

Is Unwanted Birth Associated with Child Malnutrition In Bangladesh?

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CONTEXT: The association between unintended pregnancy and maternal and child health has been well documented. However, the relationship of unintended pregnancy with child malnutrition is not well understood, and may be important in countries such as Bangladesh that have high levels of these events.

METHODS: Data from the 2011 Bangladesh Demographic and Health Survey on 6,506 last-born, singleton children younger than five were used to investigate the relationship between pregnancy intendedness and the prevalence of stunting, wasting and underweight during early childhood. Multivariate logistic regression analyses were used to identify associations.

RESULTS: Substantial proportions of children were stunted (40%), wasted (16%) and underweight (35%) at the time of the survey. Mothers reported that at the time of conception, 14% of their index pregnancies had been unwanted and 16% had been mistimed. Compared with children whose conception had been intended, those whose conception had been unwanted were more likely to be stunted (46% vs. 39%), wasted (19% vs. 15%) or underweight (43% vs. 33%). In regression analyses, children who had been unwanted at the time of conception had an elevated risk of being stunted (odds ratio, 1.4), wasted (1.4) or underweight (1.3).

CONCLUSION: Maternal pregnancy intentions are associated with child stunting, wasting and underweight. If these associations are causal, preventing unwanted pregnancies may help reduce the prevalence of childhood malnutrition in Bangladesh.

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Despite the substantial progress made during the past decade in reducing its prevalence, child malnutrition is still a major public health problem, especially in resource-poor countries. Malnutrition is related to macronutrient deficiency and is characterized by stunting, wasting and underweight. Stunting, defined as insufficient height for age, is an indicator of chronic undernutrition, and is the result of prolonged food deprivation or of disease or illness; wasting, or insufficient mass for height, is an indicator of acute undernutrition, and is the result of relatively recent food deprivation or illness; and underweight, or insufficient weight for age, is a composite indicator that reflects both acute and chronic undernutrition, although it cannot distinguish between them.¹ Globally, an estimated 165 million children younger than five (26%) are stunted, 52 million (8%) are wasted and 100 million (16%) are underweight.² Malnutrition is responsible for 35% of the burden of disease in children younger than five, and 11% of the disability-adjusted life years (healthy years of life) lost worldwide.³

Bangladesh has one of the highest rates of child malnutrition in the world,⁴ and malnutrition is the country's leading cause of child morbidity and mortality.⁵ Two of every five children in Bangladesh suffer from moderate-to-severe underweight,⁶ and roughly two-thirds of deaths among children younger than five are attributable to un-

dernutrition.⁷ Despite the importance of early child nutrition for survival and long-term development, the international nutrition community has had difficulty reaching a consensus on how to combat child undernutrition.^{8,9}

An ample body of research has examined the biological,^{10,11} environmental,^{12,13} and socioeconomic^{14,15} correlates of child malnutrition, but researchers have only begun to investigate many aspects of the social environment. Moreover, research indicates that maternal education,¹⁶ maternal autonomy,¹⁷ maternal body mass index (BMI),¹⁸ maternal height,¹⁹ household wealth,²⁰ urban residence,²¹ and having a safe source of drinking water and hygienic toilet facilities²² are positively associated with child nutrition. A psychological factor that might influence a child's risk of malnutrition is whether the pregnancy was unintended—either unwanted (the parent did not desire any, or any more, children) or mistimed (the pregnancy occurred earlier than desired).²³ A parent's feelings toward a child born as a result of unwanted pregnancy may adversely affect the child's health if these feelings contribute to conscious or unconscious neglect of the child, resulting in inadequate provision of nutrition, lack of parent-child bonding and inattention to the child's health care needs.²⁴ Researchers have attempted to model the associations between maternal pregnancy intendedness and child survival and health outcomes. Barber and colleagues hypothesized

that various pathways link unwanted childbearing, child health and mother-child relationships, and suggested that children who had been unwanted at the time of conception may suffer more neglect and abuse than those who had been wanted.²⁵ Women whose pregnancies are unwanted tend to initiate antenatal care later than do women whose pregnancies are wanted.^{26,27} In a study of postnatal outcomes, rates of infant mortality (death during the first

