

# Factors Associated with Duration of Breastfeeding in Bangladesh: Evidence from Bangladesh Demographic and Health Survey 2014

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## Research article

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# Abstract

**Background:** Breastfeeding for optimum duration is one of the most effective ways to reduce infant morbidity and mortality and confirm expected growth and development of children. The aim of this study was to find out the effect of socio-demographic and anthropometric determinants on duration of breastfeeding among Bangladeshi mothers.

**Methods:** The data was extracted from the Bangladesh Demographic and Health Survey (BDHS)-2014. A total of 3541 married non-pregnant Bangladeshi mothers in reproductive age who had at least one child aged 6-36 months were included in this study. Independent sample t-test and analysis of variance (ANOVA) were used to find the significance difference in duration of breastfeeding between two and more than two groups respectively. Multiple linear regression model was utilized to determine the effect of some quantitative variables on duration of breastfeeding.

**Results:** This study revealed that the mean and median duration of breastfeeding among Bangladeshi mothers was 18.91 (95% CI: 18.65-19.17) and 19.00 months respectively. Independent sample t-test and ANOVA showed that duration of breastfeeding among Bangladeshi mothers was significantly influenced by (i) ANC service, (ii) religion, (iii) mode of delivery, (iv) parents' education, (v) geographical location and (vi) household wealth quintile. Multiple regression analysis demonstrated that mothers' age, mothers' body mass index, total number of children and mothers' age at first birth were important predictors of duration of breastfeeding.

**Conclusions:** Healthcare providers and decision makers can consider these findings to make plan for counseling of mothers and family members to promote optimum duration of breastfeeding practice in first two years of baby's life.

## Background

Over the last decade, scientific studies have substantiated the evidence of the integral role of breastfeeding in the survival, growth and development of children, as well as good health and wellbeing of mothers. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend optimum early breastfeeding particularly within one hour after birth should be encouraged by healthcare professionals [1]. According to WHO, only breast milk can ensure a complete nutritional requirements for growth, health and development of babies in first six months [2]. Infants should be exclusively breastfed to achieve optimum growth, development and maintenance of health [2]. Furthermore, it is safe and contains antibodies that help protect infants and boost immunity. Consequently, optimum breastfeeding reduces the risk of diarrhea, respiratory or ear infections and other infectious diseases that increase infant mortality [3]. Furthermore, optimal breastfeeding is also identified as a protective factor for overweight and obesity in childhood [4]. A study clearly mentioned that sub-optimum breastfeeding can increase the risk of mortality in first two or more years of child life [5]. In addition, breastfeeding is inexpensive, easily available, and clean at the right temperature. Breastfeeding

also acts as natural family planning method and reduces the risk of developing breast and ovarian cancers [6]. Many of the health benefits of human milk are dose related, that is, the longer the baby receives human milk, the greater are the benefits. For adequate growth and maintenance of health, infants should also receive nutritionally rich and safe complementary foods along with breastfeeding from six months to two years of age [7, 8]. However, knowledge and attitude towards duration of breastfeeding among mothers are influenced by sociocultural, demographic and physiological factors such as education, income, residence, tradition, belief, and parents age [9-15].

This study was designed to work with the health related issues under the Sustainable Development Goals (SDGs). Breastfeeding practices for recommended duration are still sub-optimum in Bangladesh which would be a challenge to meet the SDGs by 2030. Subsequently, the benefits of breastfeeding would optimum when it continues for at least two years with complementary feeding [16]. To the best of our knowledge, there are a few studies on duration of breastfeeding practices in the context of Bangladesh by using BDHS-1999-2000 [17] and BDHS-2004 dataset [18]. None of these studies considered mothers' BMI as a factor associated with duration of breastfeeding although some studies showed that BMI was significantly associated with breastfeeding status [19, 20]. Household wealth quintile, women education level and medical facilities have been increasing in Bangladesh during the last decades [21], which may have effect on knowledge, attitude and practice on duration of breastfeeding [22]. Therefore, it is important to investigate the duration of breastfeeding among mothers in Bangladesh considering the latest nationally representative data. The aim of the current study was to determine the effect of socio-economic, demographic and anthropometric variables on the duration of breastfeeding among Bangladeshi mothers.

