Breastfeeding during Pregnancy and its Association with Childhood Malnutrition and Pregnancy Loss in Low- and Middle-Income Countries

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ABSTRACT

In many populations, breastfeeding of one child frequently extends into the mother's subsequent pregnancy. Best-practice recommendations are currently silent on the safety of the practice, however. This is because there has been little research examining the associations of breastfeeding during pregnancy (BDP) with the health of the breastfed child or the pregnancy, and none using nationally representative data. This paper uses DHS data from 55 countries and 115 surveys to examine the association between BDP and childhood malnutrition and the risk of spontaneous abortion. This study finds that BDP is associated with higher odds of stunting and wasting for breastfed children and higher risks of spontaneous abortion among pregnant women. For childhood malnutrition, there was a dose-response relationship indicating that longer durations of BDP were associated with increasingly greater odds of stunting and wasting. If these findings can be confirmed with prospective data, best-practice recommendations will need to be updated.

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Introduction

Breastfeeding confers a wide range of health benefits to both mothers and children, including lower risks of infant mortality [1], childhood obesity [2], diarrheal and respiratory infections [3], and ovarian and breast cancer [4]. When exclusive breastfeeding is practiced for up to six months after the birth of a child, it can also serve as an effective form of contraception by extending a woman's duration of postpartum amenorrhea [5]. These qualities have made the promotion of optimal breastfeeding practices a cornerstone of international strategies for both family planning [6] and improving maternal and child health [7, 8]. Noticeably absent from best-practice recommendations, however, is advice regarding the safety of continued breastfeeding during a subsequent pregnancy.

In many low-income settings, it is not uncommon for women to breastfeed their young children for up to several years after birth, although most young children are not exclusively breastfed for up to six months [5]. A consequence of such long durations of breastfeeding is that many women become pregnant while they are still nursing their most recently born child. Although there are few recent nationally representative statistics, research from various low-income settings has reported a prevalence of breastfeeding during pregnancy (BDP) ranging from 17% to 50% of higher-parity pregnancies [9-16].

Despite being such a common arrangement, there has been little research into the associations between BDP and the outcomes of either the pregnancy and breastfed children. Lactation and pregnancy, particularly after the first trimester, are both calorically demanding processes [17, 18], which, when coinciding, can potentially compromise the health of the fetus, child, or mother if there are no opportunities to supplement the nutrition of the mother or child. The current body of literature has been mixed regarding the safety of BDP [19]. A number of studies have found that women who breastfed during a subsequent pregnancy

experienced changes in their nutritional status, including reductions in fat reserves in the first and second trimesters of pregnancy [10], lower weight gain during pregnancy [20], and lower hemoglobin levels late in pregnancy [16, 20]. Furthermore, BDP has been shown to be associated with decreases in milk production [16, 21]. Far fewer studies have examined the association between BDP and pregnancy or child health outcomes, however. Those which have studied its association with the risk of spontaneous abortion have not found any statistical differences between the women who did and did not breastfeed during pregnancy [14, 20, 22, 23]. To date here have been no studies examining the health of the breastfed child. Recent systematic reviews of the literature on BDP have demonstrated the need for more research on the safety of the practice, calling for studies using larger samples and particularly focusing on child health outcomes in low- and middle-income countries [19, 24]. Furthermore, none of the studies in the current body of literature have used nationally-representative data.

The aim of this study was to estimate the association between BDP and childhood stunting and wasting using data from 49 low- and middle-income countries, as well as its association with the risk of spontaneous abortion in the first five months of pregnancy in 55 countries. In addition, this study examined if a dose-response relationship exists between the duration of BDP and childhood malnutrition.

Methods

Data Source

The data come from the Demographic and Health Surveys (DHS) [25], nationally-representative retrospective surveys of low- and middle-income countries that have been collected since 1985 until present. The DHS gathers information on women in reproductive ages and children under age five and is particularly focused on reproductive behavior and health for both women and children.

Of particular interest for this study is the survey's detailed documentation of women's recent reproductive history. In nearly all surveys, women are asked if they are currently pregnant and, if so, for how many months. They are also asked to list the number of children they have given birth to in the five years preceding the interview, starting with the most recent. For each child listed, information is collected on the child's sex, multiplicity, and breastfeeding duration. Women are also asked to report if they ever experienced a pregnancy loss. If so, they are asked to provide information on length of gestation and date of pregnancy termination for the most recent case.

Study Population

The study population consisted of women who gave birth at least once in the five years preceding the survey, were at least 15 years old at the time of their last birth, and whose most recent birth was not a multiple birth (figure 1). Women were excluded if they were recorded in a survey that did not collect information on spontaneous abortions or that had low reporting on breastfeeding practices (i.e. at least 90% of individuals with non-missing or unambiguous responses regarding breastfeeding duration). In order to make an adequate comparison between exposed and unexposed groups, only women who ever breastfed their most recently born child were considered. In order to have been considered at-risk of BDP, a woman either must have been currently pregnant at the time of the interview or had become pregnant and miscarried since the birth of her last child. In total, 137 195 women met these criteria, from which two analytical samples were derived.

(Figure 1 here)

In the sample used to examine childhood malnutrition, index children were included if they were recorded in a survey that collected data on child anthropometry, were alive at the time of the interview, had their own height and weight data collected, and if their mother reported sufficient information on the length of gestation to calculate interpregnancy intervals.

Only the most recently born child in a mother's birth history is included in the analysis, because full information on gestation is only available for the most recent pregnancy. After dropping cases with missing values in maternal BMI, maternal education, and children's birth weight, 35 976 children remained in the sample from 49 countries and 86 surveys.

In the spontaneous abortion sample, women were included if they had sufficient information to calculate interpregnancy intervals, had given birth within the five months preceding the survey, and if their most recently born child was alive at the time of conception. After dropping cases with missing data in the covariates, the final analytical sample was comprised of 36 987 women from 55 countries and 115 surveys (Supplementary Material Tables A1-2 provide a comparison between waves with and without data on birth weight and maternal BMI, respectively).

Exposure

The exposure variable was categorical and indicated if a woman's last-born child was breastfed during her latest pregnancy. A small number of women (n=76) could not remember the duration of breastfeeding for the last child, and they were categorized as "Uncertain". In the final sample of children, 35.4% (IQR: 22.1-51.2%) had breastfed for any duration during a subsequent pregnancy (see Table 1). These figures were similar in both the sample with and without full birth weight information. To examine if there was a dose-response relationship between the duration of BDP and child malnutrition, a categorical operationalization (<3 months, 3-6 months, 6+ months) was adopted to reflect breastfeeding concurrent with different trimesters of the subsequent pregnancy. Among children who were BDP, 55.1% did so during the first trimester, 33.6% during the second, and 11.3% during the third. Because women's caloric demands greatly increase in each trimester of pregnancy [17, 18], BDP during late pregnancy may be more strongly associated with malnutrition than during early pregnancy.

(Table 1 here)

Outcome Measures

Three outcomes were considered in this study. The first two, childhood stunting and wasting, pertained to the most recent child born within the five years preceding the survey. They were defined as binary variables indicating stunting or wasting relative to the 2006 WHO reference population [26]. A child whose height-for-age or weight-for-height/length was below two standard deviations of the WHO reference median was considered stunted and wasted, respectively.

The third outcome considered in this study was spontaneous abortion within the first 20 weeks of gestation.

Statistical Analysis

The associations between BDP and both indicators of childhood malnutrition were estimated using logistic regression. Unadjusted odds ratios (uOR) were first estimated using an intercept-only model. Then, adjusted odds ratios (aOR) were estimated by introducing control variables for characteristics of the child and mother. The former included urban-rural residence, length of the interpregnancy interval following the birth of the index child, sex, age of the child at the time of measurement, birth order, birth year, and birth weight. The latter included maternal age at the birth of the index child, highest degree earned, marital status at the time of the interview, body mass index (BMI) as a % of the WHO reference median, and an indicator if she had a history of pregnancy loss (see Appendix C for further description of the variables). The model also controlled for survey (i.e. country-year) fixed effects to account for any systematic differences in measurement or reporting between the surveys. Summary statistics and prevalence of stunting and wasting by the covariate values are available in Table 2. Birth weight was not as widely available in the DHS as other covariate information, and its inclusion in the model caused roughly half of the observations meeting all

other inclusion criteria to be lost (Supplementary Material Table A3 provides a comparison of the samples with and without birth weight and Table A4 provides summary statistics for only the sample with birth weight according to BDP status). The sensitivity of the results to the missing data is examined later in the study.

(Table 2 here)

To account for differences in observed exposure to spontaneous abortion due to the survey's retrospective design, Cox proportional hazard models were used estimate the association between BDP and the risk of spontaneous abortion. Women entered the risk population on the date of their latest pregnancy occurring within five months of the interview and exited it upon reaching five months of pregnancy, the interview date, or experienced a spontaneous abortion. The exposure to BDP was treated as time-varying.

Two models were estimated, as above. First, unadjusted hazard ratios (uHR) were estimated from a model without controls. The second model estimated adjusted hazard ratios (aHR) by introducing controls for rural-urban residence, previous history of pregnancy loss, the woman's age at the start of the pregnancy, calendar year of the pregnancy, the duration of the preceding interpregnancy interval, the highest degree earned, number of children ever born, and her BMI. Marital status was not included as a control, because the DHS does not collect information on all marriage unions, making it impossible to determine if there had been changes in a woman's marital status while she was pregnant. Summary statistics for the spontaneous abortion sample may be found in Table 3. As was the case when including children's birth weight as a control variable, the inclusion of women's BMI led to nearly a quarter of observations being dropped. (Supplementary Material Table A5 compares samples with and without information on maternal BMI and Table A6 provides summary statistics for the sample without BMI information). To check the robustness of the findings, models were also estimated for the entire sample, including those who did not have a recorded BMI.

(Table 3 here)

All statistical analyses were conducted using Stata 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

Results

Association between BDP and Childhood Stunting and Wasting

The overall prevalence of stunting and wasting in the sample was 35.2% and 10.6%, respectively (Table 4; see Supplementary Material Appendix D for full output of all models). For both indicators, the prevalence was higher among BDP children than non-BDP children. For stunting, non-BDP children had a prevalence of 33.4% compared to 38.4%. For wasting, the respective figures were 8.2% and 14.8%.

A positive association was found between BDP and both stunting and wasting. The uOR for stunting for BDP children compared to non-BDP children was 1.24 (95% CI: 1.19-1.30). After introducing the control variables, the aOR decreased but remained positive at 1.06 (95% CI: 1.00-1.13). The association was stronger between BDP and wasting. The uOR for wasting for BDP children compared to non-BDP children was 1.94 (95% CI: 1.81-2.08). After adjusting for the aforementioned control variables, the aOR remained positive but had decreased in magnitude to 1.16 (95% CI: 1.06-1.26).

(Table 4 here)

Duration of BDP and its Association with Childhood Stunting and Wasting

To test if the association between BDP and childhood malnutrition was stronger at longer durations of BDP, logistic regression was estimated using a categorical operationalization of BDP (Table 5). A positive association was found between the duration of BDP and the odds of stunting and wasting. The uOR for stunting were 1.05 (95% CI: 0.99-1.11), 1.45 (95% CI: 1.36-1.55), and 1.71 (95% CI: 1.54-1.91) for durations of BDP extending into the first, second, and third trimesters, respectively (test for linear trend:

$p<0.001$). After introducing controls, the positive association between the duration of BDP and stunting remained at 1.02 (95% CI: 0.96-1.10), 1.09 (95% CI: 1.00-1.18), and 1.19 (95% CI: 1.06-1.35) for the bouts of breastfeeding reaching the respective trimesters (test for linear trend: $p=0.002$).

A positive association was also found between the duration of BDP and the odds of wasting. The uOR were 1.49 (95% CI: 1.34-1.63), 2.46 (95% CI: 2.25-2.70), and 2.76 (95% CI: 2.40-3.17) (test for linear trend: $p<0.001$). Introducing the control variables again reduced the magnitude of the estimates, but a positive association remained. The respective figures were 1.06 (95% CI: 0.95-1.17), 1.26 (95% CI: 1.14-1.41), and 1.21 (95% CI: 1.04-1.41) (test for linear trend: $p=0.002$).

(Table 5 here)

Association between BDP and Spontaneous Abortion

The final part of the analysis examined if there is an association between BDP and spontaneous abortion in the first five months of pregnancy. The incidence rate of spontaneous abortion was 28.3 per 1000 woman-months at-risk, with non-BDP having an incidence of 24.0 and BDP having an incidence of 40.1 (Table 6).

The uHR for BDP compared to not BDP was 1.70 (95% CI: 1.58-1.82). After introducing the controls, the magnitude of the estimates of the aHR increased to 1.86 (95% CI: 1.70-2.03).

(Table 6 here)

Additional Analyses

Several sensitivity analyses were conducted to check the robustness of the results. The first analysis checked the sensitivity of the results to the omission of observations that were missing data on either birth weight or maternal BMI in the malnutrition and spontaneous abortion samples, respectively (Supplementary Material Tables B1-3). All models were

estimated with the full sample and omitting the control for the missing variable. The estimates were similar in magnitude and the associations between BDP and the dependent variables remained the same in their direction.

The second sensitivity analysis examined the importance of heaping durations of breastfeeding for the results. The distribution of breastfeeding duration showed clear signs of heaping on multiples of six months (e.g. 6, 12, 18, 24, etc.) (Myers' Blended Index=27.8%). If these are systematic overestimates, this will certainly influence the prevalence of BDP and may also influence the associations found in the previous models. The same models for childhood malnutrition and spontaneous abortion were estimated excluding any child or woman who had a reported duration of breastfeeding that was a multiple of six (Supplementary Material Tables B4-6). Omitting the heaped cases did not change the results substantively.

A third sensitivity analysis was conducted to investigate how much the results were driven by one particularly large survey from India in 2015-2016. That survey alone accounted for 37.5% of the observations in the children sample and 23.9% of the time at-risk in the woman sample. The models from the main analysis were estimated on two subsamples, one comprised of all surveys except for India 2015-2016 and one only for India 2015-2016 (Supplementary Material Table B7-9). When excluding India, the uOR of BDP compared to non-BDP children remained positive at 1.10 (95% CI: 1.02-1.17) for stunting and 1.46 (95% CI: 1.27-1.67) for wasting, but after including controls the respective aOR became 0.98 (95% CI: 90-107) and 0.99 (95% CI: 0.83-1.18). In the model only including India 2015-2016, the associations were similar to the results from the pooled sample. In the dose response models, the association between BDP and wasting remained positive, but not for stunting, while the results for India again remained similar to the original results. It appears, therefore, that much of the association between BDP and childhood malnutrition is driven by one survey. The

same procedure did not change the substantive conclusions of original findings in the model of spontaneous abortion.

Discussion

This study was the first to investigate the associations between BDP and child and pregnancy outcomes using nationally representative data for low- and middle-income countries. The results showed that the practice of BDP is widespread and that there was a positive association between BDP and the odds of both childhood stunting and wasting. This was characterized as a dose-response association, in which children who breastfed for longer durations of their mother's subsequent pregnancy were increasingly likely to be classified as stunted or wasted. There was also a positive association found between BDP and the risk of spontaneous abortion in the first five months of pregnancy.

This was the first study in the current body of literature to specifically examine the association between BDP and the health of the breastfed child [19]. While the analyses largely were consistent with a positive association between BDP and the odds of stunting and wasting, there are two important limitations that should be pointed out. First, this finding was heavily dependent on the inclusion of one survey from India in 2015-2016. When that survey was removed from the sample, there was no longer an association between BDP and childhood malnutrition in the remaining sample. However, the association remained when only the sample for India was analyzed. Because of the much smaller sample sizes from other populations in this study, it is therefore unclear if the relationship between BDP and childhood malnutrition is only present in specific populations or if it is a more general phenomenon. Nevertheless, the association was present in the largest population in the world and therefore may be an underappreciated factor influencing childhood malnutrition. In the dose response models, on the other hand, there remained a positive association between BDP and wasting at durations of BDP extending into the second and third trimesters even in the

samples excluding India, which is consistent with the increasing nutritional burden of BDP on the mother. More research is therefore needed in order to investigate the conditions in which the association is or is not present.

