growth as measured by HAZ. In the multivariable Poisson regression models, contraceptive use was associated with statistically significant lower prevalence of stunting and severe stunting.

While the magnitude of the associations reported in this study is modest, these results should be viewed in the context of other strategies to improve child growth. A meta-analysis of evidence-based interventions for child nutrition reported the effect size of nutrition education in food-insecure populations of 0.25 HAZ and

Table 1 Survey-weighted characteristics of children in the sample

Characteristic	No	Population estimate
Dependent variables		
HAZ, mean (SD)	11 674	−1.68 (1.14)
Stunted, % (95% CI)	11 674	39.1 (37.4 to 40.8)
Severely stunted, % (95% CI)	11 674	12.1 (11.0 to 13.4)
Independent variables		
Maternal current contraceptive use, % (95% CI)	12 440	
No use		44.3 (42.8 to 45.9)
Traditional method		10.9 (10.1 to 11.7)
Modern method, <15 months		22.9 (21.7 to 24.2)
Modern method, ≥15 months		21.9 (20.8 to 23.1)
Maternal prior contraceptive use, % (95% CI)	12 440	
No use		49.8 (48.3 to 51.4)
Traditional method		11.4 (10.5 to 12.4)
Modern method		38.8 (37.3 to 40.3)
Birth interval, % (95% CI)	12 440	
Less than 24 months		12.8 (12.0 to 13.6)
24 months or greater		55.3 (54.2 to 56.5)
No preceding interval		31.9 (30.9 to 33.0)
Birth order, median (IQR)	12 440	2 (1 to 4)
Confounding variables		
Child's age in months, median (IQR)	11 962	29 (14 to 44)
Mother age in years, median (IQR)	12 440	27 (23 to 32)
Wealth index, median (IQR)	12 440	−49 854 (-107 310 to 33 359)
Male sex, % (95% CI)	12 440	51.9 (50.9 to 52.9)
Rural area of residence, % (95% CI)	12 440	64.2 (62.2 to 66.2)
Maternal education, % (95% CI)	12 440	
None		18.9 (17.5 to 20.3)
Incomplete primary		35.2 (33.7 to 36.7)
Primary		17.3 (16.3 to 18.3)
Incomplete secondary		17.7 (16.6 to 18.9)
Complete secondary		7.4 (6.6 to 8.2)
Higher		3.6 (3.2 to 4.2)
Partner education, % (95% CI)	12 440	
No education		12.5 (11.5 to 13.7)
Incomplete primary		31.0 (29.7 to 32.4)
Primary		19.6 (18.6 to 20.7)
Incomplete secondary		19.3 (18.1 to 20.6)
Complete secondary		8.4 (7.7 to 9.2)
Higher		4.4 (3.9 to 5.0)
No partner or unknown		4.7 (4.2 to 5.2)
Maternal literacy, % (95% CI)	12 432	
Not literate		21.4 (19.8 to 23.0)
Semiliterate		12.9 (11.9 to 13.9)
Literate		65.8 (63.9 to 67.6)
Maternal marital status, % (95% CI)	12 440	

Continued

Table 1 Continued

Characteristic	No	Population estimate
Never in union		4.5 (4.0 to 5.0)
Current partner		87.5 (86.7 to 88.3)
Former partner		8.0 (7.4 to 8.7)
Region of country, % (95% CI)	12 440	
Metropolitan Guatemala city		15.4 (13.8 to 17.2)
North		11.3 (10.0 to 12.8)
Northeast		9.1 (8.0 to 10.4)
Southeast		8.9 (8.0 to 9.9)
Central		10.7 (9.7 to 11.9)
Southwest		23.6 (22.2 to 25.1)
Northwest		16.9 (15.3 to 18.6)
Petén		4.0 (3.3 to 4.9)
Indigenous ethnicity, % (95% CI)	12 436	51.9 (49.4 to 54.4)
Mayan language spoken in home, % (95% CI)	12 440	30.5 (27.9 to 33.2)
Diarrhoea last 2 weeks, % (95% CI)	12 038	19.2 (18.3 to 20.3)