### **The study was based on the following hypotheses:**

H<sub>01</sub>: Socio-economic factors are significantly associated with duration of breastfeeding.

H<sub>02</sub>: Demographic factors have effect on the duration of breastfeeding.

H<sub>03</sub>: Duration of breastfeeding is associated with anthropometric measurements.

## **Methods**

Study design and population: Bangladesh Demographic and Health Survey (BDHS)-2014 collected socio-demographic, health, anthropometric and lifestyle information from 17,863 Bangladeshi married women aged 15 to 49 years. The data was collected from March 24, 2014 to August 11, 2014. BDHS-2014 had taken information on duration of breastfeeding among their children born in the three years preceding the survey. This was a nationally representative survey which covered all administrative regions (divisions) of Bangladesh including both urban and rural settings. All information regarding study design, study population, data collection technique, instruments, data reliability, questionnaire etc. have been described elsewhere [22]. This is the latest nationally representative data collected by BDHS. In our present study, we used BDHS-2014 data.

**Sampling:** In developing countries, the Demographic and Health Surveys (DHS) program is the main source for collecting and disseminating accurate, nationally representative data on health and population [23]. BDHS-2014 used two stage stratified random sampling for selecting sample from urban and rural areas from each administrative division. Bangladesh Bureau of Statistics (BBS) divided Bangladesh into many small areas called enumeration areas (EA) for population and housing census in 2011. BDHS-2014 considered EA as the primary sampling unit (PSU) for their survey. In the first stage, BDHS-2014 randomly selected 600 EAs ( 207 in urban and 393 in rural areas). In the second stage, they selected on average 30 households from each selected EA using systematic sampling. BDHS-2014 interview was successfully completed in 17,300 (99%) households. A total of 18,245 ever-married women in reproductive age were identified in these households and 17,863 were interviewed. From the preliminary sample, the mothers were excluded for the present study who had no children. The mothers who had children aged less than 6 months were also excluded from the present study. All currently pregnant mothers were not considered. Besides, some incomplete information and missing samples were also excluded from the data. Finally, 3541 mothers were considered for the analysis in this study.

**Dependent variable:** The duration of breastfeeding among Bangladeshi mothers who had at least one child aged 6-36 months was the dependent variable for this study. BDHS researcher asked every mother a question “For how many months did you breastfeed?” For comparing between two/more groups, a group having lower/lowest mean value was considered as shorter duration of breastfeeding than other groups.

**Independent variables:** The quantitative variables for this study were: mothers’ age, mothers’ body mass index (BMI), total number of ever born children and mothers’ age at first birth. The qualitative variables were: antenatal care (ANC) visits during pregnancy, mothers’ education level, fathers’ education level, mother’s occupation, geographic location (division), religion, sex of children, place of residence, mode of delivery, place of delivery and household wealth quintile ((wealth index (WI)). The categories and codes of qualitative variables were given in Table 1 (Table1).

**Statistical analysis:** Independent sample t-test and one-way analysis of variance (ANOVA) were used to find the significant difference in duration of breastfeeding between two and more than two groups respectively. Data was checked for the standard assumptions of independent sample t-test and ANOVA. Normality and homogeneity of cohort variances were checked using the Kolmogorov–Smirnov non-parametric test and a normal probability plot, and the Levene test respectively.

Multiple linear regression analysis was used to identify the predictors of duration of breastfeeding. Pearson’s correlation coefficients was used to select the independent variables for multiple linear regression. Variation inflation factor (VIF) was used to check for the multicollinearity problem among the predictor variables in multiple linear regression analysis. According to Chatterjee and Hadi, if the value of VIF lies between 0 to less than 5, there is no evidence of multicollinearity problem; if this value lies between 5 to less than 10, there is a moderate multicollinearity problem and if this value is greater than or equal to 10, there is a serious multicollinearity problem of variables [24].