A second limitation is that, because this study makes use of retrospective data, it is not entirely possible to address the possibility that the results concerning malnutrition are driven by reverse causality. It is plausible that mothers were more likely to continue breastfeeding during their pregnancy because their children were already stunted or wasted, and it was not BDP that caused the condition to arise. The inclusion of birth weight of the child as a control variable was therefore critical to estimating the association between BDP and malnutrition, as it should at least partially account for mothers' perceptions of their children's needs for longer breastfeeding and also children's early-life propensity for being stunted and wasted. Ideally, a prospective study with repeated observations could adequately address the issue of reverse causality.

The other major finding of this study was that there is a large positive association between BDP and the risk of spontaneous abortion. This is an important finding as the current consensus is that BDP is not associated with spontaneous abortions [19, 24], yet virtually all previous studies have been comprised of small, non-nationally representative samples. Furthermore, the findings relating to spontaneous abortion remained robust to all sensitivity analyses. Nevertheless, this finding also comes with two caveats.

Data on spontaneous abortions from retrospective surveys have well-known limitations. Early-term spontaneous abortions, in particular, tend to be omitted from pregnancy histories for various reasons [27]. Instances of pregnancy loss may be omitted as a result of being mistaken for delayed menstruation, shame or guilt for losing a pregnancy, or the pain of reliving the experience [28]. Furthermore, there has been evidence from some contexts suggesting that stigma and laws against induced abortions can cause respondents to

report them as spontaneous abortions [29]. If the misclassification of induced abortions is widespread and if unwanted pregnancies are associated with BDP, this can lead to a spurious association between BDP and the risk of spontaneous abortions. Although this study could not quantify the extent of misreporting of spontaneous abortions, every model has controlled for survey fixed-effects in order to adjust for the fact that there may be differences in the accuracy of reporting across time and space.

A second limitation concerns the reporting of breastfeeding during a pregnancy. Taboos against the practice have been reported in several contexts [14, 20, 22]. If this taboo is widespread, it could influence women to report shorter durations of breastfeeding, especially if she suffered pregnancy loss. Nevertheless, this reason for omission should bias the estimates of the association between BDP and spontaneous abortion downwards.

Finally, it should be mentioned that the results presented in this study are unlikely to be reflective of the associations one would find in wealthier and healthier countries. The association between BDP and childhood malnutrition or pregnancy loss is most likely only present in populations in which undernourishment is widespread and persistent

Conclusion

This study provided new evidence for the associations between BDP and childhood malnutrition and pregnancy loss. Further work is needed using nationally-representative, prospective data with multiple collection waves in order to properly account for the possibility of reverse causality and the misreporting of induced abortions as spontaneous abortions. If future research findings support the results of this study, best-practice protocols regarding optimal breastfeeding will need to be updated.

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Figures and Tables

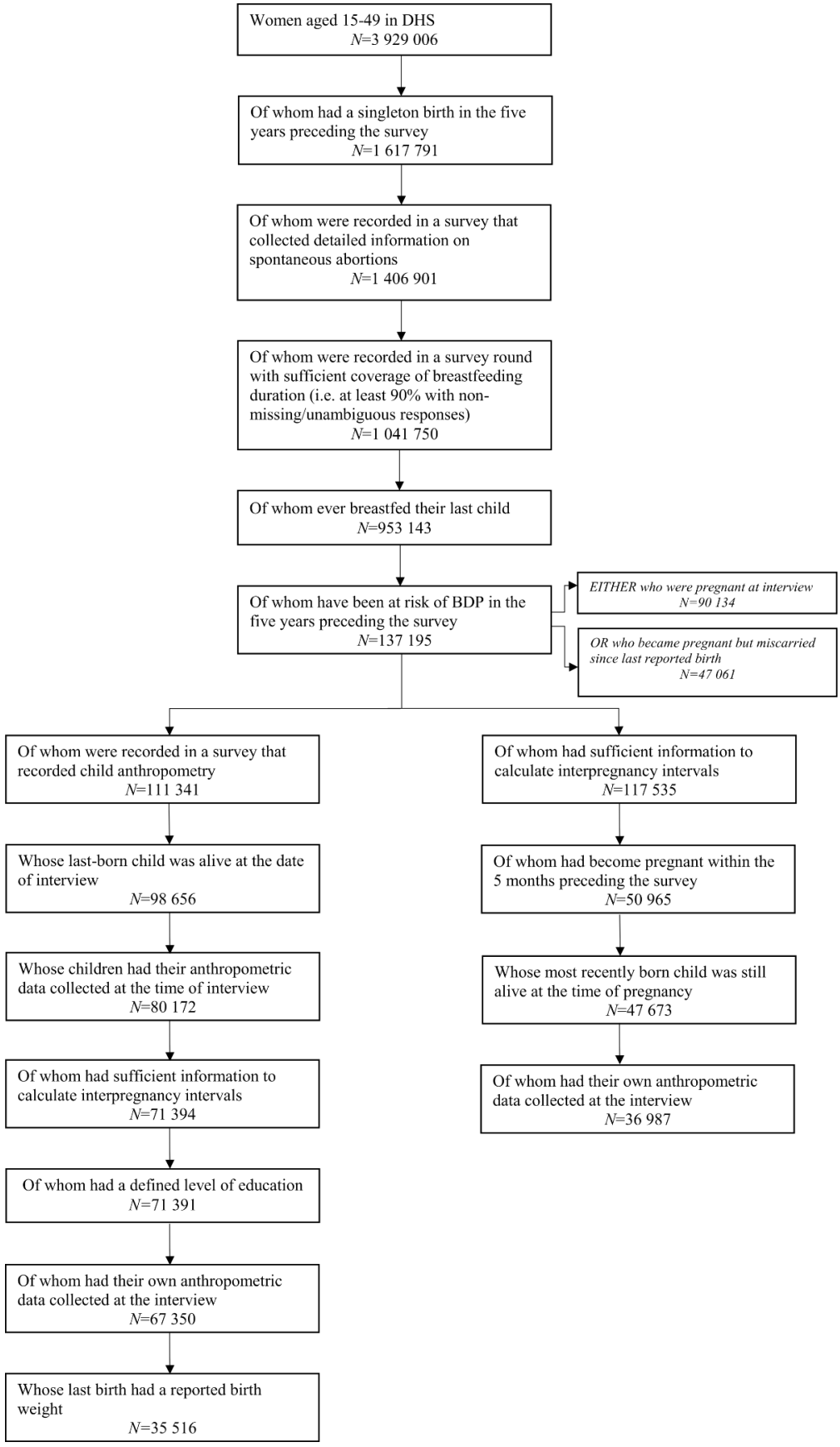

Figure 1. Flowchart documenting sample selection.

Table 1. Prevalence and duration of BDP for the most recent child born to women who had since become pregnant.

	All covariates available			Birth Weight Missing		
	N	%	Interquartile range[a]	*N*	%	Interquartile range[a]
Did not BDP	22 873	64.4	48.6-77.9	42 451	63.0	48.4-76.9
BDP	12 567	35.4	22.1-51.2	24 685	36.7	22.7-51.4
Uncertain	76	0.2	0.0-0.2	214	0.3	0.0-0.4
Duration of BDP (months):	*N*	%	Cumulative %	*N*	%	Cumulative %
<1	1434	11.4	11.4	2798	11.3	11.3
1	2333	18.6	30.0	4133	16.7	28.1
2	3160	25.2	55.1	6052	24.5	52.6
3	2242	17.8	73.0	4466	18.1	70.7
4	1191	9.5	82.4	2561	10.4	81.1
5	790	6.3	88.7	1749	7.1	88.1
6	513	4.1	92.8	1107	4.5	92.6
7	421	3.4	96.2	831	3.4	96.0
8	319	2.5	98.7	643	2.6	98.6
9+	164	1.3	100.0	345	1.4	100.0

[a] Calculated based on distribution of breastfeeding-pregnancy overlap observed across all country-waves of the survey.

Table 2. Characteristics of index children according to BDP status.

	Did Not BDP				BDP				Uncertain			
Variable	N	%	Stunted[a]	Wasted[a]	N	%	Stunted[a]	Wasted[a]	N	%	Stunted[a]	Wasted[a]
Residence												
Urban	16 870	37.1	28.6	6.6	6 982	27.2	32.6	10.4	42	18.4	33.3	2.4
Rural	28 624	62.9	47.7	9.2	18 690	72.8	49.9	15.2	186	81.6	50.5	5.4
Mother's age												
15-19	8 041	17.7	42.0	8.3	4 751	18.5	48.5	15.1	33	14.5	57.6	9.1
20-24	17 071	37.5	39.4	9.1	10 419	40.6	44.6	15.7	82	36.0	32.9	3.7
25-29	11 232	24.7	39.2	8.0	6 147	23.9	44.9	13.1	55	24.1	60.0	3.6
30-34	5 898	13.0	42.1	7.1	2 832	11.0	42.7	9.9	35	15.4	51.4	5.7
35-39	2 558	5.6	45.2	5.8	1 201	4.7	45.6	8.5	17	7.5	47.1	5.9
40-49	694	1.5	48.1	7.1	322	1.3	45.0	8.1	6	2.6	50.0	0.0
Interpregnancy interval (years)												
0.0-0.4	699	1.5	19.6	8.4	2 358	9.2	25.8	13.1	11	4.8	36.4	0.0
0.5-0.9	2 663	5.9	28.9	8.2	5 733	22.3	36.1	14.9	20	8.8	35.0	5.0
1.0-1.4	5 928	13.0	41.3	8.5	7 711	30.0	48.5	13.5	41	18.0	43.9	2.4
1.5-1.9	8 509	18.7	44.6	7.9	5 556	21.6	52.0	13.2	46	20.2	63.0	2.2
2.0-2.4	8 796	19.3	44.9	8.2	2 258	8.8	55.2	14.2	27	11.8	44.4	3.7
2.5-2.9	6 605	14.5	42.4	8.0	1 170	4.6	52.1	14.1	32	14.0	56.3	12.5
3.0-3.4	5 460	12.0	39.2	8.0	510	2.0	49.8	15.1	21	9.2	42.9	9.5
3.5-3.9	3 625	8.0	35.9	8.5	266	1.0	51.1	16.5	19	8.3	36.8	5.3
4.0-4.4	2 679	5.9	35.8	8.9	89	0.4	55.1	20.2	10	4.4	40.0	0.0
4.5-4.9	530	1.2	33.6	7.7	21	0.1	57.1	23.8	1	0.4	0.0	0.0
Sex of Child												
Male	22 612	49.7	42.0	8.5	12 809	49.9	47.3	14.7	106	46.5	48.1	6.6
Female	22 882	50.3	39.3	7.9	12 863	50.1	43.2	13.1	122	53.5	46.7	3.3
Age of Child												

0	835	1.8	18.9	9.8	2 010	7.8	22.6	16.3	11	4.8	18.2	0.0
1	8 342	18.3	40.3	8.7	11 471	44.7	46.8	14.9	45	19.7	51.1	6.7
2	15 594	34.3	46.2	7.9	7 579	29.5	51.0	13.0	71	31.1	56.3	1.4
3	12 121	26.6	39.8	8.0	2 902	11.3	43.7	12.4	54	23.7	51.9	11.1
4	8 602	18.9	34.0	8.4	1 710	6.7	38.0	11.2	47	20.6	31.9	2.1
Birth weight (kg)												
<2	703	1.6	42.3	13.9	490	1.9	56.7	25.1	2	0.9	50.0	0.0
2.0-2.4	2 147	4.7	42.7	12.6	1 377	5.4	47.4	21.3	5	2.2	40.0	20.0
2.5-2.9	5 970	13.1	37.1	11.1	3 755	14.6	43.0	18.8	21	9.2	52.4	9.5
3.0-3.4	8 799	19.3	31.3	6.7	4 248	16.6	35.5	12.5	31	13.6	38.7	0.0
3.5-3.9	5 419	11.9	25.2	4.3	2 393	9.3	28.2	8.0	19	8.3	31.6	5.3
4.0-4.4	1 665	3.7	26.3	4.0	700	2.7	30.4	6.1	5	2.2	20.0	0.0
4.5-4.9	599	1.3	24.5	3.7	274	1.1	32.9	6.2	0	0.0	0.0	0.0
Missing	20 192	44.4	51.3	8.9	12 435	48.4	52.9	13.4	145	63.6	51.7	4.8
Birth Order												
1	14 667	32.2	32.3	9.4	9 262	36.1	39.8	15.4	56	24.6	30.4	5.4
2	10 878	23.9	38.6	8.3	6 278	24.5	44.3	14.1	64	28.1	48.4	6.3
3	6 823	15.0	43.7	7.4	3 662	14.3	49.1	13.2	25	11.0	44.0	0.0
4	4 485	9.9	45.8	7.7	2 342	9.1	51.1	13.7	27	11.8	59.3	3.7
5	3 020	6.6	51.2	7.1	1 419	5.5	50.3	12.4	21	9.2	61.9	4.8
6	2 146	4.7	52.1	7.4	1 017	4.0	53.4	11.6	11	4.8	63.6	9.1
7	1 392	3.1	51.7	6.3	649	2.5	52.1	9.6	12	5.3	50.0	8.3
8+	2 083	4.6	54.0	6.3	1 043	4.1	52.7	9.6	12	5.3	58.3	0.0
Mother’s education												
None	13 077	28.7	56.5	11.2	8 737	34.0	56.7	17.5	108	47.4	58.3	7.4
Primary	14 296	31.4	43.9	5.9	6 882	26.8	48.3	10.7	60	26.3	51.7	1.7
Secondary	14 753	32.4	29.1	8.3	8 581	33.4	35.4	13.5	53	23.3	26.4	3.8
Tertiary	3 366	7.4	15.5	6.2	1 471	5.7	20.3	9.7	7	3.1	0.0	0.0
Missing	2	0.0	0.0	0.0	1	0.0	100.0	0.0	0	0.0	0.0	0.0

Mother’s current marital status												
Never married	549	1.2	35.0	4.7	112	0.4	37.5	7.1	1	0.4	100.0	0.0
Married	35 989	79.1	42.2	9.6	22 841	89.0	46.2	15.1	170	74.6	47.1	5.9
Cohabiting	7 447	16.4	35.0	2.8	2 289	8.9	37.4	4.0	49	21.5	51.0	2.0
Widowed	155	0.3	48.4	8.4	75	0.3	37.3	8.0	1	0.4	0.0	0.0
Divorced	294	0.7	32.0	4.1	68	0.3	29.4	5.9	0	0.0	0.0	0.0
Separated	1 060	2.3	31.7	3.3	287	1.1	36.6	5.9	7	3.1	28.6	0.0
Mother's BMI (% of WHO ref. median)												
70-89	1 869	4.1	49.0	20.7	1 509	5.9	49.5	27.9	14	6.1	28.6	14.3
90-99	5 513	12.1	50.9	14.4	4 275	16.7	52.1	21.3	34	14.9	58.8	5.9
100-109	8 516	18.7	48.6	10.4	5 828	22.7	50.2	16.3	57	25.0	49.1	7.0
110-119	8 479	18.6	45.4	7.9	4 921	19.2	47.2	11.9	46	20.2	43.5	2.2
120-129	6 445	14.2	39.6	6.7	3 315	12.9	42.1	9.8	29	12.7	55.2	6.9
130-139	4 376	9.6	34.1	4.9	1 975	7.7	38.3	8.7	12	5.3	58.3	0.0
140-149	2 891	6.4	30.2	3.8	1 210	4.7	32.0	5.5	8	3.5	25.0	0.0
150-159	1 775	3.9	25.5	3.7	690	2.7	30.4	4.2	6	2.6	50.0	0.0
160-169	1 113	2.5	22.6	3.5	429	1.7	27.3	4.4	3	1.3	66.7	0.0
170-179	606	1.3	21.6	2.3	229	0.9	29.7	3.1	3	1.3	0.0	0.0
180+	870	1.9	23.5	2.2	305	1.2	25.6	1.3	2	0.9	50.0	0.0
Missing	3 041	6.7	26.5	3.3	986	3.8	38.5	7.7	14	6.1	35.7	0.0
History of pregnancy loss												
No	29 065	63.9	44.1	8.9	14 521	56.6	49.6	15.1	140	61.4	54.3	5.7
Yes	16 429	36.1	34.4	7.0	11 151	43.4	39.5	12.4	88	38.6	36.4	3.4
Child’s Birth Year												
1986	2	0.0	50.0	0.0	1	0.0	0.0	0.0	0	0.0	0.0	0.0
1987	182	0.4	33.5	2.8	10	0.0	20.0	10.0	0	0.0	0.0	0.0
1988	458	1.1	36.5	2.2	54	0.2	33.3	1.9	0	0.0	0.0	0.0
1989	773	1.8	50.8	4.0	180	0.7	55.0	4.4	0	0.0	0.0	0.0
1990	722	1.7	42.9	6.1	418	1.7	48.6	6.5	0	0.0	0.0	0.0