'Population estimate' refers to calculations that account for survey weighting and sampling design, thus making the values nationally representative in Guatemala. Of note, estimates differ slightly from the DHS report, which uses the Household Member Recode in its calculations.
DHS, Demographic and Health Survey; HAZ, height-for-age z-score.

complementary food provision of 0.39 HAZ.[39] Trials of water, sanitation and hygiene interventions have not consistently found benefit.[40] A review of context-specific nutrition programme found a median reduction in child stunting of 3% per year.[41] These sobering figures reiterate that stunting arises from a complex political, economic and social context that can only be partially attenuated via technical intervention.[25]

This research is, to our knowledge, one of the few studies assessing direct measures of modern contraceptive use against child growth. As discussed in the introduction, other researchers have explored the relationship between family planning and child growth principally by focusing on pregnancy intention or indirect metrics of contraception like birth intervals, maternal age and family size. Such measures have generally been found to

Table 2 Bivariate relationships between dependent and independent variables

	HAZ, mean (95% CI)	Stunted, % (95% CI)	Severely stunted, % (95% CI)
Current contraceptive use			
No use	−1.86 (−1.92 to −1.80)	45.1 (42.8 to 47.6)	16.3 (14.5 to 18.2)
Traditional method	−1.72 (−1.81 to −1.63)	40.5 (36.8 to 44.4)	12.1 (9.8 to 15.0)
Modern method, <15 months	−1.53 (−1.60 to −1.47)	33.4 (30.6 to 36.3)	9.1 (7.6 to 10.8)
Modern method, ≥15 months	−1.47 (−1.53 to −1.41)	32.5 (30.2 to 34.8)	7.2 (6.0 to 8.5)
Prior contraceptive use			
No use	−1.83 (−1.89 to −1.78)	44.5 (42.3 to 46.7)	15.4 (13.8 to 17.2)
Traditional method	−1.65 (−1.74 to −1.56)	36.7 (33.2 to 40.3)	9.9 (7.9 to 12.3)
Modern method	−1.50 (−1.55 to −1.45)	32.9 (30.8 to 35.0)	8.5 (7.3 to 9.8)
Birth interval			
Less than 24 months	−1.98 (−2.06 to −1.90)	49.7 (46.5 to 52.8)	18.8 (16.3 to 21.6)
24 months or greater	−1.74 (−1.79 to −1.69)	41.5 (39.6 to 43.5)	13.0 (11.6 to 14.5)
No preceding interval	−1.46 (−1.51 to −1.41)	30.5 (28.5 to 32.7)	7.9 (6.8 to 9.2)
Birth order*	−0.11 (−0.12 to −0.10)	1.20 (1.17 to 1.23)	1.18 (1.14 to 1.21)

Estimates account for sampling design.
*Birth order (continuous value) presented as bivariate regression coefficients and 95% CI.
HAZ, height-for-age z-score.

Table 3 Coefficient estimates and 95% CI from linear regression models relating to contraceptive use and HAZ (n=11 501)

	Model 1A	Model 1B	Model 1C	Model 1D
Current contraceptive use	***	***	***	***
No use	(Reference)	(Reference)	(Reference)	(Reference)
Traditional	0.12** (0.04 to 0.20)	0.11** (0.03 to 0.19)	0.12** (0.04 to 0.19)	0.12** (0.04 to 0.19)
Modern, any duration	0.10*** (0.05 to 0.16)	0.10*** (0.05 to 0.16)	N/A	N/A
Modern, <15 months	N/A	N/A	0.02 (–0.05 to 0.08)	0.02 (–0.04 to 0.09)
Modern, ≥15 months	N/A	N/A	0.20*** (0.13 to 0.26)	0.21*** (0.15 to 0.28)
Prior contraceptive use		***	***	***
No use		(Reference)	(Reference)	(Reference)
Traditional		0.09* (0.02 to 0.17)	0.11** (0.03 to 0.18)	0.11** (0.04 to 0.19)
Modern		0.10*** (0.04 to 0.15)	0.11*** (0.06 to 0.17)	0.12*** (0.07 to 0.18)
Birth interval				***
No preceding interval				(Reference)
Less than 24 months				–0.18*** (–0.26 to –0.10)
24 months or greater				–0.11*** (–0.17 to –0.05)
Birth order				–0.04*** (–0.06 to –0.02)