28 days of life) were higher following unwanted pregnancies than following other pregnancies.²⁸ In an analysis of Demographic and Health Survey (DHS) data from five developing countries, Montgomery and colleagues found that unwantedness was linked to child malnutrition in the Dominican Republic, but not in the other four countries.²⁹ Unwanted pregnancies have also been linked to adverse outcomes and behaviors—including low birth weight, neo-

TABLE 1. Selected characteristics of last-born singleton children aged 59 months or younger, Bangladesh Demographic and Health Survey, 2011

Characteristic	% (N=6,506)	Characteristic	% (N=6,506)
CHILD		MOTHER	
Height for age		Age (yrs.)	
Stunted	39.6	13–24	49.3
Not stunted	60.4	25–34	41.7
		35–49	9.0
Weight for height		Educational attainment	
Wasted	16.2	None	18.9
Not wasted	83.8	Primary	30.1
Weight for age		Secondary	43.6
Underweight	34.9	>secondary	7.4
Not underweight	65.1	Body mass index	
Intendedness at conception		Thin	26.6
Intended	70.4	Normal	60.9
Mistimed	15.7	Overweight/obese	12.1
Unwanted	14.0	Data missing	0.4
Age (mos.)		Height	
0–11	22.6	<145 cm	12.8
12–23	21.4	≥145 cm	87.2
24–35	19.0	Data missing	0.0‡
36–59	37.0	Autonomy score	
Sex		0	19.3
Male	51.6	1	11.2
Female	48.4	2	13.0
Birth order		3	14.2
1st	33.5	4	40.8
2nd	29.8	Data missing	1.5
3rd	18.1	HOUSEHOLD	
4th	9.4	Wealth quintile	
≥5th	9.1	Poorest	22.1
Preceding birth interval (mos.)†		Poorer	20.1
≤23	13.1	Middle	19.9
24–35	16.8	Richer	19.5
36–47	18.3	Richest	18.4
≥48	51.8	Area of residence	
Size at birth		Urban	23.1
Average or larger	82.9	Rural	76.9
Below average	17.1	Source of drinking water	
Ever vaccinated		Protected	89.1
Yes	35.6	Unprotected	10.9
No	4.7	Has sanitary toilet facilities	
Data missing	59.7	Yes	78.9
Still breast-feeding		No	21.1
Yes	63.4	Media access	
No	36.6	Some	64.8
		None	35.1
		Data missing	0.1
		Total	100.0

†Excludes the 2,216 first-born children (33.5% of the sample after weighting). ‡Proportion of respondents with missing data was less than 0.1%. Notes: All percentages are weighted. Percentages may not total 100.0 because of rounding.

natal mortality, absence of breast-feeding and poor parental care—in several U.S. studies.^{30,31} However, little evidence exists in these studies, or in studies in poorer countries, of an association between mistimed (as opposed to unwanted) pregnancies and adverse outcomes.^{30–32} The high rates of mistimed and unwanted pregnancies in developing countries make it important to study the relationship between such pregnancies and child nutrition and growth; it is plausible that adverse nutritional outcomes are more likely for a child if the pregnancy had been unintended than if it had been intended.

Although overall fertility has decreased and contraceptive use has increased in Bangladesh, one in four pregnancies are unwanted or mistimed.³³ Such pregnancies are associated with an elevated risk of adverse outcomes for women, fetuses and infants.^{34,35} The direct relationship between unintended childbearing and childhood mortality

has been well documented in both the developed²⁸ and developing^{29,36} world. However, far fewer studies have focused on the relationship between unintended pregnancy and nutritional status. Most of these studies have been conducted in developing countries, where malnutrition remains a major public health problem. Marston and Cleland found that in Peru, the odds of stunting were 15% greater if a pregnancy had been unwanted rather than wanted, although in Egypt the likelihood of stunting was lower if a pregnancy had been mistimed or unwanted than if it had been wanted.³⁰ Unwanted fertility was associated with low height-for-age in the Dominican Republic,²⁹ and an analysis of data from the 1998 Bolivia DHS found that children aged 12–35 months were about a third more likely to be stunted if their birth had been mistimed or unwanted rather than intended.²² However, these studies have examined only the relationship be-

TABLE 2. Percentage of last-born singleton children aged 59 months or younger who were stunted, wasted or underweight, by selected characteristics