1991	528	1.2	36.9	5.3	308	1.3	41.9	7.1	1	0.5	0.0	0.0
1992	908	2.1	40.0	5.2	245	1.0	41.2	4.9	1	0.5	0.0	0.0
1993	1158	2.7	45.9	3.9	430	1.7	54.2	8.6	1	0.5	100.0	0.0
1994	1033	2.4	43.1	4.4	736	3.0	54.1	9.5	0	0.0	0.0	0.0
1995	1110	2.6	36.1	4.1	521	2.1	38.8	7.1	5	2.3	60.0	0.0
1996	1321	3.1	38.2	5.5	476	1.9	36.6	4.6	2	0.9	0.0	0.0
1997	1469	3.5	45.3	4.2	467	1.9	50.5	7.3	2	0.9	50.0	0.0
1998	1538	3.6	46.6	4.1	836	3.4	58.3	5.6	6	2.8	50.0	0.0
1999	1213	2.9	34.2	3.1	824	3.3	48.8	10.2	8	3.7	75.0	0.0
2000	1551	3.7	36.7	3.9	297	1.2	36.7	10.1	8	3.7	75.0	0.0
2001	2263	5.3	42.0	6.6	701	2.8	42.8	5.1	21	9.8	33.3	4.8
2002	2793	6.6	45.3	7.2	1131	4.6	47.4	9.3	17	7.9	47.1	5.9
2003	2948	6.9	46.3	8.0	1464	5.9	50.5	10.7	18	8.4	50.0	5.6
2004	2949	7.0	44.7	9.1	1832	7.4	52.0	12.9	36	16.8	50.0	2.8
2005	2130	5.0	36.9	7.4	1105	4.5	38.7	13.5	14	6.5	35.7	14.3
2006	1936	4.6	37.6	7.1	777	3.2	39.3	10.3	13	6.1	23.1	7.7
2007	1148	2.7	37.6	6.9	540	2.2	32.2	8.9	8	3.7	37.5	0.0
2008	810	1.9	38.8	6.3	394	1.6	39.1	10.2	4	1.9	75.0	0.0
2009	484	1.1	28.5	5.6	273	1.1	39.6	8.1	2	0.9	50.0	0.0
2010	1089	2.6	36.9	11.8	317	1.3	37.2	16.7	2	0.9	0.0	0.0
2011	2523	5.9	38.8	14.4	909	3.7	36.6	13.4	9	4.2	66.7	11.1
2012	3143	7.4	42.1	15.2	1967	8.0	47.5	15.7	17	7.9	58.8	11.8
2013	2789	6.6	46.5	17.3	3505	14.2	49.8	20.8	9	4.2	55.6	11.1
2014	1274	3.0	43.7	18.6	3094	12.5	43.1	23.6	9	4.2	44.4	0.0
2015	205	0.5	38.5	20.5	864	3.5	31.8	27.3	1	0.5	100.0	0.0
2016	1	0.0	0.0	100.0	9	0.0	22.2	44.4	0	0.0	0.0	0.0

[a] Prevlance of stunting or wasting as a %

Table 3. Incidence of spontaneous abortion by characteristics of women and according to BDP status during their latest pregnancy.

	Not currently Breastfeeding				Currently Breastfeeding				Uncertain			
Variable	Woman-Months	Failures	%	Incidence Rate[a]	Woman-Months	Failures	%	Incidence Rate[a]	Woman-Months	Failures	%	Incidence Rate[a]
Residence												
Urban	40041	1416	33.7	35.4	8375	491	21.7	58.6	113	4	19.7	35.4
Rural	78884	1439	66.3	18.2	30277	995	78.3	32.9	460	8	80.3	17.4
History of pregnancy loss												
No	115067	2149	96.8	18.7	37651	1249	97.4	33.2	552	9	96.3	16.3
Yes	3859	706	3.2	183.0	1000	237	2.6	236.9	21	3	3.7	142.9
Mother's age at pregnancy												
15-19	8158	153	6.9	18.8	3810	105	9.9	27.6	20	0	3.5	0.0
20-24	37533	755	31.6	20.1	15119	526	39.1	34.8	171	6	29.8	35.1
25-29	37187	871	31.3	23.4	11238	442	29.1	39.3	221	1	38.6	4.5
30-34	21269	555	17.9	26.1	5286	244	13.7	46.2	114	1	19.9	8.8
35-39	10877	337	9.1	31.0	2485	113	6.4	45.5	36	3	6.3	83.3
40-49	3901	184	3.3	47.2	714	56	1.8	78.4	11	1	1.9	90.9
Interpregnancy interval (years)												
0.0-0.4	1666	61	1.4	36.6	2300	112	6.0	48.7	11	2	1.9	181.8
0.5-0.9	6782	171	5.7	25.2	7917	320	20.5	40.4	32	2	5.6	62.5
1.0-1.4	15301	284	12.9	18.6	11994	383	31.0	31.9	67	0	11.7	0.0
1.5-1.9	22642	425	19.0	18.8	8881	310	23.0	34.9	131	1	22.9	7.6
2.0-2.4	21919	472	18.4	21.5	3897	164	10.1	42.1	103	1	18.0	9.7
2.5-2.9	16728	388	14.1	23.2	1939	97	5.0	50.0	70	1	12.2	14.3
3.0-3.4	13499	367	11.4	27.2	928	54	2.4	58.2	54	1	9.4	18.5
3.5-3.9	9878	284	8.3	28.8	496	33	1.3	66.5	52	2	9.1	38.5

4.0-4.4	8241	309	6.9	37.5	240	11	0.6	45.8	46	2	8.0	43.5
4.5-4.9	2270	94	1.9	41.4	59	2	0.2	33.9	7	0	1.2	0.0
Education												
None	35755	569	30.1	15.9	15241	404	39.4	26.5	292	4	51.0	13.7
Primary	40072	860	33.7	21.5	11021	339	28.5	30.8	141	1	24.6	7.1
Secondary	35218	1127	29.6	32.0	10970	631	28.4	57.5	116	6	20.2	51.7
Tertiary	7881	299	6.6	37.9	1421	112	3.7	78.8	24	1	4.2	41.7
Missing	1666	61	1.4	36.6	2300	112	6.0	48.7	11	2	1.9	181.8
Children ever born												
1	38876	804	32.7	20.7	13979	469	36.2	33.6	168	4	29.3	23.8
2	27201	751	22.9	27.6	9026	417	23.4	46.2	116	4	20.2	34.5
3	17088	467	14.4	27.3	5557	245	14.4	44.1	64	0	11.2	0.0
4	12109	269	10.2	22.2	3491	127	9.0	36.4	73	0	12.7	0.0
5	8357	185	7.0	22.1	2275	85	5.9	37.4	70	1	12.2	14.3
6	5937	109	5.0	18.4	1472	51	3.8	34.6	42	0	7.3	0.0
7	3949	107	3.3	27.1	1112	37	2.9	33.3	27	2	4.7	74.1
8+	5408	163	4.5	30.1	1740	55	4.5	31.6	13	1	2.3	76.9
Mother's BMI (% of WHO ref. Median)												
70-89	3779	55	3.2	14.6	2343	66	6.1	28.2	19	1	3.3	52.6
90-99	11649	205	9.8	17.6	6317	196	16.3	31.0	99	2	17.3	20.2
100-109	18723	350	15.7	18.7	8471	292	21.9	34.5	128	1	22.3	7.8
110-119	18694	383	15.7	20.5	6742	266	17.4	39.5	82	4	14.3	48.8
120-129	13610	320	11.4	23.5	3998	194	10.3	48.5	55	1	9.6	18.2
130-139	8906	240	7.5	26.9	2231	114	5.8	51.1	20	1	3.5	50.0
140-149	5681	190	4.8	33.4	1135	74	2.9	65.2	16	0	2.8	0.0
150-159	3374	144	2.8	42.7	587	45	1.5	76.7	4	1	0.7	250.0
160-169	2051	91	1.7	44.4	395	25	1.0	63.4	10	0	1.7	0.0
170-179	1139	63	1.0	55.3	166	11	0.4	66.2	5	0	0.9	0.0

≥180	1487	96	1.3	64.5	200	24	0.5	120.2	3	0	0.5	0.0
Missing	29833	718	25.1	24.1	6068	179	15.7	29.5	132	1	23.0	7.6
Year of Pregnancy												
1989	25	1	0.0	39.7	4	1	0.0	263.2				
1990	2056	52	1.7	25.3	289	4	0.7	13.9				
1991	3308	69	2.8	20.9	452	8	1.2	17.7				
1992	2714	41	2.3	15.1	861	17	2.2	19.7				
1993	1933	62	1.6	32.1	508	22	1.3	43.3				
1994	2099	27	1.8	12.9	305	7	0.8	23.0				
1995	2975	51	2.5	17.1	1274	20	3.3	15.7				
1996	2456	50	2.1	20.4	722	18	1.9	24.9				
1997	4787	101	4.0	21.1	982	34	2.5	34.6	19	1	3.3	52.6
1998	1699	53	1.4	31.2	412	13	1.1	31.6	6	0	1.0	0.0
1999	2821	58	2.4	20.6	802	23	2.1	28.7	15	0	2.6	0.0
2000	7176	189	6.0	26.3	2234	48	5.8	21.5	52	2	9.1	38.5
2001	2238	49	1.9	21.9	496	13	1.3	26.2	9	0	1.6	0.0
2002	3785	115	3.2	30.4	586	18	1.5	30.7	7	0	1.2	0.0
2003	7867	153	6.6	19.4	1544	49	4.0	31.7	85	0	14.8	0.0
2004	6963	127	5.9	18.2	1382	33	3.6	23.9	17	0	3.0	0.0
2005	7810	182	6.6	23.3	2957	90	7.7	30.4	51	0	8.9	0.0
2006	9904	221	8.3	22.3	3329	121	8.6	36.3	95	3	16.6	31.6
2007	6592	177	5.5	26.9	1325	54	3.4	40.8	61	1	10.6	16.4
2008	7868	183	6.6	23.3	1436	37	3.7	25.8	41	2	7.2	48.8
2009	4756	115	4.0	24.2	669	23	1.7	34.4	18	1	3.1	55.6
2010	4358	113	3.7	25.9	855	14	2.2	16.4	10	0	1.7	0.0
2011	1861	75	1.6	40.3	512	23	1.3	45.0	2	1	0.3	500.0
2012	533	19	0.4	35.7	60	3	0.2	49.6				
2013	1927	40	1.6	20.8	212	7	0.5	33.0	12	0	2.1	0.0
2014	4793	106	4.0	22.1	3395	137	8.8	40.4	28	0	4.9	0.0

2015	9383	269	7.9	28.7	7768	405	20.1	52.1	36	1	6.3	27.8
2016	4237	157	3.6	37.1	3282	244	8.5	74.3	9	0	1.6	0.0

[a] Per 1000 woman-months. Incidence rates may not compute exactly to failures divided by woman-months at-risk due to rounding to the nearest woman-month.

Table 4. Association between BDP and childhood stunting and wasting.

I. Stunting

			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*35 516*	*35.2*				
Did not BDP	22 873	33.4	1.00		1.00	
BDP	12 567	38.4	1.24	(1.19-1.30)	1.06	(1.00-1.13)
Uncertain	76	43.4	1.53	(0.97-2.41)	1.67	(1.01-2.72)

II. Wasting[b]

			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*35 319*	*10.6*				
Did not BDP	22 718	8.2	1.00		1.00	
BDP	12 525	14.8	1.94	(1.81-2.08)	1.16	(1.06-1.26)
Uncertain	76	5.3	0.62	(0.23-1.70)	0.46	(0.16-1.28)

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview, birth weight) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a percentage of WHO reference median).

[b] 197 observations were not included in the wasting models because the specific survey-wave they belonged to had no variation in the outcome (i.e. only positive or negative outcomes in the specific wave).

Table 5. Association between duration of BDP and childhood stunting and wasting.[a]

I. Stunting

			Model 1			Model 2[b]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*35 440*	*35.2*						
Did not BDP	22 873	33.4	1.00			1.00		
<3	6927	34.5	1.05	(0.99-1.11)		1.02	(0.96-1.10)	
3-6	4223	42.2	1.45	(1.36-1.55)		1.09	(1.00-1.18)	
≥6	1417	46.2	1.71	(1.54-1.91)		1.19	(1.06-1.35)	
Test for Linear Trend					0.000			0.002

II. Wasting[c]

			Model 1			Model 2[b]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*35 243*	*10.6*						
Did not BDP	22 718	8.2	1.00			1.00		
<3	6894	11.8	1.49	(1.34-1.63)		1.06	(0.95-1.17)	
3-6	4214	18.1	2.46	(2.25-2.70)		1.26	(1.14-1.41)	
≥6	1417	19.8	2.76	(2.40-3.17)		1.21	(1.04-1.41)	
Test for Linear Trend					0.000			0.002

[a] Models exclude cases in which the BDP status was unknown

[b] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview, birth weight) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a percentage of WHO reference median).

[c] 197 observations were not included in the wasting models because the specific survey-wave they belonged to had no variation in the outcome (i.e. only positive or negative outcomes in the specific wave).

Table 6. Association between BDP and the risk of spontaneous abortion.

				Model 1		Model 2[a]	
Exposure	Women	Woman-Months	Incidence Rate[b]	HR	95% CI	HR	95% CI
Overall	*36 987*	*122 117*	*28.3*				
Not currently breastfeeding	27 886	89 092	24.0	1.00		1.00	
Currently breastfeeding	12 462	32 584	40.1	1.70	(1.58-1.82)	1.86	(1.70-2.03)
Uncertain	125	441	24.9	1.07	(0.59-1.93)	1.12	(0.62-2.05)

[a] Associations adjusted for the wave of the DHS survey (country-year), rural-urban residence, woman's age at pregnancy, duration of most recent interpregnancy interval, educational level, history of previous miscarriage, year in which the woman became pregnant, number of children ever born, and maternal BMI as a % of the WHO reference median.
[b] Per 1000 woman-months.

Supplementary material for "Breastfeeding during Pregnancy and its Association with Childhood Malnutrition and Pregnancy Loss in Low- and Middle-Income Countries"

APPENDIX A: Sample Characteristics and Missing Data

Table A1. Number of total observations and cases of stunting or wasting included from each country and wave of the DHS by the availability of birth weight data.