Asterisks not associated with estimates reflect the overall p value of the variable. The same prespecified confounding variables were included in all models: age of child, age of mother, wealth index, child sex, area of residence, maternal and partner education attainment, maternal literacy, maternal marital status, region of country, ethnic group, language and presence of diarrhoea in the last 2 weeks. Estimates account for sampling design.
*P<0.05, **P<0.01, ***P<0.001.
HAZ, height-for-age z-score; N/A, not applicable.

be associated with child growth, often using underlying DHS data.[4 16–19] However, indirect measures are difficult to translate into policy decision, whereas contraceptive usage rates lend themselves the best to discussion of improving investments and infrastructure for delivery. Here, our results demonstrating that direct measures of contraceptive use are associated with better child growth in Guatemala provide further concrete support for policy officials and global health workers of the spillover benefits of family planning.

Several findings that emerged from this work merit additional comment. First, an unexpected result was that the use of traditional methods was generally associated with similar changes in child growth and stunting compared with use of modern methods. We caution that our study was not intended to test the ordering of contraceptive types on child growth, does not address contraceptive efficacy, and is subject to methodological issues. For example, self-reporting of traditional contraceptive use might reflect residual confounders such as maternal autonomy, which was not incorporated in this analysis but has been associated with stunting in other settings.[42] In addition, we used DHS-aligned definitions of contraceptive type (modern or traditional), but the distinction between modern versus traditional methods has been debated.[43] We justify the definitions used in this study as appropriate given that it is the classification scheme currently recommended by DHS.

Second, the relationship between current modern contraceptive use and HAZ seemed to be 'dose dependent,' as current use of modern methods for 15 or more months was associated with statistically significant improvements in child HAZ and stunting, while users of less than 15 months had no significant difference in child growth compared with those not using contraception.

Third, the association between contraception and child growth persisted even in the analysis (model 1D) that controlled for birth number and antecedent birth intervals. Although we cannot exclude the possibility of residual confounding in our models, this may suggest that the impact of contraception on child growth may not be solely mediated through offspring number and timing. As discussed in the introduction, there are various potential causal mechanisms put forth by evolutionary

Table 4 Prevalence ratios of stunting and severe stunting estimated from multivariable Poisson regression models using contraceptive use

	Prevalence ratio of stunting (95% CI)	Prevalence ratio of severe stunting (95% CI)
Current contraceptive use	*	***
No use	(Reference)	(Reference)
Traditional method	0.93 (0.86 to 1.02)	0.84 (0.69 to 1.03)
Modern method, <15 months	1.01 (0.94 to 1.10)	0.93 (0.79 to 1.09)
Modern method, ≥15 months	0.87*** (0.81 to 0.94)	0.61*** (0.50 to 0.73)
Prior contraceptive use	**	***
No use	(Reference)	(Reference)
Traditional method	0.89* (0.81 to 0.98)	0.71** (0.59 to 0.87)
Modern method	0.93* (0.87 to 0.98)	0.79** (0.69 to 0.92)

Asterisks not associated with estimates reflect the overall p value of the variable. The same prespecified confounding variables were included in all models: age of child, age of mother, wealth index, child sex, area of residence, maternal and partner education attainment, maternal literacy, maternal marital status, region of country, ethnic group, language, and presence of diarrhoea in the last 2 weeks. Estimates account for sampling design.
*P<0.05, **P<0.01, ***P<0.001.

anthropologists linking contraception to child growth; the most well-described pathway involves increased household resources directed to children in smaller families. As discussed below, future research using methods like structural equation modelling might help elucidate these pathways.