We used sampling weight as mentioned in BDHS-2014 for analyzing data [21]. Intra-class Correlation Coefficient (ICC) was utilized to check the variation in our outcome variable duration of breastfeeding among clusters (EAs). The value of ICC ranges from 0 to 1. If ICC is 0, there is no cluster effect, and if ICC is greater than 0, a multilevel regression model is appropriate for the analysis [25]. The value of ICC was very close to 0 (0.0001), which meant that there was no cluster effect of duration of breastfeeding among EAs.

We used STATA (version 11) and SPSS software (version IBM 22) for statistical analyses, and statistical significance was accepted at  $p < 0.05$ .

## Results

A total of 3541 mothers having children aged 6-36 months were included in the study to investigate the socio-demographic determinants of duration of breastfeeding in Bangladesh. The mean duration of breastfeeding among Bangladeshi mothers was 18.91 month (95% CI: 18.65-19.17) and median was 19.00 month. The Kolmogorov–Smirnov non-parametric test exhibited our dependent variable (duration of breastfeeding) was normally distributed. In addition, the Levene test showed that the data were homogeneous.

It was found, more than 78% of mothers received ANC services during their pregnancy period, and independent sample t-test demonstrated that the mean duration of breastfeeding was significantly ( $p < 0.01$ ) lower (18.63 month) among the mothers receiving ANC than mothers who did not receive (18.63 month). The mean duration of breastfeeding among rural mothers (19.00 month) was somewhat longer ( $p = 0.061$ ) than that of mothers living in urban environment. Muslim mothers had practice to provide their breast milk for a shorter duration (18.82 month) than Non-Muslim mothers (20.10 month) ( $p < 0.05$ ). The mean duration of breastfeeding was longer (19.10 month) among vaginal delivered mothers compared to caesarean delivered mothers (18.27 month) ( $p < 0.01$ ). Also, mean duration of breastfeeding (19.18 month) was longer among mothers who delivered at home than that of mothers delivered at hospital or clinic (18.48 month) ( $p < 0.05$ ). Mothers working outside of house provided their breast milk to their children for significantly ( $p < 0.01$ ) longer time (20.14 month) than their counterparts (18.51 month). It was noted that the duration of breastfeeding among mothers decreased with increase in their education level, and ANOVA showed that the variation of duration of breastfeeding among mothers' education level was significant ( $p < 0.05$ ). Almost same pattern of breastfeeding was observed among fathers' education level ( $p < 0.01$ ). Highest mean value of duration of breastfeeding was found among mothers living in Rangpur division (20.00 month) followed by Khulna (19.38 month), Barisal (19.17 month), Sylhet (19.16 month), Rajshahi (18.97 month), Chittagong (18.33 month) and Dhaka (17.99 month). The variation of breastfeeding among divisions was statistically significant ( $p < 0.01$ ). It was found that the mean value of duration of breastfeeding decreased with increasing household quintile index, and the variation was significant ( $p < 0.05$ ) (Table 2).

In Table 3, we observed that VIF values of all predictors lie between 0 and 5; there was no evidence of multicollinearity problem among the predictors. Multiple linear regression model showed that the mothers' age had significant ( $p < 0.05$ ) positive effect on duration of breastfeeding. BMI of mothers had significant ( $p < 0.05$ ) positive effect on duration of breastfeeding. However, total number of children ever born and mothers' age at first birth had a significant ( $p < 0.05$ ) negative effect on duration of breastfeeding (Table 3).