		Missing Birth Weight					Birth Weight Available				
Country	Survey Years	Children	Stunted	Wasted	% Stunted	% Wasted	Children	Stunted	Wasted	% Stunted	% Wasted
Albania	2008-2009	76	13	5	17.1	6.6	70	12	4	15.8	5.3
Armenia	2000	403	64	6	15.9	1.5	387	63	6	15.6	1.5
Azerbaijan	2006	422	102	18	24.2	4.3	318	74	14	17.5	3.3
Bangladesh	1996-1997	373	249	74	66.8	19.8					
Bangladesh	1999-2000	402	236	38	58.7	9.5					
Bangladesh	2004	442	240	59	54.3	13.3					
Bangladesh	2007	390	189	59	48.5	15.1					
Bangladesh	2011	544	246	95	45.2	17.5					
Bangladesh	2014	455	209	62	45.9	13.6					
Benin	2001	384	176	18	45.8	4.7	252	95	10	24.7	2.6
Benin	2006	1142	548	89	48.0	7.8	677	283	44	24.8	3.9
Bolivia	1994	281	134	9	47.7	3.2	140	42	4	14.9	1.4
Bolivia	2003	667	266	11	39.9	1.6	443	150	10	22.5	1.5
Bolivia	2008	640	201	6	31.4	0.9	480	110	4	17.2	0.6
Cambodia	2000	414	256	72	61.8	17.4	47	18	7	4.3	1.7
Cameroon	2011	527	207	25	39.3	4.7	320	101	9	19.2	1.7
Chad	2004	502	291	80	58.0	15.9	97	42	16	8.4	3.2
Colombia	1995	365	95	5	26.0	1.4	215	50	4	13.7	1.1
Colombia	2000	350	79	2	22.6	0.6	234	43	1	12.3	0.3
Colombia	2005	922	192	22	20.8	2.4	593	104	11	11.3	1.2
Colombia	2010	1036	168	12	16.2	1.2	674	89	6	8.6	0.6

Congo Democratic Republic	2007	314	166	26	52.9	8.3	205	101	15	32.2	4.8
Dominican Republic	1991	289	82	3	28.4	1.0	256	69	3	23.9	1.0
Dominican Republic	1996	358	75	12	20.9	3.4	351	72	12	20.1	3.4
Dominican Republic	2013	273	22	10	8.1	3.7	263	19	9	7.0	3.3
Dominican Republic[a]	2013	80	8	1	10.0	1.3	76	8	1	10.0	1.3
Egypt	1992	671	238	22	35.5	3.3	50	7	3	1.0	0.4
Egypt	1995	1042	407	75	39.1	7.2	95	24	4	2.3	0.4
Egypt	2003	503	104	24	20.7	4.8					
Egypt	2005	852	233	35	27.3	4.1	283	68	17	8.0	2.0
Egypt	2008	806	231	54	28.7	6.7	332	93	23	11.5	2.9
Ethiopia	2000	798	525	97	65.8	12.2	42	12	3	1.5	0.4
Ethiopia	2005	303	185	34	61.1	11.2	9	2	0	0.7	0.0
Gabon	2000	365	118	6	32.3	1.6	313	98	6	26.8	1.6
Ghana	1998	208	83	21	39.9	10.1	40	5	5	2.4	2.4
Ghana	2003	278	129	16	46.4	5.8	67	21	5	7.6	1.8
Ghana	2008	203	63	12	31.0	5.9	87	24	6	11.8	3.0
Guatemala	1995	749	507	41	67.7	5.5	540	347	31	46.3	4.1
Guatemala	1998-1999	311	208	5	66.9	1.6	216	138	5	44.4	1.6
Guyana	2009	167	30	4	18.0	2.4	132	21	4	12.6	2.4
Haiti	2000	500	187	31	37.4	6.2	34	5	1	1.0	0.2
Haiti	2005-2006	195	85	13	43.6	6.7	26	11	0	5.6	0.0
Honduras	2005-2006	607	263	13	43.3	2.1	361	115	5	18.9	0.8
India	2005-2006	3859	1952	644	50.6	16.7	1457	515	212	13.3	5.5
India	2015-2016	19 640	8596	3772	43.8	19.2	14 355	5821	2756	29.6	14.0
Jordan	1997	658	85	17	12.9	2.6	623	75	16	11.4	2.4
Jordan	2002	567	95	14	16.8	2.5	546	93	13	16.4	2.3
Jordan	2007	479	79	33	16.5	6.9	474	79	32	16.5	6.7
Jordan	2009	526	59	7	11.2	1.3	523	58	7	11.0	1.3

Kazakhstan	1995	48	18	2	37.5	4.2	46	17	2	35.4	4.2
Kazakhstan	1999	13	1	1	7.7	7.7	13	1	1	7.7	7.7
Kenya	1998	242	124	18	51.2	7.4	88	33	7	13.6	2.9
Kenya	2008-2009	397	148	25	37.3	6.3	165	40	10	10.1	2.5
Kenya	2014	603	189	34	31.3	5.6	286	72	7	11.9	1.2
Kyrgyz Republic	1997	59	26	0	44.1	0.0	56	25	0	42.4	0.0
Lesotho	2004	83	48	5	57.8	6.0	48	27	1	32.5	1.2
Lesotho	2009	62	28	1	45.2	1.6	41	16	0	25.8	0.0
Liberia	2007	448	215	21	48.0	4.7	38	15	1	3.3	0.2
Madagascar	2003-2004	396	220	54	55.6	13.6	167	88	22	22.2	5.6
Malawi	2000	859	545	39	63.4	4.5	409	251	20	29.2	2.3
Malawi	2004	794	502	47	63.2	5.9	346	210	21	26.4	2.6
Malawi	2010	387	211	16	54.5	4.1	230	122	9	31.5	2.3
Maldives	2009	142	28	18	19.7	12.7	140	28	18	19.7	12.7
Mali	2006	1050	517	128	49.2	12.2	276	107	30	10.2	2.9
Morocco	1992	423	145	11	34.3	2.6	102	18	1	4.3	0.2
Morocco	2003-2004	396	91	38	23.0	9.6	173	26	15	6.6	3.8
Mozambique	2003	690	395	29	57.2	4.2	322	158	15	22.9	2.2
Namibia	2006-2007	211	89	15	42.2	7.1	138	55	7	26.1	3.3
Nepal	1996	275	197	39	71.6	14.2					
Nepal	2001	501	347	61	69.3	12.2					
Nepal	2006	458	282	50	61.6	10.9	78	25	7	5.5	1.5
Nicaragua	1998	449	159	11	35.4	2.4	295	90	9	20.0	2.0
Nicaragua	2001	324	113	7	34.9	2.2	206	57	5	17.6	1.5
Niger	2006	421	276	55	65.6	13.1	114	50	8	11.9	1.9
Nigeria	2008	1883	945	223	50.2	11.8	326	104	23	5.5	1.2
Peru	1991-1992	685	335	14	48.9	2.0	419	167	7	24.4	1.0
Peru	1996	1062	435	18	41.0	1.7	642	192	11	18.1	1.0

Peru	2000	699	288	7	41.2	1.0	459	148	5	21.2	0.7
Peru	2007-2008	563	185	3	32.9	0.5	472	137	2	24.3	0.4
Rwanda	2000	572	331	29	57.9	5.1	172	80	9	14.0	1.6
Rwanda	2005	331	205	14	61.9	4.2	91	45	1	13.6	0.3
Sao Tome and Principe	2008-2009	138	39	18	28.3	13.0	113	30	14	21.7	10.1
Sierra Leone	2008	125	55	13	44.0	10.4	42	23	2	18.4	1.6
Swaziland	2006-2007	90	34	0	37.8	0.0	65	23	0	25.6	0.0
Tanzania	2004-2005	727	367	20	50.5	2.8	330	168	9	23.1	1.2
Timor-Leste	2009-2010	544	361	94	66.4	17.3	140	81	22	14.9	4.0
Turkey	1993	448	106	13	23.7	2.9					
Turkey	1998	372	77	10	20.7	2.7	228	28	2	7.5	0.5
Turkey	2003	451	92	4	20.4	0.9	259	25	4	5.5	0.9
Uganda	2000-2001	562	290	19	51.6	3.4	156	64	4	11.4	0.7
Uganda	2006	269	123	19	45.7	7.1	84	31	8	11.5	3.0
Uzbekistan	1996	61	25	9	41.0	14.8	59	24	9	39.3	14.8
Zambia	2007	507	268	12	52.9	2.4	234	118	5	23.3	1.0
Zambia	2013-2014	853	401	36	47.0	4.2	517	228	23	26.7	2.7
Zimbabwe	1994	150	71	11	47.3	7.3	91	38	6	25.3	4.0
Zimbabwe	1999	189	79	11	41.8	5.8	137	49	8	25.9	4.2
TOTAL		67 350	29 002	7131	43.1	10.6	35 516	12 511	3734	18.6	5.5

[a] An additional DHS was administered in Dominican Republic in 2013, which is why there were two surveys in the same country in the same year.

Table A2. Exposure and incidence of spontaneous abortion for each country and wave of the DHS by the availability of maternal BMI information.

		Missing Maternal BMI			Maternal BMI Available		
Country	Survey Years	Woman-Months	Failures	Incidence Rate[a]	Woman-Months	Failures	Incidence Rate[a]
Albania	2008-2009	90	6	66.7	90	6	66.7
Armenia	2000	277	55	198.6	262	53	202.3
Azerbaijan	2006	340	67	197.1	332	65	195.8
Bangladesh	1993-1994	614	3	4.9			
Bangladesh	1996-1997	467	11	23.6	448	11	24.6
Bangladesh	1999-2000	528	12	22.7	523	12	22.9
Bangladesh	2004	525	22	41.9	516	22	42.6
Bangladesh	2007	532	31	58.3	519	30	57.8
Bangladesh	2011	709	25	35.3	688	25	36.3
Bangladesh	2014	659	16	24.3	646	16	24.8
Burkina Faso	2003	1433	14	9.8	1424	14	9.8
Benin	2001	844	13	15.4	839	13	15.5
Benin	2006	2382	39	16.4	2217	36	16.2
Bolivia	1993-1994	708	18	25.4	441	14	31.7
Bolivia	2003-2004	934	31	33.2	914	31	33.9
Bolivia	2008	858	37	43.1	853	37	43.4
Brazil	1991-1992	340	14	41.2			
Brazil	1996	467	16	34.3	438	15	34.2
Cambodia	2007	1306	16	12.3	671	7	10.4
Cambodia	2005	42	8	190.5	39	8	205.1
Cameroon	2004	1086	0	0.0	516	0	0.0
Cameroon	2011	1763	79	44.8	899	40	44.5
Colombia	1990	409	8	19.6			
Colombia	1995	550	12	21.8	523	11	21.0

Colombia	2000	460	13	28.3	444	13	29.3
Colombia	2004-2005	1328	71	53.5	1300	70	53.8
Colombia	2009-2010	1440	53	36.8	1402	49	35.0
Colombia	2015-2016	731	29	39.7			
Congo Democratic Republic	1991	586	17	29.0	522	14	26.8
Congo	1996	580	16	27.6	564	16	28.4
Dominican Republic	1999	56	5	89.3			
Dominican Republic	2002	1236	62	50.2			
Dominican Republic	2007	1154	69	59.8			
Dominican Republic	2007	152	9	59.4			
Dominican Republic	2013	440	26	59.2	433	26	60.1
Dominican Republic[b]	2013	148	3	20.3	148	3	20.3
Dominican Republic	1992-1993	964	21	21.8	945	20	21.2
Dominican Republic[b]	1995-1996	1733	44	25.4	1679	42	25.0
Egypt	2000	1396	36	25.8	1385	35	25.3
Egypt	2003	915	23	25.1	912	23	25.2
Egypt	2005	1896	0	0.0	1881	0	0.0
Egypt	2008	1541	46	29.9	1538	46	29.9
Egypt	1992	1434	22	15.3	1426	22	15.4
Egypt	1997	1050	8	7.6	537	6	11.2
Ethiopia	2000	633	36	56.9	612	35	57.2
Ethiopia	1998-1999	491	1	2.0	477	1	2.1
Gabon	2003	480	5	10.4	460	5	10.9
Ghana	2008	365	11	30.1	356	11	30.9
Ghana	2005	697	13	18.7	360	7	19.4
Ghana	1995	1281	14	10.9	1190	13	10.9
Guinea	1998-1999	602	6	10.0	545	5	9.2
Guatemala	2009	291	22	75.6	276	22	79.7

Guatemala	2005-2006	1066	12	11.3	1038	12	11.6
Guyana	2000	915	12	13.1	898	11	12.2
Honduras	2005-2006	773	9	11.6	393	5	12.7
Haiti	2005-2006	5788	210	36.3	5514	203	36.8
Haiti	2015-2016	30504	1262	41.4	29955	1243	41.5
India	1991	1213	20	16.5			
India	1994	1500	18	12.0			
Indonesia	1997	1256	19	15.1			
Indonesia	2002-2003	1199	20	16.7			
Indonesia	2007	1295	22	17.0			
Indonesia	1990	1369	37	27.0			
Indonesia	1997	1096	43	39.2	1089	43	39.5
Jordan	2002	1042	24	23.0	1001	21	21.0
Jordan	2007	1713	53	30.9	824	23	27.9
Jordan	2009	1611	51	31.7	783	31	39.6
Jordan	1998	634	7	11.0	602	7	11.6
Jordan	2003	660	7	10.6	560	6	10.7
Kenya	2008-2009	672	15	22.3	663	15	22.6
Kenya	2014	1048	12	11.5	1034	12	11.6
Kenya	2000	1220	43	35.2	679	22	32.4
Kenya	2005-2006	518	42	81.1	10	0	0.0
Kazakhstan	1995	119	0	0.0	119	0	0.0
Kazakhstan	1999	65	0	0.0	30	0	0.0
Kyrgyz Republic	1997	171	0	0.0	171	0	0.0
Liberia	2006-2007	787	21	26.7	764	19	24.9
Lesotho	2004-2005	254	0	0.0	162	0	0.0
Lesotho	2009-2010	197	0	0.0	120	0	0.0
Morocco	1992	657	5	7.6	646	4	6.2

Morocco	2003-2004	676	15	22.2	671	15	22.4
Madagascar	1992	651	0	0.0			
Madagascar	2003-2004	635	11	17.3	627	11	17.5
Madagascar	2008-2009	1537	33	21.5	769	13	16.9
Mali	2001	1832	38	20.7	1721	35	20.3
Mali	2006	1995	22	11.0	1961	22	11.2
Maldives	2009	364	10	27.5	320	9	28.1
Malawi	2000	1585	12	7.6	1561	12	7.7
Malawi	2004-2005	1519	11	7.2	1463	10	6.8
Malawi	2010	2542	20	7.9	771	6	7.8
Mozambique	2003-2004	1372	18	13.1	1288	17	13.2
Nicaragua	1997-1998	831	15	18.1	802	13	16.2
Nicaragua	2001	544	8	14.7	529	7	13.2
Nigeria	2003	1055	21	19.9	1029	19	18.5
Nigeria	2008	3990	51	12.8	3877	50	12.9
Niger	2006	1461	14	9.6	765	5	6.5
Namibia	2000	328	8	24.4			
Namibia	2006-2007	450	3	6.7	443	3	6.8
Nepal	1996	704	0	0.0	531	0	0.0
Nepal	2001	828	15	18.1	817	14	17.1
Nepal	2006	682	15	22.0	674	15	22.3
Peru	1991-1992	1102	24	21.8	1035	21	20.3
Peru	1996	1550	31	20.0	1496	31	20.7
Peru	2000	960	23	24.0	903	22	24.4
Peru	2003-2008	1091	42	38.5	736	27	36.7
Peru	2009	807	32	39.7	786	32	40.7
Peru	2010	740	33	44.6	735	32	43.5
Peru	2011	673	36	53.5	668	36	53.9

Peru	2012	736	31	42.1	729	31	42.5
Philippines	1993	1250	43	34.4			
Philippines	1998	923	37	40.1			
Philippines	2003	739	11	14.9			
Philippines	2008	546	8	14.7			
Pakistan	2006-2007	1393	24	17.2			
Paraguay	1990	548	11	20.1			
Rwanda	2000	1120	19	17.0	1107	19	17.2
Rwanda	2005	1180	27	22.9	568	14	24.6
Sierra Leone	2008	415	13	31.3	187	7	37.4
Senegal	2005	1754	38	21.7	521	13	25.0
Sao Tome and Principe	2008-2009	259	3	11.6	230	3	13.0
Swaziland	2006-2007	244	0	0.0	236	0	0.0
Chad	2004	883	10	11.3	863	10	11.6
Timor-Leste	2009-2010	952	4	4.2	930	4	4.3
Turkey	1993	452	41	90.7	429	40	93.2
Turkey	1998	409	45	110.0	399	42	105.3
Turkey	2003-2004	515	50	97.1	506	50	98.8
Tanzania	2004-2005	1347	24	17.8	1339	24	17.9
Tanzania	2009-2010	1112	19	17.1	1103	19	17.2
Uganda	2000-2001	1086	13	12.0	1002	13	13.0
Uganda	2006	1264	30	23.7	400	7	17.5
Uzbekistan	1996	219	0	0.0	219	0	0.0
Vietnam	1997	230	19	82.6			
Vietnam	2002	123	13	105.7			
South Africa	1998	246	3	12.2			
Zambia	2001-2002	876	21	24.0	864	21	24.3
Zambia	2007	956	10	10.5	941	9	9.6

Zambia	2013-2014	1553	18	11.6	1543	18	11.7
Zimbabwe	1994	518	4	7.7	293	2	6.8
Zimbabwe	1999	413	2	4.8	387	2	5.2
Zimbabwe	2005-2006	104	3	28.8	99	3	30.3
TOTAL		158150	4353	26.9	122117	3455	27.7

[a] Per 1000 woman-months at-risk.