Characteristic	Stunted	Wasted	Underweight	Characteristic	Stunted	Wasted	Underweight
CHILD							
Intendedness at conception							
Intended	38.6***	15.2***	33.2***	Educational attainment			
Mistimed	38.8	17.8	35.4	None	49.8***	19.0***	49.0***
Unwanted	45.7	19.5	42.8	Primary	44.9	19.8	40.7
				Secondary	34.8	13.6	28.0
				>secondary	21.1	9.7	15.7
Age (mos.)							
0–11	20.2***	15.1	20.1***	Body mass index			
12–23	49.9	16.2	35.8	Thin	49.4***	21.5***	48.5***
24–35	46.2	15.2	38.9	Normal	38.3	15.3	32.1
36–59	42.2	17.4	41.3	Overweight/obese	25.3	9.1	19.2
Sex							
Male	38.9	16.6	32.9***	Height			
Female	40.4	15.8	37.0	<145 cm	59.1***	18.9*	50.2***
Birth order							
1st	36.0***	15.3***	30.8***	≥145 cm	36.8	15.8	32.6
2nd	38.3	14.9	31.9	Autonomy score			
3rd	39.9	15.5	35.8	0	39.6	18.1*	35.4
4th	43.7	21.3	42.6	1	39.0	18.6	37.0
≥5th	52.7	19.6	49.7	2	39.5	17.1	34.3
Preceding birth interval (mos.)†							
≤23	49.8***	17.5	44.2***	3	40.8	13.4	34.1
24–35	47.9	17.1	40.2	4	39.4	15.6	34.7
36–47	43.1	18.5	39.4	HOUSEHOLD			
≥48	36.7	15.6	33.2	Wealth quintile			
Size at birth							
Average or larger	37.4***	14.2***	31.4***	Poorest	51.5***	19.2***	49.1***
Below average	50.3	25.8	51.8	Poorer	44.0	17.4	41.0
Ever vaccinated							
Yes	41.5***	17.0*	36.5**	Middle	39.0	17.6	34.5
No	28.3	22.5	28.7	Richer	35.1	13.5	26.0
Still breast-feeding							
Yes	39.8	16.4	34.0*	Richest	26.1	12.5	20.8
No	39.3	15.9	36.4	Area of residence			
MOTHER							
Age (yrs.)							
13–24	39.3	16.5	33.7***	Urban	35.4***	14.2*	27.1***
25–34	39.3	15.4	34.7	Rural	40.9	16.8	37.2
35–49	42.7	18.1	42.2	Source of drinking water			
Media access							
Some	35.7***	14.3***	29.7***	Protected	40.3**	16.4	35.6***
None	46.8	19.8	44.4	Unprotected	34.3	14.7	29.0
Has sanitary toilet facilities							
Yes	38.7**	16.2	33.8***	Has sanitary toilet facilities			
No	42.9	16.2	39.0	Yes	38.7**	16.2	33.8***
Media access							
Some	35.7***	14.3***	29.7***	No	42.9	16.2	39.0
None	46.8	19.8	44.4	Media access			
Media access							
Some	35.7***	14.3***	29.7***	Some	35.7***	14.3***	29.7***
None	46.8	19.8	44.4	None	46.8	19.8	44.4

*p<.05. **p<.01. ***p<.001. †Excludes first-born children. Notes: P values refer to differences within subcategories. All data are weighted.

tween pregnancy intendedness and stunting; no study has assessed where there is an association between pregnancy intention and underweight or wasting (the latter is an important outcome to assess because it is an indicator of acute nutritional change). Understanding the relationship between pregnancy intendedness and the three types of child malnutrition is particularly important in Bangladesh, where malnutrition is a major public health problem⁴ and a barrier to development. The aim of this study, therefore, was to use a nationally representative sample to assess the association between maternal pregnancy intentions and child stunting, wasting and underweight in Bangladesh.

