THE LANCET
Child & Adolescent Health

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplemental Table 1. Systematic literature review of evidence for linkage between adolescent pregnancy and child undernutrition*

Author, year	Country	Outcomes examined							
		Child undernutrition	Education & bargaining power	Maternal nutrition	Access to ANC services	Access to delivery services	Access to services during childhood	Infant and young child feeding	Living Conditions
Kane et al., 2018[1]	US	x							
Sarker et al., 2018[2]	Bangladesh		x						x
Marphatia et al., 2017[3]	Bangladesh, India, Nepal, and Pakistan	x	x	x	x	x			x
Chari et al., 2017[4]	India	x	x				x		
Yussif et al., 2017[5]	Ghana	x							
Nguyen et al., 2017[6]	Bangladesh	x	x	x					
Islam et al., 2017[7]	Bangladesh		x						x
Delprato et al., 2017[8]	Sub-Saharan Africa and Southwest Asia		x		x	x	x		
Owolabi et al., 2017[9]	13 west African countries				x				
Acharya et al., 2017[10]	Nepal					x			
Mombo-Ngoma et al., 2016[11]	Benin, Gabon, Mozambique, Tanzania	x	x	x	x				
Vir, 2016[12]	South Asia	x	x	x	x	x	x	x	x
Traisrisilp et al., 2015[13]	Thailand	x							
Fall et al., 2015[14]	Brazil, Guatemala, India, Philippines, and South Africa	x							
Goli et al., 2015[15]	India			x					
Ganchimeg et al., 2014[16]	29 countries in Africa, Latin America, Asia and the Middle East.	x							
Fink et al., 2014[17]	61 LMICs	x		x					x
Godha et al., 2013[18]	India, Bangladesh, Nepal, and Pakistan				x	x			
Prakash et al., 2011[19]	India	x	x	x					x
Bakker et al., 2011[20]	The Netherlands	x	x	x					
Rah et al., 2008[21]	Bangladesh			x					
Abdullah et al., 2007[22]	Bangladesh	x	x	x			x		x

Study	Country			
Chandra *et al.*, 2002[23]	US	x	x	
Motil *et al.*, 1997[24]	US			x
Verrier et al., 1993[25]	US	x		
Fraser *et al,* 1995[26]	US	x		
Keterlinus *et al.*, 1990[27]	US	x		

*The search was conducted in PubMed between December 15 and 19, 2018. Search terms included (adolescent OR adolescence OR teenage OR teen) AND (pregnant OR pregnancy) AND (infant OR child) AND (stunting OR stunted); English language and Human study filters were applied; the search yielded 1170 items, which were screened for relevance. Among the relevant items, references were also examined for additional relevant studies.

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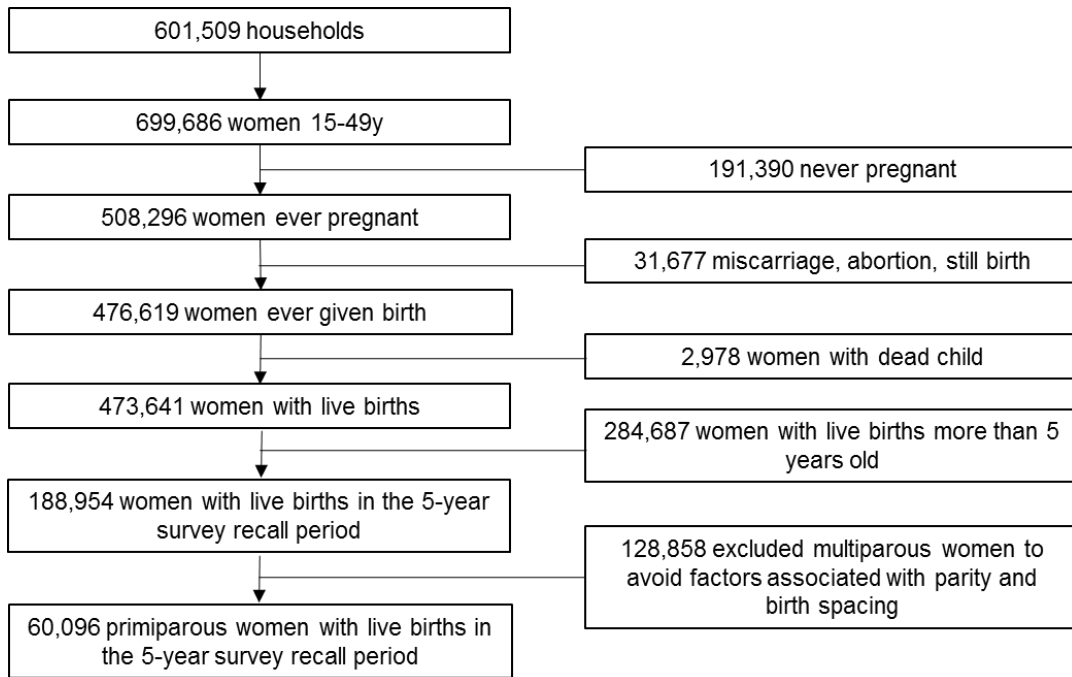
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Supplemental Table 2. Household, maternal and child characteristics of primiparous Indian women aged 15-49 years by age at first birth.