## Discussion

In this study, we found the mean duration of breastfeeding was 18.91 months among Bangladeshi mothers. One of the earlier study with BDHS-1999-2000 data set reported that the mean duration of breastfeeding among Bangladeshi mothers was 31.3 months [26]. Another study with BDHS-2004 dataset found that the mean duration of Bangladeshi mothers was 30.41 months [27]. It is observed that the mean duration of breastfeeding has been decreasing over time in Bangladesh. May be it is occurring due to increase in the higher education level of women and number of caesarean delivery in Bangladesh [21]. Moreover, the average duration of breastfeeding in Bangladesh was lower than that of other South Asian countries such as India (20.37 month) [28], Pakistan (21.8 month) [29], Sri Lanka (23.2 month) [30]. These were very old studies. One of the recent Indian studies reported that the median duration of breastfeeding was 12 months, according to nationally representative data from the 2011–2012 Indian Human Development Survey II. They also found that the median duration of breastfeeding had decreased by 50% from 1992–1993 to 2011–2012 [31]. We found that the median duration of breastfeeding in Bangladesh was 19 months that was higher than that found in Indian study.

The mean duration of breastfeeding was lower among the mothers who received ANC than who did not. Our results did not coincide with other studies [32] who found that duration of breastfeeding was longer among the mothers who visited ANC. This dissimilarity was happened due to the fact that urban mothers received more ANC than rural mothers in Bangladesh [33, 34], and we found urban mothers provided their breast milk to their children averagely for a shorter period than rural mothers. Similar results were also found in India [28] that mothers residing in rural areas have longer duration of breastfeeding compared to those living in urban areas. Most of the rural mothers delivered at home, and our study showed that the mean duration of breastfeeding among home delivered mothers was longer than mothers who delivered at hospitals or clinics. Education, figure consciousness and availability of breast milk substitution in urban area might be the possible reason behind the shorter duration of breastfeeding. It was also observed that the average breastfeeding period was shorter in younger mothers than older mothers. Similar results were also found in Brazil [35, 36], China [37], India [28] and Kuwait [38, 39]. This may be due to lack of experience and knowledge of younger mothers regarding breastfeeding. In addition, they might have received less counseling on benefits of breastfeeding. Our results indicated no significant difference in duration of breastfeeding between male and female children. This finding was supported by a previous study [38]. The present study detected that average duration of breastfeeding among educated mothers was comparatively shorter than low educated mothers. Our result coincided with other studies in Nigeria [32], Kuwait [38, 39] and India [28]. The higher educated women have more opportunities in the

workforce and tend to choose their career over fertility-related matters [40]. Higher educated working mothers might not breastfeed their children for long time due to the demand of occupation [41, 42]. Educational status was one of the most important factors that influence breastfeeding practices which concurs with the study conducted in Malaysia [43]. However, we found that exterior working mother breastfeed their children for long time than housewife, which was consistent with the findings of other study in Bangladesh [44]. In rural areas of Bangladesh, usually women involved in some casual works such as domestic work, jobs in cottage industries, small-scale marketing and so on. These types of works give them more time to take care of their baby and breastfeed for longer periods. Moreover, this result happened in our population due to working mothers' education level; our data showed 11% of mothers were higher educated out of whom only 24.1% working outside at home. More research is required regarding the issue.

In this study, mean duration of breastfeeding was shorter among caesarian mothers. Similar findings were also observed in China [45] and Vietnam [46]. It is well known that mothers with a C-section tend to experience longer recovery periods and more medical care [47]. Thus C-section mothers introduce solid foods for her baby and intend to stop breastfeeding earlier than mothers with normal delivery [48]. Therefore, mode of delivery can be stated as an important indicator for the breastfeeding duration. It was found that the mothers who delivered a large number of children had negative effect on duration of breastfeeding in Bangladesh because their fertility returns early. In 2018, Al-Kandari also found the same results among Kuwaiti mothers [39]. The fathers' educational level was also an important factor for duration of breastfeeding discovered by the present study. Usually, educated male married educated female and educational level of female showed an inverse relationship with duration of breastfeeding found in this study. This result is supported by other studies [39, 49].

It was observed that mothers who lived in Dhaka division breastfed averagely for a shorter period than other divisions in Bangladesh. Women living in Dhaka division, the Capital city of Bangladesh are comparatively more educated than women living in other divisions [50]. Our findings suggested that women who had completed at least primary education, breastfed their children for an averagely shorter period than illiterate women. Thus geographic factor can be mentioned as an important determinant for the duration of breastfeeding.