METHODS

Sample

This study analyzed data from the most recent Bangladesh DHS, which surveyed a nationally representative sample of women of childbearing age between July and December 2011. A two-stage, stratified cluster sample of 600 primary sampling units (207 in urban areas and 393 in rural areas), derived from the 2011 Bangladesh Population and Housing Census, served as the sampling frame. A total of 18,222 eligible women aged 12–49 were selected to participate in the survey; 17,842 (98%) of these women were interviewed. Respondents provided information about themselves, their children and their household. In addition, weight and height measurements for children aged 0–59 months were obtained by trained data collectors according to the standard DHS fieldwork protocol,³³ using lightweight scales with digital screens and height/length boards specially produced for use in survey settings. Details of data collection and management procedures are described elsewhere.³³

For the current analysis, the data set consisted of 7,066 last-born singleton children* who were aged 59 months or younger at the time of the survey. Three hundred and seventy-three of these children were excluded because of missing anthropometric measurements, 149 because the combination of their weight and their height was implausible† and 38 because their reported height was not within credible limits, yielding a final sample of 6,506 children.

Measures

Maternal pregnancy intendedness was determined by asking women to recall their feelings at the time of conception for each birth within the past five years. Women were asked whether the pregnancy had been planned (wanted at that time), mistimed (wanted later) or unwanted (not wanted at any time). Because the personal, partnership-related, social and political realities of unwanted pregnancies are different from those of mistimed pregnancies, the use of separate categories may better reflect the way women think about a pregnancy.²³

Children's weights and heights were converted to weight-for-age and height-for-age standard deviation units (z-scores) using the World Health Organization's child growth standards.³⁷ Children were classified as stunted if

their height was at least two standard deviations below the mean for their age; as wasted if their weight was at least two standard deviations below the mean for their height; and as underweight if their weight was at least two standard deviations below the mean for their age.

A variety of child and maternal socioeconomic and demographic characteristics that have been theoretically or empirically linked to child nutrition^{16–22} or maternal pregnancy intentions^{38–40} were also included in the analysis.

The children's characteristics were age, sex, birth size, preceding birth interval, breast-feeding status and vaccination history. Age was classified as 0–11, 12–23, 24–35 or 36–59 months. Sex was included because in South Asia, male children are valued more than female children, and receive preferential treatment, including better nutrition and care.⁴¹ Because birth weight was not known for many children, particularly those born at home, mothers' estimates of their child's size at birth were used instead; though subjective, a mother's report that a baby was "very small" or "smaller than average" is a useful proxy for objectively confirmed low birth weight.³³ Birth intervals were categorized as up to 23 months, 24–35 months, 36–47 months, or 48 or more months. Dichotomous variables indicated whether a child was still breast-feeding, which is strongly associated with child health outcomes in developing countries,⁴² and whether he or she had ever been vaccinated.

Maternal characteristics included in the analyses were age, educational level, BMI, height and autonomy. Maternal age was classified as 15–24, 25–34 or 35–49, in accordance with research that has found that infant and child mortality varies substantially according to these groupings.⁴³ Educational attainment was categorized as none, any primary (1–5 years), any secondary (6–12 years) or higher (≥ 13 years). Maternal BMI, which is strongly linked child nutritional status,⁴⁴ was classified as thin (< 18.5 kg/m²), normal (18.5–24.99 kg/m²) or overweight/obese (≥ 25.0 kg/m²). Height was a dichotomous variable indicating whether a woman was at least 145 cm tall; studies from South Asia and other developing regions suggest that this cutoff point is useful for assessing risk of adverse birth and early childhood outcomes.⁴⁵

Women's autonomy was included because a growing body of research suggests that enhancing such autonomy may be an important intervention for improving child nutrition.⁴⁶ In the current analysis, maternal autonomy was measured using women's responses to four questions that asked who makes decisions in the household regarding obtaining maternal health care, making large household purchases, visiting family and relatives, and obtaining child health care. Response options for each category were the respondent alone, the respondent and her husband or

*Twins were omitted because they are more likely than singletons to be undernourished.

†The DHS data set flags cases in which a person's weight and height would yield a BMI that is implausibly low (< 12 kg/m²) or implausibly high (> 60 kg/m²).