The strengths of this study include use of a recently released, representative DHS survey that permitted current population-level estimates of change in HAZ and stunting in Guatemala. Additionally, our prior ethnographic and programmatic experience in Guatemala assisted in selection of a comprehensive set of covariates tailored to the setting. In response to critiques of DHS studies arising from the economics literature, we also carefully specified non-linear relationships between continuous covariates and HAZ.[44] A final study strength is our thorough sensitivity analyses. Most of our sensitivity analyses supported our primary findings, although inclusion of variables relating to access to and utilisation of health services weakened the association between stunting and contraception use in the Poisson regression model.

This research has some additional limitations and weaknesses. First, this study used data from a single survey in Guatemala, which limits generalisability to other countries. At the same time, an advantage of using single-country data is that it allowed us to carefully select confounders of interest based on stunting risk factors in a single context. Second, the use of secondary survey data does not permit us to infer causality and raises the possibility of residual confounding. Potential examples include dimensions of wealth not captured in asset-based indices,[45] maternal autonomy[42] or paternal anthropometry.[46] Third, we are unsure of the accuracy of self-reported contraceptive data in large surveys in Guatemala. In our own ethnographic and programmatic experience, family planning can be a delicate topic in Guatemalan households.

Our study suggests multiple directions for future research on the relationship between contraception and child growth. Since our analysis was not intended to assess the mechanism of impact of contraception on child growth, use of structural equation modelling with DHS data might delineate pathways and mediators of this relationship. Multicountry studies would be useful to further evaluate the association between contraceptive need and child growth. Aggregating data across countries would also facilitate analysis of the association between child growth and use of long-acting reversible contraceptives, which are increasingly emphasised in the global reproductive health literature. Given the difficulty in designing an ethically rigorous randomised trial examining the impact of a contraception intervention on child growth, alternative methodological and statistical approaches to infer causality would be helpful. Such strategies could also help better understand the dynamic process of contraceptive discontinuation and its impact on child growth.[47]

In conclusion, using secondary survey data in Guatemala, this study found an association between direct measures of contraception and better child growth outcomes that was

What is known about the subject?

- There has been limited research on the relationship between contraception and child growth in low-income and middle-income countries like Guatemala.
- Prior studies have shown that indirect markers of family planning utilisation such as maternal age, birth intervals and family size are often associated with improved child growth.
- However, these proxy markers of contraception are disconnected from real-world access and use.

What this study adds?

- Use of contraceptive methods was generally associated with modestly better child linear growth and less stunting and severe stunting in Guatemala.
- This is one of the first studies to assess the relationship between contraceptive use and child growth in a low-income and middle-income country.
- This analysis adds to the evidence that family planning may have positive spillover effects on child growth.

modest in magnitude yet significant from a public health perspective. In addition to the human rights imperative to expand contraceptive access and choice, family planning merits further research and policy consideration as a strategy to improve child growth in Guatemala and similar countries with high prevalence of stunting.

Author affiliations
[1]Wuqu' Kawoq, Santiago Sacatepéquez, Guatemala
[2]Departments of Internal Medicine and Pediatrics, University of Michigan, Ann Arbor, Michigan, United States
[3]Division of Biostatistics, University of Minnesota, Minneapolis, Minnesota, USA
[4]Department of Emergency Medicine, Massachusetts General Hospital, Boston, Massachusetts, United States
[5]Department of Family Medicine, Boston University School of Medicine, Boston, Massachusetts, United States
[6]Division of Global Health Equity, Brigham and Women's Hospital, Boston, Massachusetts, United States

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