[b] Special DHS.

Table A3. Characteristics and prevalence of stunting and wasting in samples with and without missing birth weight information.

	Missing Birth Weight				Birth Weight Available			
Variable	N	%	Stunted	Wasted	N	%	Stunted	Wasted
BDP								
No	20 192	61.6	51.3	8.9	25 302	65.5	32.1	7.7
Yes	12 435	37.9	52.9	13.4	13 237	34.3	38.0	14.4
Uncertain	145	0.4	51.7	4.8	83	0.2	39.8	4.8
Duration of BDP								
Never BDP	20 192	61.6	51.3	8.9	25 302	65.5	32.1	7.7
<3 months	6249	19.1	49.3	11.4	7380	19.1	34.0	11.3
3-5 months	4644	14.2	55.6	14.7	4400	11.4	42.1	17.9
6+ months	1542	4.7	59.4	17.4	1457	3.8	46.0	20.0
Missing	145	0.4	51.7	4.8	83	0.2	39.8	4.8
Residence								
Urban	7086	21.6	40.5	9.1	16 808	43.5	25.3	7.1
Rural	25 686	78.4	55.0	11.0	21 814	56.5	41.0	12.2
Mother's age								
15-19	5872	17.9	53.0	11.4	6953	18.0	37.3	10.4
20-24	11 534	35.2	51.2	11.3	16 038	41.5	34.2	11.8
25-29	8027	24.5	51.7	10.8	9407	24.4	32.4	8.8
30-34	4517	13.8	51.6	8.9	4248	11.0	32.4	7.1
35-39	2137	6.5	54.3	7.4	1639	4.2	33.6	5.7
40-49	685	2.1	50.8	8.9	337	0.9	39.8	4.2
Interpregnancy interval (years)								
0.0-0.4	1115	3.4	31.6	13.2	1953	5.1	20.4	11.3
0.5-0.9	3255	9.9	42.6	15.2	5161	13.4	28.3	11.2
1.0-1.4	6145	18.8	53.4	12.1	7535	19.5	38.8	10.6
1.5-1.9	6940	21.2	55.3	9.7	7171	18.6	40.1	10.2

2.0-2.4	5493	16.8	56.7	9.3	5588	14.5	37.4	9.6
2.5-2.9	3793	11.6	54.4	9.0	4014	10.4	34.0	8.9
3.0-3.4	2805	8.6	51.5	8.7	3186	8.3	30.1	8.5
3.5-3.9	1786	5.5	47.9	9.3	2124	5.5	27.7	8.9
4.0-4.4	1229	3.8	46.9	9.0	1549	4.0	28.1	9.4
4.5-4.9	211	0.6	44.1	10.0	341	0.9	28.5	7.3
Sex of Child								
Male	16 289	49.7	53.4	11.1	19 238	49.8	35.9	10.4
Female	16 483	50.3	50.4	10.0	19 384	50.2	32.5	9.6
Age of Child								
0	984	3.0	27.1	16.6	1872	4.9	18.5	13.2
1	8701	26.6	52.3	13.3	11 157	28.9	37.7	11.4
2	11 523	35.2	56.6	9.4	11 721	30.4	39.2	9.6
3	7077	21.6	51.3	8.9	8000	20.7	31.1	8.8
4	4487	13.7	45.2	9.2	5872	15.2	26.6	8.6
Birth Order								
1	7757	23.7	46.0	11.7	16 228	42.0	30.1	11.8
2	7454	22.8	49.9	11.1	9766	25.3	33.7	9.9
3	5409	16.5	53.3	10.2	5101	13.2	37.4	8.5
4	3857	11.8	54.1	10.3	2997	7.8	39.2	9.0
5	2766	8.4	57.2	9.9	1694	4.4	40.6	6.9
6	2074	6.3	58.5	10.0	1100	2.9	41.5	6.3
7	1363	4.2	56.1	8.7	690	1.8	43.3	4.8
8+	2092	6.4	56.6	8.3	1046	2.7	47.4	5.6
Education								
None	15 375	46.9	58.6	12.8	6547	17.0	51.7	15.8
Primary	10 345	31.6	51.5	7.7	10 893	28.2	39.5	7.2
Secondary	6412	19.6	39.3	9.9	16 975	44.0	28.4	10.3

Tertiary	640	2.0	22.0	8.4	4204	10.9	16.2	7.0
Missing	0	0.0	0.0	0.0	3	0.0	100.0	0.0
Current Marital Status								
Never married	223	0.7	49.8	7.6	439	1.1	28.3	3.9
Married	28 483	86.9	52.3	11.5	30 517	79.0	35.8	11.9
Cohabiting	3396	10.4	49.1	3.9	6389	16.5	28.5	2.6
Widowed	129	0.4	49.6	7.8	102	0.3	38.2	8.8
Divorced	108	0.3	55.6	5.6	254	0.7	21.3	3.9
Separated	433	1.3	46.4	5.1	921	2.4	26.3	3.3
Mother's BMI (% of WHO ref. median)								
70-89	1835	5.6	55.8	22.3	1557	4.0	41.4	25.7
90-99	5386	16.4	57.9	16.3	4436	11.5	43.7	18.6
100-109	7565	23.1	56.9	12.0	6836	17.7	40.7	13.7
110-119	6576	20.1	53.4	8.7	6870	17.8	39.1	10.0
120-129	4444	13.6	49.1	7.7	5345	13.8	33.3	7.8
130-139	2545	7.8	44.4	5.7	3818	9.9	29.5	6.3
140-149	1514	4.6	40.4	4.7	2595	6.7	25.1	4.1
150-159	832	2.5	35.0	4.6	1639	4.2	22.9	3.5
160-169	502	1.5	28.5	4.0	1043	2.7	21.8	3.6
170-179	243	0.7	29.2	1.7	595	1.5	21.5	2.9
180+	392	1.2	27.3	1.8	785	2.0	22.4	2.0
Missing	938	2.9	54.7	6.2	3103	8.0	21.9	3.8
History of pregnancy loss								
No	21 436	65.4	54.6	10.9	22 290	57.7	37.7	11.0
Yes	11 336	34.6	46.8	9.9	16 332	42.3	29.3	8.6
Child’s Birth Year								
1985	4	0.0	0.0	0.0	14	0.0	0.0	0.0
1986	20	0.1	25.0	0.0	84	0.2	14.3	1.2

1987	123	0.4	38.2	3.3	240	0.6	21.7	1.7
1988	431	1.3	44.1	2.1	502	1.3	27.3	1.8
1989	858	2.6	54.3	4.4	615	1.6	28.6	2.4
1990	927	2.8	50.2	7.1	436	1.1	38.3	3.9
1991	652	2.0	43.6	6.8	259	0.7	34.0	3.1
1992	645	2.0	48.2	6.1	540	1.4	31.3	4.1
1993	898	2.7	54.6	7.1	730	1.9	41.2	2.6
1994	956	2.9	59.5	9.1	849	2.2	35.6	3.7
1995	771	2.4	51.9	7.1	879	2.3	24.4	3.2
1996	863	2.6	51.9	7.4	997	2.6	26.3	3.2
1997	1084	3.3	57.1	6.4	947	2.5	32.6	2.8
1998	1417	4.3	58.8	6.2	1189	3.1	35.5	2.8
1999	1133	3.5	49.4	8.6	1126	2.9	26.4	3.3
2000	995	3.0	44.1	6.0	1143	3.0	25.8	3.0
2001	1702	5.2	48.9	6.6	1531	4.0	31.6	5.3
2002	2366	7.2	54.4	8.5	1711	4.4	32.3	6.7
2003	2712	8.3	55.6	10.5	1939	5.0	32.8	5.9
2004	2781	8.5	55.8	12.4	2256	5.8	34.8	7.4
2005	1697	5.2	47.0	12.7	1848	4.8	26.5	5.7
2006	1499	4.6	48.7	11.6	1367	3.5	24.6	3.8
2007	858	2.6	45.3	9.7	859	2.2	26.8	5.4
2008	548	1.7	53.5	12.6	673	1.7	27.5	3.3
2009	342	1.0	46.2	10.2	422	1.1	22.0	3.3
2010	579	1.8	43.0	15.9	841	2.2	32.8	10.8
2011	1090	3.3	49.4	13.6	2385	6.2	33.6	14.4
2012	1544	4.7	54.1	14.5	3643	9.4	40.2	15.9
2013	1734	5.3	56.0	18.7	4634	12.0	45.6	19.5
2014	1213	3.7	51.0	22.0	3205	8.3	40.7	22.3

2015	326	1.0	36.8	28.5	752	2.0	31.5	25.1
2016	4	0.0	0.0	50.0	6	0.0	33.3	50.0

Table A4. Distribution of characteristics and the prevalence of stunting and wasting of index children according to BDP status for sample which had a recorded birth weight.

	Did not BDP				BDP				Uncertain			
Variable	N	%	Stunted	Wasted	N	%	Stunted	Wasted	N	%	Stunted	Wasted
Residence												
Urban	10 803	47.2	25.6	6.5	4315	34.3	28.1	10.3	23	30.3	26.1	0.0
Rural	12 070	52.8	40.5	9.7	8252	65.7	43.8	17.1	53	69.7	50.9	7.6
Mother's age												
15-19	4003	17.5	36.5	8.4	2237	17.8	43.3	16.5	13	17.1	53.9	7.7
20-24	9262	40.5	33.3	9.5	5692	45.3	38.2	17.0	32	42.1	34.4	3.1
25-29	5739	25.1	31.1	7.4	2934	23.4	37.6	12.8	16	21.1	56.3	6.3
30-34	2641	11.6	33.2	6.3	1173	9.3	33.4	9.8	10	13.2	50.0	10.0
35-39	1032	4.5	34.4	5.4	437	3.5	35.7	7.3	5	6.6	20.0	0.0
40-49	196	0.9	42.9	5.1	94	0.8	37.2	4.3	0	0.0	0.0	0.0
Interpregnancy interval												
0.0-0.4	407	1.8	18.2	6.9	1301	10.4	21.9	13.5	7	9.2	14.3	0.0
0.5-0.9	1596	7.0	24.8	7.5	3068	24.4	31.2	14.2	8	10.5	50.0	0.0
1.0-1.4	3191	14.0	36.6	8.1	3695	29.4	42.8	14.1	20	26.3	45.0	5.0
1.5-1.9	4142	18.1	39.0	7.9	2449	19.5	45.0	16.1	11	14.5	54.6	0.0
2.0-2.4	4138	18.1	36.5	8.2	1043	8.3	45.5	16.6	11	14.5	27.3	0.0
2.5-2.9	3202	14.0	33.9	8.4	545	4.3	41.5	14.3	5	6.6	60.0	40.0
3.0-3.4	2687	11.8	30.3	8.2	258	2.1	42.6	17.4	6	7.9	33.3	0.0
3.5-3.9	1819	8.0	27.8	8.7	147	1.2	41.5	17.0	5	6.6	80.0	20.0
4.0-4.4	1391	6.1	28.6	9.4	48	0.4	41.7	20.8	3	4.0	33.3	0.0
4.5-4.9	300	1.3	29.0	7.0	13	0.1	53.9	23.1	0	0.0	0.0	0.0
Sex of Child												
Male	11 342	49.6	35.0	8.5	6299	50.1	40.6	15.3	30	39.5	40.0	10.0
Female	11 531	50.4	31.9	7.9	6268	49.9	36.2	14.3	46	60.5	45.7	2.2

Age of Child												
0	494	2.2	17.4	8.7	1112	8.9	19.1	16.8	6	7.9	16.7	0.0
1	4473	19.6	35.4	8.4	5652	45.0	41.6	15.2	16	21.1	50.0	6.3
2	7454	32.6	39.0	7.8	3415	27.2	42.5	14.9	21	27.6	57.1	0.0
3	5935	26.0	31.2	8.2	1497	11.9	35.9	13.5	15	19.7	46.7	13.3
4	4517	19.8	26.9	8.6	891	7.1	31.2	11.5	18	23.7	27.8	5.6
Birth weight												
<2	631	2.8	43.6	14.7	465	3.7	57.6	26.0	1	1.3	100.0	0.0
2.0-2.4	1971	8.6	43.4	13.2	1322	10.5	47.4	21.3	5	6.6	40.0	20.0
2.5-2.9	5507	24.1	37.9	11.7	3621	28.8	42.9	19.1	19	25.0	57.9	10.5
3.0-3.4	7965	34.8	32.6	7.1	4028	32.1	36.1	12.8	27	35.5	44.4	0.0
3.5-3.9	4825	21.1	26.6	4.6	2252	17.9	28.6	8.3	19	25.0	31.6	5.3
4.0-4.4	1448	6.3	28.3	4.2	638	5.1	32.1	6.7	5	6.6	20.0	0.0
4.5-4.9	526	2.3	26.8	4.0	241	1.9	32.8	6.6	0	0.0	0.0	0.0
Birth Order												
1	9358	40.9	28.1	9.9	5860	46.6	35.4	16.2	29	38.2	34.5	3.5
2	5737	25.1	32.8	8.0	3229	25.7	38.5	14.9	28	36.8	35.7	7.1
3	3105	13.6	37.4	6.4	1545	12.3	42.0	13.9	5	6.6	60.0	0.0
4	1864	8.2	39.3	7.1	839	6.7	42.4	14.1	10	13.2	60.0	10.0
5	1089	4.8	41.9	6.1	414	3.3	42.8	10.4	2	2.6	100.0	0.0
6	698	3.1	41.8	5.6	278	2.2	49.3	8.6	1	1.3	100.0	0.0
7	429	1.9	44.8	4.4	152	1.2	48.7	6.6	1	1.3	100.0	0.0
8+	593	2.6	52.1	5.1	250	2.0	46.4	8.4	0	0.0	0.0	0.0
Education												
None	3598	15.7	51.4	12.1	2581	20.5	53.1	22.2	14	18.4	64.3	14.3
Primary	6620	28.9	40.6	6.1	2913	23.2	44.0	11.2	22	29.0	59.1	0.0
Secondary	9955	43.5	27.1	8.7	5886	46.8	33.0	14.2	37	48.7	29.7	5.4
Tertiary	2700	11.8	15.5	6.2	1187	9.5	19.4	10.2	3	4.0	0.0	0.0
Current Marital Status												

Never married	316	1.4	28.2	3.2	62	0.5	35.5	4.8	1	1.3	100.0	0.0
Married	17 816	77.9	34.1	9.7	11 136	88.6	39.4	16.2	59	77.6	40.7	6.8
Cohabiting	3954	17.3	31.8	2.5	1157	9.2	30.3	3.6	12	15.8	58.3	0.0
Widowed	70	0.3	32.9	7.1	31	0.3	51.6	12.9	0	0.0	0.0	0.0
Divorced	82	0.4	35.4	3.7	23	0.2	21.7	0.0	0	0.0	0.0	0.0
Separated	635	2.8	28.0	3.2	158	1.3	28.5	5.1	4	5.3	25.0	0.0
Mother's BMI (% of WHO ref. Median)												
70-89	819	3.6	39.9	22.1	734	5.8	42.9	29.8	4	5.3	50.0	0.0
90-99	2434	10.6	42.0	14.7	1991	15.8	45.7	23.6	11	14.5	54.6	0.0
100-109	4059	17.8	38.9	10.8	2756	21.9	43.4	17.9	20	26.3	50.0	15.0
110-119	4446	19.4	38.4	8.3	2410	19.2	40.3	13.1	14	18.4	35.7	0.0
120-129	3599	15.7	32.3	6.6	1734	13.8	35.3	10.2	12	15.8	41.7	8.3
130-139	2703	11.8	28.4	5.0	1109	8.8	32.0	9.5	6	7.9	50.0	0.0
140-149	1835	8.0	24.9	3.7	755	6.0	25.7	5.2	3	4.0	0.0	0.0
150-159	1198	5.2	21.1	3.3	437	3.5	27.5	4.1	4	5.3	50.0	0.0
160-169	767	3.4	21.3	3.5	275	2.2	23.3	4.0	1	1.3	0.0	0.0
170-179	432	1.9	19.9	2.3	162	1.3	25.9	4.3	1	1.3	0.0	0.0
180+	581	2.5	21.9	2.1	204	1.6	24.0	2.0	0	0.0	0.0	0.0
History of pregnancy loss												
No	13 996	61.2	36.8	9.2	6598	52.5	42.7	16.7	41	54.0	58.5	9.8
Yes	8877	38.8	28.2	6.6	5969	47.5	33.6	12.7	35	46.1	25.7	0.0
Child’s birth year												
1986	2	0.0	50.0	0.0	1	0.0	0.0	0.0	0	0.0	0.0	0.0
1987	103	0.5	23.3	2.9	5	0.0	20.0	0.0	0	0.0	0.0	0.0
1988	182	0.8	30.8	1.1	18	0.1	27.8	0.0	0	0.0	0.0	0.0
1989	193	0.8	37.3	1.6	38	0.3	36.8	0.0	0	0.0	0.0	0.0
1990	217	1.0	31.8	2.8	77	0.6	35.1	3.9	0	0.0	0.0	0.0
1991	185	0.8	32.4	3.8	43	0.3	20.9	0.0	0	0.0	0.0	0.0
1992	450	2.0	30.0	4.2	74	0.6	36.5	4.1	0	0.0	0.0	0.0