TABLE 3. Adjusted odds ratios (and 95% confidence intervals) from multivariate regression analyses examining associations between selected characteristics and stunting, wasting and underweight

Characteristic	Stunting	Wasting	Underweight
CHILD			
Intendedness at conception			
Intended (ref)	1.00	1.00	1.00
Mistimed	0.86 (0.63–1.18)	1.05 (0.68–1.52)	1.15 (0.85–1.73)
Unwanted	1.41 (1.17–1.96)**	1.35 (1.11–1.92)*	1.33 (1.12–1.90)*
Age (mos.)			
0–11 (ref)	1.00	1.00	1.00
12–23	6.37 (4.02–9.62)***	1.31 (0.74–1.98)	4.63 (2.50–6.12)***
24–35	1.73 (1.22–2.43)***	0.75 (0.56–1.43)	1.74 (1.17–2.89)**
36–59	1.47 (1.10–2.01)***	1.27 (0.72–1.76)	2.42 (1.69–3.78)***
Sex			
Male (ref)	1.00	1.00	1.00
Female	1.28 (1.05–1.65)	0.85 (0.59–1.18)	1.45 (1.13–1.76)*
Birth order			
1st (ref)	1.00	1.00	1.00
2nd	1.16 (0.99–1.34)	1.01 (0.83–1.21)	1.04 (0.89–1.22)
3rd	1.15 (0.96–1.36)	1.02 (0.82–1.27)	1.20 (1.01–1.43)*
4th	1.20 (0.97–1.48)	1.35 (1.05–1.75)*	1.30 (1.05–1.62)*
≥5th	1.63 (1.29–2.06)***	1.06 (0.80–1.40)	1.46 (1.15–1.85)**
Size at birth			
Average or larger (ref)	1.00	1.00	1.00
Below average	1.85 (1.25–2.73)***	1.98 (1.41–2.82)***	2.32 (1.76–3.66)***
Still breast-feeding			
Yes	0.81 (0.54–0.98)*	0.72 (0.48–0.91)*	0.82 (0.61–0.97)*
No (ref)	1.00	1.00	1.00
MOTHER			
Age (yrs.)			
13–24 (ref)	1.00	1.00	1.00
25–34	0.82 (0.62–1.27)	0.68 (0.51–0.87)*	0.81 (0.61–1.24)
35–49	0.75 (0.56–1.18)	0.98 (0.60–1.52)	1.01 (0.78–1.45)
Educational attainment			
None (ref)	1.00	1.00	1.00
Primary	0.85 (0.60–0.95)*	1.48 (1.09–1.98)	0.61 (0.46–0.82)***
Secondary	0.71 (0.53–0.91)*	0.88 (0.69–1.36)	0.80 (0.60–1.06)
>secondary	0.63 (0.35–0.85)**	0.51 (0.31–0.98)*	0.35 (0.21–0.88)**
Body mass index			
Thin	1.41 (0.95–2.06)	2.24 (1.38–3.92)*	1.39 (0.91–2.19)*
Normal (ref)	1.00	1.00	1.00
Overweight/obese	1.84 (1.09–2.32)***	3.58 (2.06–6.84)***	3.74 (2.32–4.16)***
Height			
<145 cm (ref)	1.00	1.00	1.00
≥145 cm	0.46 (0.24–0.66)***	0.65 (0.43–1.01)	0.38 (0.25–0.51)***
Autonomy score			
0 (ref)	1.00	1.00	1.00
1	0.91 (0.53–1.24)	0.79 (0.54–1.47)	0.78 (0.50–1.30)
2	0.55 (0.26–0.82)*	0.69 (0.45–1.28)	0.72 (0.54–1.18)
3	1.04 (0.71–1.43)	0.71 (0.48–1.18)	0.89 (0.63–1.26)
4	1.18 (0.94–1.74)	0.89 (0.67–1.28)	1.12 (0.95–1.47)
HOUSEHOLD			
Wealth quintile			
Poorest (ref)	1.00	1.00	1.00
Poorer	0.84 (0.59–1.14)	1.15 (0.83–1.61)	1.15 (0.73–1.41)
Middle	0.78 (0.60–1.09)	1.11 (0.83–1.58)	0.77 (0.55–1.12)*
Richer	1.06 (0.89–1.43)	0.95 (0.63–1.39)	0.81 (0.49–1.15)
Richest	0.53 (0.38–0.76)**	0.89 (0.51–1.46)	0.55 (0.32–0.82)*
Area of residence			
Urban (ref)	1.00	1.00	1.00
Rural	1.45 (1.11–1.78)**	1.78 (1.32–2.42)*	1.56 (1.23–2.12)*

partner, the respondent and someone other than her husband or partner, her husband or partner alone, someone else or other. For each of the four categories, a value of 1 was assigned if the respondent was involved in making the decision, and 0 if she was not; the values were summed to yield a score of 0–4 (Cronbach's alpha, 0.91).