|	First birth during adolescence (10-19 y)		First birth during young adulthood (20-24 y)		First birth during adulthood (25 -49 y)	
Household	*Total women*	*N (%) or mean*	*Total women*	*N (%) or mean*	*Total women*	*N (%) or mean*
Household size, n	14,107	6·02	31,475	5·91	14,514	5·50
Place of residence (rural)	14,107	11,243 (76·60)	31,475	22,824 (67·02)	14,514	8,584 (48·95)
Religion, %						
Hindu	14,107	10,414 (77·67)	31,475	24,174 (80·94)	14,514	10,162(80·41)
Muslim	14,107	2,284 (18·41)	31,475	4,003 (13·54)	14,514	1,724 (10·28)
Other	14,107	1,409 (3·92)	31,475	3,298 (5·52)	14,514	2,628 (9·31)
Mother						
Age, y	14,107	20·07	31,475	23·60	14,514	29·59
Age at marriage, y	13,718	16·41	30,855	19·68	14,128	24·31
Age at first birth, y	14,107	18·08	31,475	21·76	14,514	27·60
Caste category, %						
Scheduled caste	14,107	2,722 (22·23)	31,475	5,605 (20·30)	14,514	2,072 (17·80)
Scheduled tribe	14,107	2,946 (12·14)	31,475	5,263 (9·21)	14,514	2,723 (7·13)
Other backward class	14,107	5,309 (38·70)	31,475	12,828 (43·87)	14,514	4,751 (40·11)
Occupation, %						
Not in work force	2,348	1,937 (84·64)	5,409	4,557 (86·22)	2,745	2,147 (78·63)
Agriculture or housewife	2,348	299 (10·27)	5,409	530 (8·10)	2,745	258 (8·74)
Other	2,348	112 (5·08)	5,409	322 (5·68)	2,745	340 (12·63)
Child						
Age, mo	13,903	22·87	31,167	22·40	14,327	24·32
Male child, %	14,107	7,459 (52·65)	31,475	16,863 (53·87)	14,514	7,623 (52·86)

Data are from India's fourth National Family Health Survey (NFHS4, 2016)