1993	591	2.6	40.1	2.0	120	1.0	45.0	5.8	0	0.0	0.0	0.0
1994	626	2.7	33.7	2.4	209	1.7	38.3	6.7	0	0.0	0.0	0.0
1995	642	2.8	24.8	3.6	229	1.8	22.7	2.2	1	1.3	0.0	0.0
1996	732	3.2	27.2	3.7	227	1.8	21.6	2.2	2	2.6	0.0	0.0
1997	732	3.2	34.7	2.9	150	1.2	27.3	3.3	1	1.3	100.0	0.0
1998	751	3.3	37.7	2.7	260	2.1	43.9	2.3	1	1.3	100.0	0.0
1999	660	2.9	27.9	2.0	274	2.2	32.1	5.1	1	1.3	100.0	0.0
2000	754	3.3	29.7	3.3	135	1.1	23.7	4.4	1	1.3	100.0	0.0
2001	1020	4.5	35.3	5.9	280	2.2	28.2	5.0	5	6.6	20.0	0.0
2002	1210	5.3	33.4	6.4	388	3.1	34.8	8.8	4	5.3	25.0	0.0
2003	1273	5.6	33.2	6.1	469	3.7	41.2	6.6	4	5.3	75.0	0.0
2004	1407	6.2	35.0	6.0	653	5.2	40.1	12.3	10	13.2	50.0	0.0
2005	1117	4.9	26.3	5.6	473	3.8	31.5	7.0	5	6.6	20.0	20.0
2006	908	4.0	23.8	3.3	347	2.8	30.3	5.2	7	9.2	28.6	0.0
2007	586	2.6	27.8	4.6	261	2.1	25.3	6.9	1	1.3	0.0	0.0
2008	463	2.0	26.8	3.2	202	1.6	28.2	3.5	1	1.3	100.0	0.0
2009	320	1.4	21.3	3.8	100	0.8	24.0	2.0	1	1.3	0.0	0.0
2010	691	3.0	33.1	10.6	144	1.2	32.6	12.5	2	2.6	0.0	0.0
2011	1714	7.5	33.0	14.9	644	5.1	34.2	13.0	7	9.2	57.1	14.3
2012	2252	9.9	38.1	15.2	1336	10.6	43.3	16.8	11	14.5	45.5	9.1
2013	2043	8.9	42.7	17.7	2536	20.2	47.8	20.9	5	6.6	40.0	20.0
2014	909	4.0	40.0	19.4	2262	18.0	40.6	23.5	6	7.9	66.7	0.0
2015	140	0.6	35.0	15.0	606	4.8	30.9	27.1	0	0.0	0.0	0.0
2016	0	0.0	0.0	0.0	6	0.1	33.3	50.0	0	0.0	0.0	0.0

Table A5. Distribution of exposure according to women's characteristics and the incidence of spontaneous abortion during their latest pregnancy in samples with and without women with a recorded BMI.

	Missing Maternal BMI				Maternal BMI Available			
Variable	Woman-Months	Failures	%	Incidence Rate[a]	Woman-Months	Failures	%	Incidence Rate[a]
BDP								
Not currently breastfeeding	29833	718	82.8	24.1	89092	2137	73.0	24.0
Currently breastfeeding	6068	179	16.8	29.5	32584	1307	26.7	40.1
Uncertain	132	1	0.4	7.6	441	11	0.4	24.9
Residence								
Urban	12248	408	34.0	33.3	36282	1503	29.7	41.4
Rural	23786	490	66.0	20.6	85836	1952	70.3	22.7
History of pregnancy loss								
No	34649	674	96.2	19.5	118621	2733	97.1	23.0
Yes	1384	224	3.8	161.8	3496	722	2.9	206.5
Mother's age at pregnancy								
15-19	2705	66	7.5	24.4	9284	192	7.6	20.7
20-24	10468	234	29.0	22.4	42355	1053	34.7	24.9
25-29	10719	210	29.7	19.6	37928	1104	31.1	29.1
30-34	7154	192	19.9	26.8	19515	608	16.0	31.2
35-39	3748	119	10.4	31.8	9650	334	7.9	34.6
40+	1241	77	3.4	62.1	3386	164	2.8	48.4
Interpregnancy Interval								
0.0-0.4	1073	34	3.0	31.7	2904	141	2.4	48.6
0.5-0.9	3510	100	9.7	28.5	11222	393	9.2	35.0
1.0-1.4	6024	125	16.7	20.8	21339	542	17.5	25.4
1.5-1.9	6956	164	19.3	23.6	24698	572	20.2	23.2
2.0-2.4	5553	132	15.4	23.8	20367	505	16.7	24.8

2.5-2.9	4224	101	11.7	23.9	14513	385	11.9	26.5
3.0-3.4	3424	88	9.5	25.7	11057	334	9.1	30.2
3.5-3.9	2564	74	7.1	28.9	7863	245	6.4	31.2
4.0-4.4	2157	64	6.0	29.7	6370	258	5.2	40.5
4.5-4.9	550	16	1.5	29.1	1786	80	1.5	44.8
Education								
None	8980	160	24.9	17.8	42307	817	34.6	19.3
Primary	14560	336	40.4	23.1	36674	864	30.0	23.6
Secondary	10070	297	27.9	29.5	36234	1467	29.7	40.5
Tertiary	2424	105	6.7	43.3	6902	307	5.7	44.5
Children ever born								
1	10612	221	29.4	20.8	42411	1056	34.7	24.9
2	7783	230	21.6	29.6	28560	942	23.4	33.0
3	5375	140	14.9	26.0	17334	572	14.2	33.0
4	3954	81	11.0	20.5	11720	315	9.6	26.9
5	2800	70	7.8	25.0	7903	201	6.5	25.4
6	1870	35	5.2	18.7	5582	125	4.6	22.4
7	1596	51	4.4	32.0	3492	95	2.9	27.2
8+	2045	70	5.7	34.2	5117	149	4.2	29.1
Year of Pregnancy								
1989	29	2	0.1	69.0				
1990	2345	56	6.5	23.9				
1991	1647	39	4.6	23.7	2113	38	1.7	18.0
1992	1114	15	3.1	13.5	2461	43	2.0	17.5
1993	1645	34	4.6	20.7	796	50	0.7	62.8
1994	1811	23	5.0	12.7	593	11	0.5	18.5
1995	323	5	0.9	15.5	3926	66	3.2	16.8
1996	127	0	0.4	0.0	3051	68	2.5	22.3

1997	2958	72	8.2	24.3	2830	64	2.3	22.6
1998	355	14	1.0	39.4	1762	52	1.4	29.5
1999	469	19	1.3	40.5	3169	62	2.6	19.6
2000	881	23	2.4	26.1	8582	216	7.0	25.2
2001	57	3	0.2	52.6	2686	59	2.2	22.0
2002	2622	99	7.3	37.8	1756	34	1.4	19.4
2003	1209	17	3.4	14.1	8287	185	6.8	22.3
2004	1781	32	4.9	18.0	6581	128	5.4	19.4
2005	2974	85	8.3	28.6	7844	187	6.4	23.8
2006	3306	80	9.2	24.2	10022	265	8.2	26.4
2007	3675	118	10.2	32.1	4303	114	3.5	26.5
2008	1596	34	4.4	21.3	7750	188	6.3	24.3
2009	1086	23	3.0	21.2	4357	116	3.6	26.6
2010	2180	38	6.1	17.4	3043	89	2.5	29.2
2011	518	19	1.4	36.7	1857	80	1.5	43.1
2012	3	0	0.0	0.0	590	22	0.5	37.3
2013	17	0	0.0	0.0	2135	47	1.7	22.0
2014	333	12	0.9	36.0	7883	231	6.5	29.3
2015	866	32	2.4	37.0	16321	643	13.4	39.4
2016	108	4	0.3	37.0	7420	397	6.1	53.5

[a] Per 1000 woman-months. Incidence rates may not compute exactly to failures divided by woman-months at-risk due to rounding to the nearest woman-month.

Table A6. Distribution of exposure according to women's characteristics and the incidence of spontaneous abortion according to BDP status during their latest pregnancy for sample which only included women with a recorded BMI.

	Not Currently Breastfeeding				Currently Breastfeeding				Uncertain			
Variable	Woman-Months	Failures	%	Rate[a]	Woman-Months	Failures	%	Rate[a]	Woman-Months	Failures	%	Rate[a]
Residence												
Urban	29423	1074	33.0	36.5	6783	425	20.8	62.7	75	4	17.0	53.3
Rural	59669	1063	67.0	17.8	25800	882	79.2	34.2	366	7	83.0	19.1
History of pregnancy loss												
No	86404	1619	97.0	18.7	31794	1106	97.6	34.8	423	8	95.9	18.9
Yes	2688	518	3.0	192.7	790	201	2.4	254.4	18	3	4.1	166.7
Mother's age at pregnancy												
15-19	6070	103	6.8	17.0	3196	89	9.8	27.8	18	0	4.1	0.0
20-24	28874	565	32.4	19.6	13341	482	40.9	36.1	140	6	31.7	42.9
25-29	28283	700	31.7	24.8	9494	403	29.1	42.4	151	1	34.2	6.6
30-34	15258	397	17.1	26.0	4171	210	12.8	50.4	86	1	19.5	11.6
35-39	7792	243	8.7	31.2	1823	89	5.6	48.8	35	2	7.9	57.1
40-49	2816	129	3.2	45.8	559	34	1.7	60.8	11	1	2.5	90.9
Interpregnancy Interval												
0.0-0.4	1072	44	1.2	41.0	1823	95	5.6	52.1	9	2	2.0	222.2
0.5-0.9	4688	114	5.3	24.3	6509	277	20.0	42.6	25	2	5.7	80.0
1.0-1.4	11065	208	12.4	18.8	10224	334	31.4	32.7	49	0	11.1	0.0
1.5-1.9	17126	296	19.2	17.3	7465	275	22.9	36.8	107	1	24.3	9.3
2.0-2.4	16955	354	19.0	20.9	3338	150	10.2	44.9	73	1	16.6	13.7
2.5-2.9	12741	298	14.3	23.4	1710	87	5.2	50.9	62	0	14.1	0.0
3.0-3.4	10187	283	11.4	27.8	823	50	2.5	60.8	48	1	10.9	20.8
3.5-3.9	7395	215	8.3	29.1	438	28	1.3	63.9	29	2	6.6	69.0
4.0-4.4	6128	247	6.9	40.3	206	9	0.6	43.7	36	2	8.2	55.6

4.5-4.9	1734	78	1.9	45.0	49	2	0.2	40.8	3	0	0.7	0.0
Education												
None	28810	458	32.3	15.9	13264	356	40.7	26.8	233	3	52.8	12.9
Primary	28108	594	31.5	21.1	8468	269	26.0	31.8	98	1	22.2	10.2
Secondary	26473	880	29.7	33.2	9667	581	29.7	60.1	94	6	21.3	63.8
Tertiary	5701	205	6.4	36.0	1185	101	3.6	85.3	16	1	3.6	62.5
Children ever born												
1	29955	615	33.6	20.5	12324	437	37.8	35.5	132	4	29.9	30.3
2	20557	562	23.1	27.3	7918	376	24.3	47.5	85	4	19.3	47.1
3	12693	360	14.2	28.4	4597	212	14.1	46.1	44	0	10.0	0.0
4	8879	210	10.0	23.7	2785	105	8.5	37.7	56	0	12.7	0.0
5	6113	126	6.9	20.6	1728	74	5.3	42.8	61	1	13.8	16.4
6	4404	84	4.9	19.1	1143	41	3.5	35.9	35	0	7.9	0.0
7	2685	68	3.0	25.3	789	26	2.4	32.9	18	1	4.1	55.6
8+	3808	112	4.3	29.4	1299	36	4.0	27.7	10	1	2.3	100.0
Mother's BMI (% of WHO ref. Median)												
70-89	3779	55	4.2	14.6	2343	66	7.2	28.2	19	1	4.3	52.6
90-99	11649	205	13.1	17.6	6317	196	19.4	31.0	99	2	22.4	20.2
100-109	18723	350	21.0	18.7	8471	292	26.0	34.5	128	1	29.0	7.8
110-119	18694	383	21.0	20.5	6742	266	20.7	39.5	82	4	18.6	48.8
120-129	13610	320	15.3	23.5	3998	194	12.3	48.5	55	1	12.5	18.2
130-139	8906	240	10.0	26.9	2231	114	6.8	51.1	20	1	4.5	50.0
140-149	5681	190	6.4	33.4	1135	74	3.5	65.2	16	0	3.6	0.0
150-159	3374	144	3.8	42.7	587	45	1.8	76.7	4	1	0.9	250.0
160-169	2051	91	2.3	44.4	395	25	1.2	63.4	10	0	2.3	0.0
170-179	1139	63	1.3	55.3	166	11	0.5	66.2	5	0	1.1	0.0
≥180	1487	96	1.7	64.5	200	24	0.6	120.2	3	0	0.7	0.0

Year of Pregnancy												
1991	1886	36	2.1	19.1	227	2	0.7	8.8				
1992	1812	28	2.0	15.5	649	15	2.0	23.1				
1993	665	38	0.7	57.1	131	12	0.4	91.7				
1994	542	8	0.6	14.8	51	3	0.2	58.7				
1995	2703	46	3.0	17.0	1223	20	3.8	16.3				
1996	2344	50	2.6	21.3	707	18	2.2	25.5				
1997	2360	48	2.6	20.3	463	15	1.4	32.4	7	1	1.6	142.9
1998	1424	41	1.6	28.8	332	11	1.0	33.2	6	0	1.4	0.0
1999	2465	43	2.8	17.4	694	19	2.1	27.4	10	0	2.3	0.0
2000	6445	172	7.2	26.7	2094	43	6.4	20.5	43	1	9.8	23.3
2001	2200	47	2.5	21.4	476	12	1.5	25.2	9	0	2.0	0.0
2002	1445	32	1.6	22.1	311	2	1.0	6.4				
2003	6877	137	7.7	19.9	1325	48	4.1	36.2	85	0	19.3	0.0
2004	5424	104	6.1	19.2	1146	24	3.5	20.9	11	0	2.5	0.0
2005	5407	113	6.1	20.9	2397	74	7.4	30.9	40	0	9.1	0.0
2006	7416	165	8.3	22.3	2535	97	7.8	38.3	71	3	16.1	42.3
2007	3490	81	3.9	23.2	791	32	2.4	40.4	22	1	5.0	45.5
2008	6619	160	7.4	24.2	1098	26	3.4	23.7	33	2	7.5	60.6
2009	3764	96	4.2	25.5	575	19	1.8	33.0	18	1	4.1	55.6
2010	2566	79	2.9	30.8	473	10	1.5	21.2	4	0	0.9	0.0
2011	1411	58	1.6	41.1	444	21	1.4	47.3	2	1	0.5	500.0
2012	530	19	0.6	35.9	60	3	0.2	50.0	12	0	2.7	0.0
2013	1915	40	2.1	20.9	207	7	0.6	33.8				
2014	4567	98	5.1	21.5	3293	133	10.1	40.4	23	0	5.2	0.0
2015	8647	244	9.7	28.2	7638	398	23.4	52.1	36	1	8.2	27.8
2016	4170	154	4.7	36.9	3241	243	9.9	75.0	9	0	2.0	0.0

[a] Per 1000 woman-months. Incidence rates may not compute exactly to failures divided by woman-months at-risk due to rounding to the nearest woman-month.