Finally, analyses included several household characteristics: wealth, area of residence, source of drinking water, type of toilet facilities and media access. The wealth variable categorized respondents into quintiles according to the household's score on the DHS wealth index, which is based on the household's amenities, assets and living conditions.⁴⁷ The other measures indicated whether the household was in an urban or rural area, and whether it had a protected source of drinking water (e.g., piped water, a protected well), sanitary toilet facilities and some degree of media access.

Statistical Analyses

Descriptive statistics were calculated for the sample, and chi-square tests were used to identify bivariate associations between pregnancy intendedness (as well as other maternal, child and household characteristics) and child stunting, wasting and underweight. In all analyses, the significance level was set at $p < 0.05$ (two-tailed). Multivariate logistic regression was used to determine the relationships of intendedness with stunting, wasting and underweight after adjustment for theoretically relevant variables. The multivariate models omitted two variables: vaccination (because data were missing for 61% of children) and birth interval (because inclusion of this variable would have resulted in multicollinearity with the birth-order variable, as 34% of children were first-born and thus had no preceding birth interval). Omitting respondents who were missing data could have created selection bias in the analytic sample and affected the results of the models.⁴⁸ However, in alternative analyses not reported here, inclusion of the two variables in multivariate models did not substantially change the results. The multicollinearity of the remaining variables was checked by examining the variance inflation factors; in all cases, the values were less than 2.0, indicating that multicollinearity was low. All statistical analyses were conducted using SPSS 20.0 for Windows and took into account sample weighting related to the complex design of the DHS.

RESULTS

Substantial proportions of children exhibited stunting (40%), wasting (16%) and underweight (35%; Table 1, page 81). Mothers reported that 16% of pregnancies were mistimed and 14% were unwanted. One in three children were first-born, one in six were described by their mother as being smaller than average at birth and nearly two-thirds were still breast-feeding. Half of the mothers were aged 13–24, and four-fifths had some formal education. Twenty-seven percent of mothers were thin, 13% were short in stature and 19% had no decision-making power

in the household. Eleven percent of households did not have a protected supply of drinking water, and 21% did not have sanitary toilet facilities.

Levels of stunting, wasting and underweight all varied by pregnancy intendedness (Table 2, page 82). Children whose conception had been unwanted had the highest prevalence of stunting (46%), wasting (20%) and underweight (43%), while those whose conception had been intended had the lowest (39%, 15% and 33%, respectively). The proportion of children who were stunted and underweight also differed by age; the prevalence of stunting was highest among children aged 12–23 months (50%), and that of underweight was highest among those aged 36–59 months (41%). Levels of stunting, wasting and underweight varied as well by other child, maternal and household characteristics, notably birth order, birth size, maternal education, maternal BMI, maternal height, wealth, area of residence, source of drinking water, type of toilet facilities and media access.

The multivariate regression models indicated that pregnancy intendedness was associated with subsequent stunting, wasting and underweight among children in Bangladesh (Table 3, page 84). Compared with children who had been wanted at the time of conception, those who had been unwanted were more likely to be stunted (odds ratio, 1.4), wasted (1.4) or underweight (1.3). Children aged 12–23 months were more likely than children aged 0–11 months to be stunted (6.4) or underweight (4.6). Fifth and higher order births were associated with elevated odds of stunting (1.6) or underweight (1.5) relative to first births. Children who had been smaller than average at birth were more likely than other children to be stunted (1.9), wasted (2.0) or underweight (2.3), while children who were breast-feeding at the time of the interview were less likely than children who were not breast-feeding to be stunted (0.8), wasted (0.7) or underweight (0.8). The odds of malnutrition were generally higher among children of thin, obese or overweight women than among those of normal-weight women, and lower among children in wealthier households than among those in the poorest households. Malnutrition was negatively associated with maternal education, maternal height and having media access, and positively associated with rural residence and lack of sanitary toilet facilities.