Supplemental Figure 1. Study sample diagram

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┌─────────────────────────────────┐
│      601,509 households         │
└─────────────────────────────────┘
                │
                ▼
┌─────────────────────────────────┐
│     699,686 women 15-49y        │
└─────────────────────────────────┘        ┌─────────────────────────────────┐
                │──────────────────────────│     191,390 never pregnant       │
                ▼                           └─────────────────────────────────┘
┌─────────────────────────────────┐
│  508,296 women ever pregnant    │
└─────────────────────────────────┘        ┌──────────────────────────────────────────┐
                │──────────────────────────│ 31,677 miscarriage, abortion, still birth │
                ▼                           └──────────────────────────────────────────┘
┌─────────────────────────────────┐
│ 476,619 women ever given birth  │
└─────────────────────────────────┘        ┌─────────────────────────────────┐
                │──────────────────────────│  2,978 women with dead child     │
                ▼                           └─────────────────────────────────┘
┌─────────────────────────────────┐
│ 473,641 women with live births  │
└─────────────────────────────────┘        ┌─────────────────────────────────┐
                │──────────────────────────│ 284,687 women with live births   │
                ▼                           │       more than 5 years old      │
┌─────────────────────────────────┐        └─────────────────────────────────┘
│ 188,954 women with live births  │
│ in the 5-year survey recall     │        ┌─────────────────────────────────┐
│ period                          │        │ 128,858 excluded multiparous     │
└─────────────────────────────────┘        │ women to avoid factors           │
                │──────────────────────────│ associated with parity and       │
                ▼                           │ birth spacing                    │
┌─────────────────────────────────┐        └─────────────────────────────────┘
│ 60,096 primiparous women with   │
│ live births in the 5-year       │
│ survey recall period            │
└─────────────────────────────────┘
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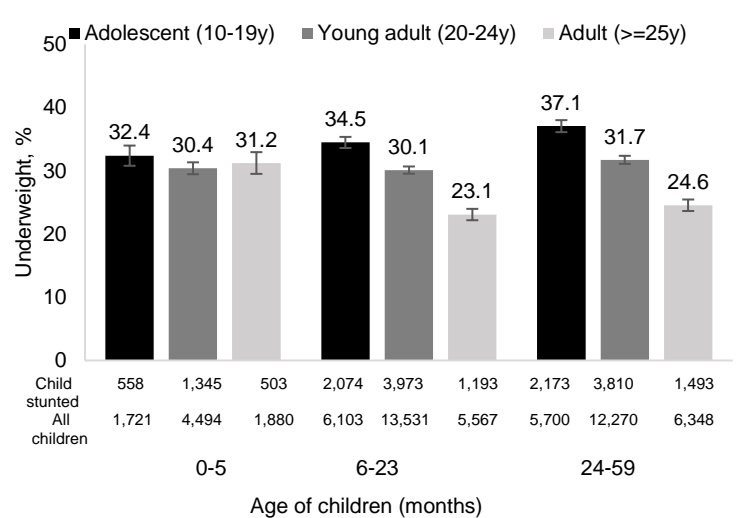
Supplemental Figure 2. Attained WAZ and underweight for first-born children by child age and mother's age at first birth in India, 2016.

A. Weight-for-age z-score
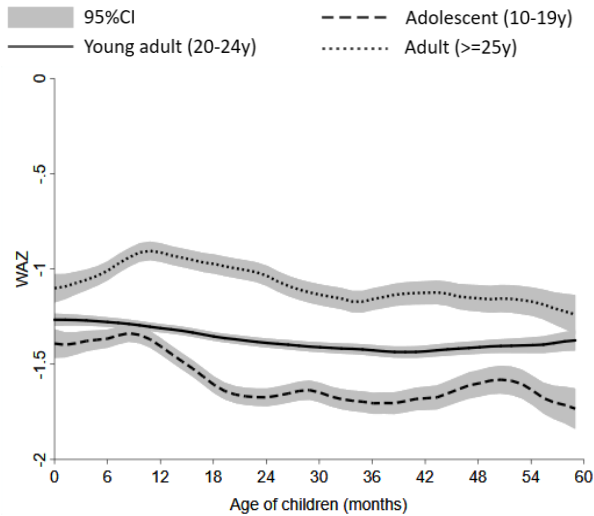
B. Underweight

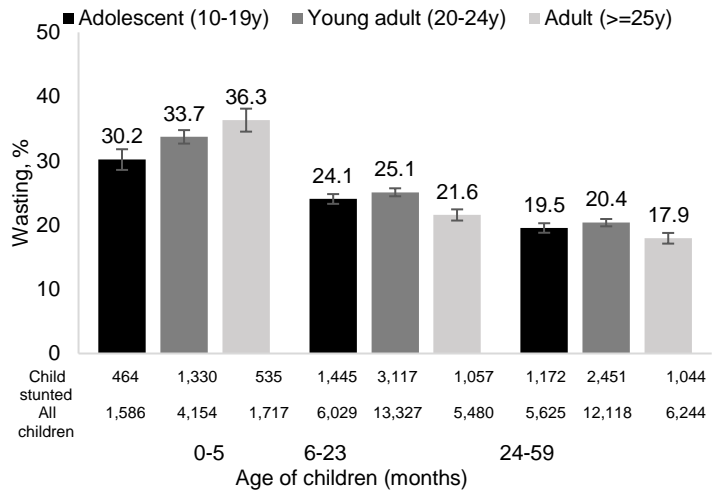|	OLS regression: WAZ		OLS regression: Underweight	
	β [95% CI]	p	β [95% CI]	p
Adolescence vs. young adulthood	-0·16 [-0·22,-0·09]	<0·0001	0·04 [0·02,0·06]	0·002
Adolescence vs. adulthood	-0·40 [-0·47,-0·32]	<0·0001	0·10 [0·07,0·12]	<0·0001