APPENDIX B: Sensitivity Analyses

Table B1. Association between BDP and childhood stunting and wasting for children with complete data on all covariates, but including those with missing information on birth weight.

I. Stunting

			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*67 350*	*43.1*				
Did not BDP	42 451	41.6	1.00		1.00	
BDP	24 685	45.5	1.17	(1.13-1.21)	1.05	(1.01-1.09)
Uncertain	214	48.1	1.30	(0.99-1.70)	1.15	(0.86-1.53)

II. Wasting

			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*67 201*	*10.6*				
Did not BDP	42 340	8.6	1.00		1.00	
BDP	24 647	14.2	1.76	(1.67-1.85)	1.11	(1.04-1.17)
Uncertain	214	5.1	0.58	(0.32-1.06)	0.47	(0.25-0.86)

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a percentage of WHO reference median).

Table B2. Association between duration of BDP and childhood stunting and wasting for children with complete data on all covariates, but including those with missing information on birth weight.

I. Stunting

			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*67 136*	*43.0*						
Did not BDP	42 451	41.6	1.00			1.00		
<3	12 983	41.4	0.99	(0.95-1.03)		1.01	(0.96-1.06)	
3-6	8776	49.1	1.35	(1.29-1.42)		1.08	(1.02-1.14)	
≥6	2926	52.9	1.57	(1.46-1.70)		1.17	(1.08-1.28)	
Test for Linear Trend					0.000			0.000

II. Wasting

			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*66 987*	*10.6*						
Did not BDP	42 340	8.6	1.00			1.00		
<3	12 954	11.7	1.41	(1.32-1.50)		1.03	(0.95-1.11)	
3-6	8767	16.3	2.08	(1.95-2.23)		1.17	(1.08-1.26)	
≥6	2926	18.6	2.44	(2.21-2.70)		1.18	(1.05-1.30)	
Test for Linear Trend					0.000			0.001

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a percentage of WHO reference median).

Table B3. Association between BDP and the risk of spontaneous abortion for all women, including those that did not have a recorded BMI.

				Model 1		Model 2[a]	
Exposure	Women	Woman-Months	Incidence Rate[b]	HR	95% CI	aHR	95% CI
Total	*47 673*	*158 150*	*27.5*				
Not Currently Breastfeeding	37 085	118 925	24.0	1.00		1.00	
Currently Breastfeeding	14 963	38 652	38.5	1.64	(1.54-1.75)	1.82	(1.68-1.97)
Uncertain	163	573	20.9	0.90	(0.51-1.58)	0.95	(0.54-1.68)

[a] Associations adjusted for the wave of the DHS survey (country-year), rural-urban residence, woman's age at pregnancy, duration of most recent interpregnancy interval, educational level, calendar year of pregnancy, number of children ever born, and history of previous miscarriage.

[b] Per 1000 woman-months. Incidence rates may not compute exactly to failures divided by woman-months at-risk due to rounding to the nearest woman-month.

Table B4. Association between BDP and childhood stunting and wasting for final sample with complete birth weight information, excluding children whose breastfeeding duration was a multiple of six months.

I. Stunting

			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*20 972*	*34.8*				
Did not BDP	12 209	31.7	1.00		1.00	
BDP	8687	39.2	1.39	(1.31-1.48)	1.09	(1.01-1.17)
Uncertain	76	43.4	1.66	(1.05-2.61)	1.69	(1.03-2.78)

II. Wasting

			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*20 779*	*10.9*				
Did not BDP	12 065	7.5	1.00		1.00	
BDP	8639	15.6	2.28	(1.05-1.30)	1.17	(1.05-1.31)
Uncertain	75	5.3	0.69	(0.16-1.22)	0.45	(0.16-1.27)

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a percentage of WHO reference median).

Table B5. Association between duration of BDP and childhood stunting and wasting for final sample with complete birth weight information, excluding children whose breastfeeding duration was a multiple of six months.

I. Stunting

			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*20 896*	*34.8*						
Did not BDP	12 209	31.7	1.00			1.00		
<3	4495	34.6	1.14	(1.06-1.23)		1.03	(0.95-1.13)	
3-6	3113	43.2	1.64	(1.51-1.78)		1.13	(1.02-1.24)	
≥6	1079	47.0	1.91	(1.69-2.17)		1.20	(1.04-1.39)	
Test for Linear Trend					0.000			0.005

II. Wasting

			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*20 704*	*10.9*						
Did not BDP	12 065	7.5	1.00			1.00		
<3	4461	12.1	1.70	(1.52-1.90)		1.06	(0.93-1.20)	
3-6	3101	19.3	2.93	(2.62-3.28)		1.31	(1.15-1.49)	
≥6	1077	19.9	3.05	(2.59-3.59)		1.17	(0.97-1.40)	
Test for Linear Trend					0.000			0.019

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a percentage of WHO reference median).

Table B6. Association between BDP and the risk of spontaneous abortion for final sample with complete BMI information, excluding women whose reported breastfeeding duration was a multiple of six months.

				Model 1		Model 2[a]	
Exposure	Women	Woman-Months	Incidence Rate[b]	HR	95% CI	aHR	95% CI
Total	*22 281*	*72 743*	*30.3*				
Not Currently Breastfeeding	14 668	46 379	24.3	1.00		1.00	
Currently Breastfeeding	9621	25 922	41.3	1.71	(1.57-1.86)	1.80	(1.62-2.00)
Uncertain	125	441	24.9	1.06	(0.58-1.92)	1.13	(0.62-2.08)

[a] Associations adjusted for the wave of the DHS survey (country-year), rural-urban residence, woman's age at pregnancy, duration of most recent interpregnancy interval, educational level, calendar year of pregnancy, number of children ever born, and history of previous miscarriage.

[b] Per 1000 woman-months. Incidence rates may not compute exactly to failures divided by woman-months at-risk due to rounding to the nearest woman-month.

Table B7. Association between BDP and childhood stunting and wasting from the sample excluding India 2015-2016 survey and from only the India 2015-2016 survey.

	Excluding India 2015-2016					
I. Stunting						
			Model 1		Model 2[a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	21 161	31.6				
Did not BDP	15 901	31.1	1.00		1.00	
BDP	5212	33.1	1.10	(1.02-1.17)	0.98	(0.90-1.07)
Uncertain	48	41.7	1.58	(0.89-2.81)	1.57	(0.83-3.00)
II. Wasting						
			Model 1		Model 2 [a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	20 964	4.7				
Did not BDP	15 746	4.2	1.00		1.00	
BDP	5170	6.0	1.46	(1.27-1.67)	0.99	(0.83-1.18)
Uncertain	48	2.1	0.48	(0.07-3.50)	0.23	(0.03-1.76)
	Only India 2015-2016[b]					
I. Stunting						
			Model 1		Model 2 [a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*14 355*	*40.6*				
Did not BDP	6972	38.8	1.00		1.00	
BDP	7355	42.2	1.15	(1.08-1.23)	1.14	(1.05-1.23)
Uncertain	28	46.4	1.36	(0.65-2.88)	1.70	(0.80-1.90)
II. Wasting						
			Model 1		Model 2 [a]	
	N	Prevalence	OR	95% CI	aOR	95% CI
Total	*14 355*	*19.2*				
Did not BDP	6972	17.3	1.00		1.00	
BDP	7355	21.0	1.27	(1.17-1.39)	1.21	(1.09-1.33)
Uncertain	28	10.7	0.57	(0.17-1.90)	0.62	(0.18-2.08)

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview, birth weight) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a % of WHO reference median).

[b] The 2015-2016 DHS from India was very large (nearly 700,000 women) and was disproportionately represented among the surveys included in the final analysis sample.

Table B8. Association between duration of BDP and childhood stunting and wasting for sample excluding India 2015-2016 survey and from only the India 2015-2016 survey.

	Excluding India 2015-2016							
I. Stunting			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	21113	31.6						
Did not BDP	15901	31.1	1.00			1.00		
<3	3409	30.2	0.96	(0.89-1.04)		0.98	(0.88-1.08)	
3-6	1461	37.6	1.34	(1.20-1.49)		0.97	(0.85-1.11)	
≥6	342	42.1	1.61	(1.30-2.00)		1.10	(0.86-1.41)	
Test for Trend					0.000			0.474
II. Wasting			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	20913	4.7						
Did not BDP	15744	4.2	1.00			1.00		
<3	3376	4.8	1.15	(0.97-1.37)		0.92	(0.75-1.12)	
3-6	1451	7.7	1.90	(1.54-2.34)		1.05	(0.82-1.34)	
≥6	342	10.8	2.75	(1.94-3.90)		1.38	(0.94-2.04)	
Test for Trend					0.000			0.071
	Only India 2015-2016[b]							
I. Stunting			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*14327*	*40.5*						

Did not BDP	6972	38.8	1.00			1.00		
<3	3518	38.7	0.99	(0.92-1.08)		1.07	(0.97-1.18)	
3-6	2762	44.6	1.27	(1.16-1.39)		1.16	(1.05-1.28)	
≥6	1075	47.5	1.43	(1.26-1.63)		1.26	(1.09-1.45)	
Test for Trend					0.000			0.001

II. Wasting

			Model 1			Model 2[a]		
	N	Prevalence	OR	95% CI	p-value	aOR	95% CI	p-value
Total	*14327*	*19.2*						
Did not BDP	6972	17.3	1.00			1.00		
<3	3518	18.5	1.09	(0.98-1.21)		1.11	(0.99-1.26)	
3-6	2762	23.6	1.47	(1.32-1.64)		1.32	(1.17-1.48)	
≥6	1075	22.7	1.40	(1.20-1.64)		1.18	(1.00-1.40)	
Test for Trend					0.000			0.011

[a] Associations adjusted for the wave of the DHS survey (country-year), individual-specific characteristics of the index child (birth year, rural-urban residence, birth order, age of mother at birth, duration of subsequent interpregnancy interval, sex, age at the time of interview, birth weight) and maternal characteristics (educational level, marital status at the time of interview, history of previous miscarriage, BMI as a % of WHO reference median).

[b] The 2015-2016 DHS from India was very large (nearly 700,000 women) and was disproportionately represented among the surveys included in the final analysis sample.

Table B9. Association between BDP and spontaneous abortion in the sample with information on maternal BMI for all survey waves excluding India 2015-2016 and then only for India 2015-2016.

	Excluding India 2015-2016						
				Model 1		Model 2[a]	
Exposure	Women	Woman-Months	Incidence Rate[b]	HR	95% CI	aHR	95% CI
Overall	27 584	92 162	24.0				
Not Currently Breastfeeding	22 989	73 071	22.7	1.00		1.00	
Currently Breastfeeding	7537	18 715	28.9	1.36	(1.23-1.49)	1.68	(1.49-1.90)
Uncertain	106	375	26.7	1.21	(0.65-2.25)	1.37	(0.73-2.57)
	Only India 2015-2016						
				Model 1		Model 2[a]	
Exposure	Women	Woman-Months	Incidence Rate[b]	HR	95% CI	aHR	95% CI
Overall	9403	29 955	41.5				
Not Currently Breastfeeding	4897	16 021	29.7	1.00		1.00	
Currently Breastfeeding	4925	13 868	55.2	1.75	(1.66-1.97)	2.07	(1.81-2.36)
Uncertain	19	66	15.2	0.51	(0.07-3.66)	0.43	(0.06-3.04)

[a] Associations adjusted for the wave of the DHS survey (country-year), rural-urban residence, woman's age at pregnancy, duration of most recent interpregnancy interval, educational level, calendar year of pregnancy, maternal BMI (as a % of WHO reference median), number of children ever born, and history of previous miscarriage.

[b] Per 1000 woman-months at-risk

APPENDIX C: Description of Variables Used in Final Models

The estimates of the association of BDP and childhood malnutrition (CM) included controls for rural-urban residence, maternal age at birth, the length of the subsequent interpregnancy interval, sex, age at measurement, birth weight, birth order, maternal education, maternal marital status at the time of interview, maternal history of pregnancy loss, and the birth year of the child, as well as the specific survey wave (country-year).

The estimates of the association between BDP and spontaneous abortion (SA) were adjusted for rural-urban residence, history of pregnancy loss, mother's age at pregnancy, length of the preceding interpregnancy interval, highest level of completed education, BMI, and year of pregnancy, as well as the specific survey wave (country-year).

The model in which the variable was included is indicated in parentheses.

Residence (CM, SA): Measured categorically as "Rural" or "Urban". Residential differences in stunting and wasting have been well-documented [30, 31]. Furthermore, some evidence suggests that the duration of breastfeeding tends to be longer in rural areas than urban areas [32-34]. This variable was included to capture regional differences in height and weight that may also confound the relationship between BDP and childhood malnutrition.

Maternal Age at Birth (CM): Measured categorically as 15-19, 20-24. 25-29. 30-34, 35-39, 40+. An association between older mothers and childhood malnutrition has been found in several low-income populations [35, 36]. Older mothers are also more likely to breastfeed than younger mothers [37]. Maternal age is therefore an important confounder because older mothers may be more likely to BDP and also have malnourished children.

Maternal Age at Pregnancy (SA): Measured categorically as 15-19, 20-24. 25-29. 30-34, 35-39, 40+. There is ample evidence that women who become pregnant at older ages have higher risks of spontaneous abortion [38-42]. Because of the correlation between maternal age and breastfeeding patterns, this is therefore an important confounder in modelling the association between BDP and spontaneous abortions.

Interpregnancy Interval (IPI) (CM, SA): Measured categorically in six-month increments ranging 0.0-0.4 up until 4.5-4.9, which is the maximum IPI that can be observed using the retrospective reports. Short IPIs are known to be associated with various poor health outcomes for women and children [43-45]. A short IPI is also more likely to result in BDP as index children will be younger and more likely to still be dependent on their mother's milk.

Sex of child (CM): Sex of the child was included to control for known differences in childhood malnutrition in low- and middle-income countries [46].

Age of Child (CM): Measured categorically in years ranging from exact ages 0 to 4. This confounder was included to account for differences across populations in growth faltering and catch-up growth, which may occur at different ages during childhood [47].

Birth weight (CM): Measured categorically in kilograms in 500g increments, ranging from <2 to 4.5-4.9. The Demographic and Health Surveys report birth weight to the nearest 0.1 kg. Birth weight information generally is taken from a child's birth certificate. If this is not available, the mother is asked to recall the child's weight at birth. Birth weight is included to account for the disadvantageous position low birth weight children begin with that may influence their probability of being stunted or wasted during childhood [48]. In addition, low birth weight may serve as an indicator to a mother that her child should continue breastfeeding.

Birth order/Children Ever Born (CM, SA): Measured categorically as ranging from 1-8+. Birth order is included to control for the cumulative resource demands on mother and child that occur as families grow larger. Previous research on low- and middle-income countries has found that higher birth order is associated with a higher prevalence of stunting [49, 50]. There is also evidence that higher parity is associated with an increased risk of spontaneous abortion [38]. In addition, because of the contraceptive effects of breastfeeding, it may be less likely breastfeeding and high parity are correlated, which can confound the associations between BDP and childhood malnutrition or spontaneous abortion.

Maternal Education (CM, SA): Measured categorically as "None", "Primary", "Secondary", and "Tertiary". The variable captures the highest level of completed education by the mother. It is meant to capture differences in both material circumstances and knowledge about infant feeding and care that may influence the probabilities of BDP and malnutrition. An inverse association between spontaneous abortion and maternal education has also been documented [51]. It is not clear if this association is due to differences in awareness of pregnancy or incidence, but it remains an important control regardless.

Marital Status at Interview (CM): Measured categorically as "Never married", "Married", "Cohabiting", "Widowed", "Divorced", and "Separated". Marital status was included as a cofounder that may influence resource availability in the household. Such resources may be material (e.g. multiple sources of income) or in terms of everyday support for a child's wellbeing and care. Unmarried pregnant women have also been shown to have higher risks of miscarriage than married women [52].

Maternal BMI (CM, SA): Measured as a % of the WHO reference median. Measured categorically as 70-89% until 180+% in intervals of 10%. Maternal BMI is included in the models of childhood malnutrition to account for correlations between maternal nutritional status and that of her child. This is meant to capture household material circumstances that may influence both the risk of BDP and stunting or wasting. There is also evidence that both low and high maternal BMI are associated with the risk of spontaneous abortion [53-56]. Furthermore, women with low BMI may be disproportionately influenced by the to the caloric demands of BDP.