DISCUSSION

This study suggests that unwanted pregnancy is associated with increased likelihoods of stunting, wasting and underweight among children in Bangladesh, even after adjustment for children's, mother's and household characteristics. This finding corroborates the results of previous studies of Bolivia²² and Peru.³⁰ Those analyses differed from the current study in that they were not restricted to a mother's last-born child, but included either all children younger than 60 months (Peru) or all children aged 36 months or younger (Bolivia). The associations between intendedness and malnutrition might be explained by a

TABLE 3. continued

Characteristic	Stunting	Wasting	Underweight
HOUSEHOLD			
Source of drinking water			
Protected (ref)	1.00	1.00	1.00
Unprotected	1.05 (0.67–1.56)	0.85 (0.57–1.32)	0.98 (0.66–1.52)
Has sanitary toilet facilities			
Yes (ref)	1.00	1.00	1.00
No	1.23 (1.02–1.86)*	1.45 (1.21–1.88)**	1.31 (1.05–1.98)*
Media access			
Some	0.76 (0.53–0.95)*	0.68 (0.46–0.87)*	0.65 (0.50–0.89)*
None (ref)	1.00	1.00	1.00

*p<.05. **p<.01. ***p<.001.

mother's attitudes and behavior; her feelings about having an unwanted child might contribute to conscious or unconscious neglect of the child, reduce her ability to cope with a young child's everyday needs and diminish the quality of her caregiving behaviors, leading to negative health consequences for the child.^{49,50} Because stunting reflects cumulative growth, it is likely to be influenced by suboptimal caregiving. On the other hand, wasting may be less affected than stunting by the quality of maternal caregiving,^{51,52} because wasting reflects acute nutritional deficiencies that may be attributable to other factors, such as seasonal variations in dietary intake and hygiene-related conditions (e.g., severe diarrhea, which can cause malnutrition, is more common in the summer than in the winter).¹⁸ The mechanism underpinning the association of pregnancy intendedness with childhood underweight may involve deficiencies in maternal caregiving, dietary deficiencies or both.

The relevance of other characteristics of the child, mother and household to child malnutrition must not be underestimated. Child age is strongly associated with the risk of stunting and underweight; consistent with earlier findings,⁵³ our results suggest that children aged 12–23 months have a substantially higher risk of stunting and underweight than do children aged 0–11 months. The risk of stunting and underweight also was elevated among children aged 24–35 or 36–59 months, although to a smaller degree, perhaps because care practices and the availability of food systematically improve as children reach these ages. Moreover, during the third year of life, children become more responsible for feeding themselves, which may contribute to adequate energy and protein intake. Not surprisingly, a child's size at birth appears to be an important indicator of malnutrition risk, as children with a lower-than-average birth size were more likely than other children to be stunted, wasted or underweight.

Children of mothers who were thin or were overweight or obese generally had a higher risk of stunting, wasting and underweight than did children whose mothers had a BMI in the normal range. This finding is not unexpected, because maternal nutritional status has been linked to child's nutritional status.⁴⁴ Consistent with prior re-

search,^{54,55} this study also found that children in wealthier households tend to have a lower risk of stunting and underweight than do children in the poorest households.

Although this study used a large, nationally representative sample, it has several limitations. Because the data were cross-sectional, causal relationships between women's, children's and household characteristics and the three child malnutrition outcomes cannot be established. As mentioned earlier, the wasting measure is potentially problematic because it involves an interaction between two outcomes (low height for age and low weight for age) that may be affected by the characteristics being investigated.¹⁸ However, this variable was included because it is particularly sensitive to acute growth disturbances. Another limitation is the retrospective assessment of pregnancy intendedness. Women underreport unintended pregnancy when asked about intendedness retrospectively; a woman who did not intend to become pregnant at the time of conception may report after giving birth that the pregnancy had been intended.⁵⁶ Women's recall of pregnancy intention at the time of conception may be influenced by experiences during pregnancy, delivery and the postpartum period.⁵⁷ Another potential limitation is bias resulting from uncontrolled confounders, such as maternal depression, maternal anxiety and abuse of the mother. Information about these events was not collected in the DHS. However, any associations between pregnancy intendedness and postpartum depression, anxiety or abuse would strengthen the relationship of unwanted and mistimed pregnancies on malnutrition. Finally, fathers' pregnancy intentions were not measured in this study.