Curves are smooth local polynomials with 95% confidence intervals shown in gray. Adjusted coefficient [95% CI] for models with and without state fixed effects are shown below the figure. WHZ: weight-for-height z-score. Data are from India's fourth National Family Health Survey (NFHS4, 2016).

Supplemental Figure 3. Attained WHZ and wasting for first-born children by child age and mother's age at first birth in India, 2016.

A. Weight-for-height z-score
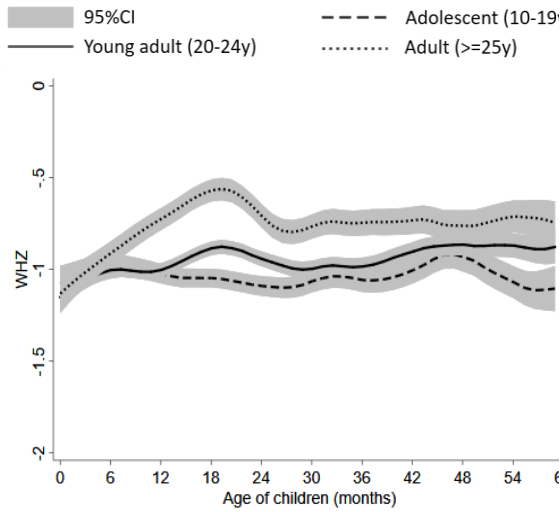
B. Wasting

	OLS regression: WHZ		OLS regression: Wasting	
	β [95% CI]	p	β [95% CI]	p
Adolescence vs. young adulthood	-0·03 [-0·09,0·03]	0·298	-0·01 [-0·03,0·00]	0·033
Adolescence vs. adulthood	-0·16 [-0·23,-0·08]	<0·0001	0·01 [-0·01,0·02]	0·681

Curves are smooth local polynomials with 95% confidence intervals shown in gray. Adjusted coefficient [95% CI] for models with and without state fixed effects are shown below the figure. WHZ: weight-for-height z-score· Data are from India's fourth National Family Health Survey (NFHS4, 2016).

Supplemental Table 3. Comparing household, maternal and child characteristics of primiparous Indian women aged 15-49 years by sample with and without bargaining variables.

	Sample without bargaining variables (n=49,535)		Sample with bargaining variables (n=10,561)		p
Household	*Total women*	*N (%) or mean*	*Total women*	*N (%) or mean*	
Household size, n	49,535	5·89	10,561	5·64	<0·0001
Place of residence (rural)	49,535	35,329 (65·72)	10,561	7,322 (63·48)	0·053
Religion, %					
Hindu	49,535	36,932 (80·00)	10,561	7,818 (80·00)	1·000
Muslim	49,535	6,493 (13·95)	10,561	1,518 (14·38)	0·541
Other	49,535	6,110 (6·06)	10,561	1,225 (5·62)	0·325
Mother					
Age, y	49,535	24·05	10,561	24·18	0·079
Age at marriage, y	48,361	19·88	10,340	20·06	0·005
Age at first birth, y	49,535	22·14	10,561	22·26	0·071
Caste category, %					
Scheduled caste	49,535	8,606 (20·55)	10,561	1,793 (18·65)	0·006
Scheduled tribe	49,535	9,001 (9·44)	10,561	1,931 (9·60)	0·737
Other backward class	49,535	18,956 (41·58)	10,561	3,932 (42·37)	0·387
Child					
Age, mo	48,958	22·94	10,439	23·00	0·833
Male child, %	49,535	26,358 (53·60)	10,561	5,587 (53·34)	0·061

Data are from India's fourth National Family Health Survey (NFHS4, 2016).