History of Pregnancy Loss (CM, SA): Measured as a binary variable indicating whether or not a woman had lost a previous pregnancy. This variable was included as a proxy for a woman's general health during pregnancy. Furthermore, there is evidence that history of a previous pregnancy loss is strongly associated with the risk of subsequent losses [38, 57, 58]. Previous pregnancy loss may be a predictor of BDP as well if it was practiced during a previous

pregnancy (in which case it would reduce BDP) or if a mother wanted to overcompensate in her care of her most recently born child to ensure his survival.

Child's Birth Year (CM): Measured continuously and operationalized as a quadratic function to capture yearly trends in childhood malnutrition over time [59].

Year of Pregnancy (SA): Measured continuously and operationalized as a quadratic function to capture yearly trends in spontaneous abortion over time.

APPENDIX D: Full Output from Main Models controlling for survey (country-year) fixed effects.

Table D1. Full output from adjusted model of the association between BDP and stunting.

Variable	OR	95% CI	Variable	OR	95% CI
BDP			Birth Order		
No	1.00		1	1.00	
Yes	1.06	(1.00-1.13)	2	1.37	(1.28-1.46)
Uncertain	1.65	(1.01-2.72)	3	1.76	(1.62-1.91)
Residence			4	1.87	(1.68-2.08)
Urban	1.00		5	2.18	(1.90-2.49)
Rural	1.30	(1.23-1.37)	6	2.36	(2.00-2.78)
Mother's age			7	2.62	(2.14-3.22)
15-19	1.78	(1.59-2.00)	8+	3.63	(2.99-4.42)
20-24	1.34	(1.22-1.48)	Education		
25-29	1.17	(1.06-1.28)	None	1.00	
30-34	1.00		Primary	0.79	(0.74-0.85)
35-39	0.84	(0.73-0.98)	Secondary	0.53	(0.50-0.57)
40-49	0.75	(0.56-0.99)	Tertiary	0.37	(0.33-0.41)
Interpregnancy Interval			Current Marital Status		
0.0-0.4	1.00		Never married	1.13	(0.88-1.46)
0.5-0.9	1.15	(0.99-1.34)	Married	1.00	
1.0-1.4	1.48	(1.27-1.73)	Cohabiting	1.11	(1.01-1.23)
1.5-1.9	1.57	(1.34-1.83)	Widowed	1.10	(0.71-1.71)
2.0-2.4	1.49	(1.26-1.75)	Divorced	0.81	(0.52-1.26)
2.5-2.9	1.58	(1.33-1.88)	Separated	1.26	(1.05-1.51)
3.0-3.4	1.49	(1.24-1.79)	Mother's BMI		
3.5-3.9	1.47	(1.20-1.80)	70-89	0.89	(0.79-1.00)
4.0-4.4	1.64	(1.32-2.05)	90-99	1.04	(0.96-1.13)
4.5-4.9	1.72	(1.25-2.35)	100-109	1.00	
Sex of Child			110-119	1.03	(0.96-1.11)
Male	1.00		120-129	0.91	(0.84-0.99)
Female	0.77	(0.74-0.81)	130-139	0.86	(0.79-0.95)
Age of Child			140-149	0.78	(0.70-0.87)
0	1.00		150-159	0.75	(0.65-0.86)
1	1.83	(1.56-2.15)	160-169	0.74	(0.63-0.88)
2	1.69	(1.42-2.02)	170-179	0.79	(0.63-0.98)
3	1.36	(1.11-1.66)	180+	0.91	(0.75-1.10)
4	1.14	(0.90-1.44)	History of pregnancy loss		
Birth weight			No	1.00	
<2	2.07	(1.81-2.37)	Yes	0.88	(0.83-0.93)
2.0-2.4	1.59	(1.46-1.73)	Child's Birth Year	1.07	(0.99-1.15)
2.5-2.9	1.32	(1.25-1.41)	Child's Birth Year2	1.00	(1.00-1.00)
3.0-3.4	1.00		Constant	0.08	(0.02-0.25)
3.5-3.9	0.78	(0.72-0.83)			

4.0-4.4	0.74	(0.66-0.83)
4.5-4.9	0.68	(0.57-0.81)

Table D2. Full output from adjusted model of the association between BDP and wasting.

Variable	OR	95% CI	Variable	OR	95% CI
BDP			Birth Order		
No	1.00		1	1.00	
Yes	1.16	(1.06-1.26)	2	1.00	(0.91-1.10)
Uncertain	0.46	(0.16-1.28)	3	1.02	(0.89-1.16)
Residence			4	1.30	(1.10-1.54)
Urban	1.00		5	1.17	(0.93-1.48)
Rural	0.96	(0.88-1.04)	6	1.04	(0.77-1.41)
Mother's age			7	1.02	(0.67-1.56)
15-19	1.06	(0.88-1.26)	8+	1.51	(1.04-2.18)
20-24	1.03	(0.88-1.21)	Education		
25-29	0.94	(0.80-1.10)	None	1.00	
30-34	1.00		Primary	0.84	(0.75-0.95)
35-39	0.90	(0.69-1.19)	Secondary	0.75	(0.68-0.83)
40-49	0.66	(0.37-1.20)	Tertiary	0.65	(0.55-0.76)
Interpregnancy Interval			Current Marital Status		
0.0-0.4	1.00		Never married	1.13	(0.62-2.07)
0.5-0.9	1.00	(0.82-1.21)	Married	1.00	
1.0-1.4	0.96	(0.78-1.18)	Cohabiting	1.13	(0.87-1.45)
1.5-1.9	1.10	(0.89-1.36)	Widowed	1.26	(0.60-2.63)
2.0-2.4	1.14	(0.90-1.43)	Divorced	0.47	(0.15-1.51)
2.5-2.9	1.09	(0.85-1.40)	Separated	1.25	(0.82-1.91)
3.0-3.4	1.06	(0.82-1.38)	Mother's BMI		
3.5-3.9	1.09	(0.82-1.45)	70-89	1.72	(1.49-1.97)
4.0-4.4	1.22	(0.89-1.68)	90-99	1.22	(1.10-1.36)
4.5-4.9	0.89	(0.54-1.47)	100-109	1.00	
Sex of Child			110-119	0.84	(0.75-0.94)
Male	1.00		120-129	0.78	(0.68-0.88)
Female	0.84	(0.78-0.90)	130-139	0.74	(0.63-0.86)
Age of Child			140-149	0.52	(0.42-0.64)
0	1.00		150-159	0.48	(0.36-0.63)
1	0.74	(0.61-0.90)	160-169	0.54	(0.38-0.75)
2	0.66	(0.52-0.82)	170-179	0.43	(0.26-0.72)
3	0.72	(0.56-0.95)	180+	0.33	(0.20-0.55)
4	0.81	(0.60-1.11)	History of pregnancy loss		
Birth weight			No	1.00	
<2	1.78	(1.50-2.11)	Yes	0.85	(0.78-0.92)
2.0-2.4	1.54	(1.37-1.73)	Child's Birth Year	1.04	(0.91-1.19)
2.5-2.9	1.34	(1.23-1.47)	Child's Birth Year2	1.00	(1.00-1.00)
3.0-3.4	1.00		Constant	0.07	(0.01-0.47)
3.5-3.9	0.79	(0.70-0.89)			
4.0-4.4	0.77	(0.62-0.96)			
4.5-4.9	0.72	(0.51-1.02)			

Table D3. Full output from adjusted model of the association between duration of BDP and stunting.

Variable	OR	95% CI	Variable	OR	95% CI
BDP			Birth Order		
No	1.00		1	1.00	
<3	1.02	(0.96-1.10)	2	1.37	(1.29-1.46)
3--6	1.09	(1.00-1.18)	3	1.76	(1.62-1.91)
6+	1.19	(1.06-1.35)	4	1.87	(1.69-2.08)
Residence			5	2.18	(1.90-2.49)
Urban	1.00		6	2.36	(2.00-2.77)
Rural	1.30	(1.23-1.37)	7	2.61	(2.13-3.21)
Mother's age			8+	3.63	(2.98-4.41)
15-19	1.78	(1.59-2.00)	Education		
20-24	1.34	(1.22-1.48)	None	1.00	
25-29	1.17	(1.06-1.28)	Primary	0.80	(0.74-0.86)
30-34	1.00		Secondary	0.54	(0.50-0.58)
35-39	0.85	(0.73-0.98)	Tertiary	0.37	(0.33-0.41)
40-49	0.75	(0.56-0.99)	Current Marital Status		
Interpregnancy interval			Never married	1.13	(0.87-1.45)
0.0-0.4	1.00		Married	1.00	
0.5-0.9	1.15	(0.99-1.34)	Cohabiting	1.11	(1.01-1.22)
1.0-1.4	1.49	(1.28-1.73)	Widowed	1.10	(0.71-1.71)
1.5-1.9	1.57	(1.35-1.84)	Divorced	0.81	(0.52-1.26)
2.0-2.4	1.49	(1.27-1.76)	Separated	1.25	(1.04-1.51)
2.5-2.9	1.58	(1.33-1.88)	Mother's BMI (% of WHO ref. Median)		
3.0-3.4	1.48	(1.23-1.78)	70-89	0.89	(0.79-1.00)
3.5-3.9	1.46	(1.19-1.78)	90-99	1.04	(0.95-1.12)
4.0-4.4	1.64	(1.31-2.04)	100-109	1.00	
4.5-4.9	1.71	(1.25-2.34)	110-119	1.03	(0.95-1.11)
Sex of Child			120-129	0.91	(0.84-0.99)
Male	1.00		130-139	0.86	(0.79-0.95)
Female	0.77	(0.74-0.81)	140-149	0.78	(0.70-0.88)
Age of Child			150-159	0.74	(0.65-0.86)
0	1.00		160-169	0.75	(0.63-0.88)
1	1.82	(1.55-2.13)	170-179	0.79	(0.63-0.98)
2	1.68	(1.4-2.00)	180+	0.91	(0.75-1.10)
3	1.35	(1.10-1.65)	History of pregnancy loss		
4	1.13	(0.90-1.44)	No	1.00	
Birth weight			Yes	0.89	(0.84-0.94)
<2	2.07	(1.81-2.37)	Child's Birth Year	1.07	(0.99-1.15)
2.0-2.4	1.59	(1.46-1.73)	Child's Birth Year2	1.00	(1.00-1.00)
2.5-2.9	1.32	(1.25-1.41)	Constant	0.08	(0.02-0.24)
3.0-3.4	1.00				
3.5-3.9	0.78	(0.72-0.83)			

4.0-4.4	0.74	(0.66-0.83)
4.5-4.9	0.68	(0.57-0.81)

Table D4. Full output from adjusted model of the association between duration of BDP and wasting.

Variable	OR	95% CI	Variable	OR	95% CI
BDP			Birth Order		
No	1.00		1	1.00	
<3	1.06	(0.95-1.17)	2	1.00	(0.91-1.10)
3--6	1.26	(1.14-1.41)	3	1.02	(0.89-1.16)
6+	1.21	(1.04-1.41)	4	1.31	(1.10-1.54)
Residence			5	1.18	(0.93-1.49)
Urban	1.00		6	1.04	(0.77-1.41)
Rural	0.95	(0.87-1.03)	7	1.02	(0.67-1.56)
Mother's age			8+	1.50	(1.04-2.17)
15-19	1.06	(0.88-1.27)	Education		
20-24	1.04	(0.89-1.22)	None	1.00	
25-29	0.94	(0.81-1.10)	Primary	0.85	(0.76-0.95)
30-34	1.00		Secondary	0.76	(0.69-0.84)
35-39	0.90	(0.69-1.19)	Tertiary	0.66	(0.56-0.77)
40-49	0.67	(0.37-1.21)	Current Marital Status		
Interpregnancy interval			Never married	1.13	(0.62-2.07)
0.0-0.4	1.00		Married	1.00	
0.5-0.9	1.00	(0.82-1.21)	Cohabiting	1.13	(1.01-1.22)
1.0-1.4	0.96	(0.78-1.18)	Widowed	1.25	(0.71-1.71)
1.5-1.9	1.10	(0.89-1.37)	Divorced	0.47	(0.52-1.26)
2.0-2.4	1.13	(0.90-1.43)	Separated	1.25	(1.04-1.51)
2.5-2.9	1.08	(0.84-1.38)	Mother's BMI (% of WHO ref. Median)		
3.0-3.4	1.06	(0.81-1.37)	70-89	1.72	(1.50-1.97)
3.5-3.9	1.08	(0.81-1.44)	90-99	1.23	(1.10-1.36)
4.0-4.4	1.22	(0.89-1.68)	100-109	1.00	
4.5-4.9	0.89	(0.54-1.47)	110-119	0.84	(0.76-0.94)
Sex of Child			120-129	0.78	(0.69-0.89)
Male	1.00		130-139	0.74	(0.63-0.87)
Female	0.84	(0.78-0.90)	140-149	0.52	(0.42-0.64)
Age of Child			150-159	0.48	(0.36-0.64)
0	1.00		160-169	0.54	(0.38-0.76)
1	0.74	(0.61-0.90)	170-179	0.44	(0.27-0.72)
2	0.66	(0.52-0.82)	180+	0.33	(0.20-0.56)
3	0.73	(0.56-0.95)	History of pregnancy loss		
4	0.82	(0.60-1.13)	No	1.00	
Birth weight			Yes	0.87	(0.80-0.94)
<2	1.78	(1.50-2.11)	Child's Birth Year	1.05	(0.91-1.20)
2.0-2.4	1.53	(1.36-1.72)	Child's Birth Year2	1.00	(1.00-1.00)
2.5-2.9	1.34	(1.22-1.46)	Constant	0.06	(0.01-0.43)
3.0-3.4	1.00				
3.5-3.9	0.78	(0.69-0.89)			

4.0-4.4	0.77	(0.62-0.96)
4.5-4.9	0.72	(0.51-1.02)

Table D5. Full output from adjusted model of the association between BDP and spontaneous abortion.

Variable	HR	95% CI	Variable	HR	95% CI
BDP			Education		
Not Currently Breastfeeding	1.00		None	1.00	
Currently Breastfeeding	1.86	(1.70-2.03)	Primary	1.28	(1.15-1.42)
Uncertain	1.12	(0.62-2.05)	Secondary	1.70	(1.54-1.89)
Residence			Tertiary	1.88	(1.61-2.20)
Urban	1.00		Children ever born		
Rural	0.67	(0.62-0.72)	1	1.00	
History of pregnancy loss			2	1.43	1.46
No	1.00		3	1.62	(1.45-1.82)
Yes	6.32	(5.76-6.93)	4	1.51	(1.31-1.75)
Mother's age at pregnancy			5	1.52	1.58
15-19	1.00		6	1.48	(1.19-1.83)
20-24	0.88	(0.75-1.03)	7	1.68	(1.32-2.14)
25-29	0.91	(0.77-1.07)	8+	1.46	(1.16-1.84)
30-34	0.97	(0.81-1.17)	Mother's BMI (% of WHO ref. Median)		
35-39	1.12	(0.91-1.39)	70-89	0.72	(0.59-0.88)
40+	1.89	(1.47-2.45)	90-99	0.85	(0.75-0.96)
Interpregnancy Interval			100-109	0.92	0.92
0.0-0.4	1.34	(1.11-1.62)	110-119	1.00	
0.5-0.9	1.07	(0.94-1.22)	120-129	1.14	(1.01-1.28)
1.0-1.4	0.92	(0.82-1.04)	130-139	1.10	(0.96-1.25)
1.5-1.9	1.00		140-149	1.24	(1.07-1.44)
2.0-2.4	1.09	(0.97-1.23)	150-159	1.45	(1.22-1.71)
2.5-2.9	1.11	(0.97-1.27)	160-169	1.31	(1.07-1.61)
3.0-3.4	1.14	(0.99-1.31)	170-179	1.53	(1.19-1.96)
3.5-3.9	1.19	(1.02-1.39)	180+	1.75	(1.43-2.16)
4.0-4.4	1.37	(1.17-1.60)	Year of Pregnancy	1.05	(0.92-1.20)
4.5-4.9	1.40	(1.10-1.78)	Year of Pregnancy2	1.00	(0.99-1.01)

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