In conclusion, our findings provide important insights into the relationship between maternal pregnancy intentions and child malnutrition in Bangladesh. Although the relationship is complex, some patterns are discernible, and the results indicate that unwanted pregnancy is associated with an increased risk of subsequent stunting, wasting and underweight among Bangladeshi children. Therefore, current policies toward reducing child malnutrition and child mortality may need to address unwanted pregnancy. Policymakers should pay particular attention to factors (such as contraceptive failure) that directly or indirectly increase unwanted pregnancy. Efforts at reducing unwanted pregnancy may reduce not only child malnutrition, but also the high fertility rate that contributes to population growth in Bangladesh. The results of this study may also be relevant to other resource-poor countries where child malnutrition is common, and to clinicians who assess children with nutritional problems. However, longitudinal studies are needed to investigate the potential mechanisms that mediate the association between maternal pregnancy intendedness and child malnutrition.

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RESUMEN

Contexto: La relación entre el embarazo no planeado y la salud materna e infantil ha sido ampliamente documentada. Sin embargo, la relación entre el embarazo no planeado con la malnutrición infantil no se comprende del todo bien y puede ser importante en países como Bangladesh, que tiene altos niveles de estos eventos.

Métodos: Se usaron datos de la Encuesta Demográfica y de Salud de Bangladesh del año 2011 sobre 6,506 niños últimos en nacer, e hijos únicos menores de cinco años para investigar la relación entre la intención de embarazarse y la prevalencia de impedimentos físicos, debilidad y bajo peso durante la niñez temprana. Se usaron análisis de regresión logística multivariada para identificar asociaciones.

Resultados: Importantes proporciones de niños presentaron impedimentos físicos (40%), debilidad (16%) o bajo peso (35%) al momento de la encuesta. Las madres reportaron que en el momento de concebir, un 14% de su índice de embarazos era no deseado y un 16% era imprevisto. En comparación

con los niños cuya concepción había sido planeada, aquellos cuya concepción había sido no deseada tuvieron mayores probabilidades de presentar impedimentos físicos (46% vs. 39%), debilidad (19% vs. 15%) y bajo peso (43% vs. 33%). En los análisis de regresión, los niños que habían sido no deseados al momento de la concepción tuvieron un riesgo elevado de tener impedimentos físicos (razón de probabilidades, 1.4), debilidad (1.4) o bajo peso (1.3).

Conclusión: Las intenciones de embarazo materno están asociadas con los impedimentos físicos, la debilidad y el bajo peso. Si estas asociaciones son causales, la prevención de los embarazos no deseados puede ayudar a reducir la prevalencia de la malnutrición durante la niñez en Bangladesh.

RÉSUMÉ

Contexte: Le rapport entre la grossesse non planifiée et la santé maternelle et infantile est bien documenté. Le rapport entre la grossesse non planifiée et la malnutrition infantile n'est pas bien compris et pourrait être considérable dans les pays tels que le Bangladesh où les deux atteignent de hauts niveaux.

Méthodes: Les données de l'Enquête démographique et de santé 2011 du Bangladesh relatives à 6.506 derniers-nés non gémellaires de moins de cinq ans ont servi à examiner le rap-

port entre l'intention de grossesse et la prévalence du retard de croissance, de la maigreur et de l'insuffisance pondérale durant la petite enfance. Les associations ont été identifiées par analyses de régression logistique multivariées.

Résultats: De nettes proportions d'enfants présentaient un retard de croissance (40%), un état de maigreur (16%) et une insuffisance pondérale (35%) au moment de l'enquête. Selon les déclarations des mères, au moment de la conception, 14% des grossesses indicielles étaient non désirées et 16%, inopportunes. Par rapport aux enfants dont la conception avait été planifiée, ceux nés d'une grossesse non désirée étaient plus susceptibles de présenter un retard de croissance (46% par rapport à 39%), un état de maigreur (19% par rapport à 15%) et une insuffisance pondérale (43% par rapport à 33%). Dans les analyses de régression, les enfants non désirés au moment de la conception présentaient un risque élevé de retard de croissance (RC, 1,4), de maigreur (1,4) ou d'insuffisance pondérale (1,3).

Conclusion: Les intentions maternelles de grossesse sont associées au retard de croissance, à la maigreur et à l'insuffisance pondérale. Si ces associations sont causales, la prévention des grossesses non désirées peut aider à réduire la prévalence de la malnutrition infantile au Bangladesh.

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