**Strength and limitations of the study:** Some studies have been done on initial and exclusive breastfeeding among Bangladeshi mothers extracting data from nationally representative dataset of BDHS-2014. Perhaps this was the first time we attempted to study on duration of breastfeeding among Bangladeshi mothers using the latest nationally representative sample (BDHS-2014) in Bangladesh. However, there were some limitations of this study. This study was conducted using secondary data and it was bounded by the limitations of those data. Because of being a cross-sectional study, it was difficult to set up a causal relationship between socio-demographic, demographic and anthropometric factors and duration of breastfeeding among mothers in Bangladesh. Last night self-recall method was used for assessing breastfeeding duration whereas longitudinal study was more effective. A large number of subjects dropped out of this study, probably due to its limited duration. From the literature review, we

observed that some independent variables were very important predictor for breastfeeding but we could not include those variables such as ethnicity, birth order, gestational age etc. [51]. Though we used the latest nationally representative data six years have already passed. Clearly, more research is required with duration of breastfeeding among Bangladeshi mothers using new nationally representative data.

## Conclusions

In the present study, we tried to determine the factors which were related to the duration of breastfeeding among mothers in Bangladesh using nationally representative data collected by BDHS-2014. Our selected statistical technique/models provided that ANC, religion, mode of delivery, parents' education, geographic location (division), mothers' age, mothers' BMI, total ever born children, mothers' age at first birth and household wealth quintile were associated factors of duration of breastfeeding among Bangladeshi mothers. The socio-demographic factors related to overall duration of breastfeeding can be a valuable appliance when planning local actions and policies aimed at improving breastfeeding duration. The present study indicated that the breastfeeding-promotion programme such as a regular maternal, newborn, child and adolescent health (MNCAH) program, world breastfeeding week, national nutrition program (NNP) of Ministry of Health and Family Welfare (MOHFW) in Bangladesh should address our findings. Government should take proper care and more attention about the maternal health benefit of breastfeeding and encourage mothers to breastfeed their child for at least 6 months. Improving mothers' knowledge and understanding of the breastfeeding was also recommended.

## Abbreviations

ANC: Antenatal Care; ANOVA: Analysis of variance; BBS: Bangladesh Bureau of Statistics; BDHS: Bangladesh Demographic and Health Survey; BMI: Body Mass Index, CI: Confidence Interval; EA: Enumeration area; NIPORT: National Institute of Population Research and Training; PSU: Primary Sampling Uunit; SDGs: *Sustainable Development Goals*; SE: Standard error; SPSS: Statistical Package For Social Sciences; UNICEF: United Nations International Children's Emergency Fund; VIF: Variance inflation factor; WHO: World Health Organization; WI: Wealth Index.

## Declarations

**Ethics approval and consent to participate:** The 2014 BDHS received ethics approval from the Ministry of Health and Family Welfare, Bangladesh. The 2014 BDHS also received written consent from each individual in the study.

**Consent for publication:** Not applicable for this study.

**Availability of data and material:** The BDHS-2014 datasets are freely available at [https://dhsprogram.com/data/dataset/Bangladesh\\_Standard-DHS\\_2014.cfm?flag=0](https://dhsprogram.com/data/dataset/Bangladesh_Standard-DHS_2014.cfm?flag=0)

**Competing interests:** The authors have no conflict of interests.



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**Authors Contributions:** UA and MGH conceptualized and designed the research; UA and ASMAM analyzed the data; UA drafted the original manuscript; MGH, ASMAM and MAS critically reviewed and edited the manuscript. All the authors read, discussed and approved the final version of the manuscript for publication.

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## Tables

Table 1: Qualitative variables with their categories and codes

Variables	Category (Code)
ANC visits (at least one time) during pregnancy	No (0), Yes (1)
Mother's educational level	Uneducation (0), Primary (1), Secondary (2), Higher (3)
Father's education level	Uneducation (0), Primary (1), Secondary (2), Higher (3)
Geographical location (Division)	Barisal (1), Chittagong (2), Dhaka (3), Khulna (4), Rajshahi (5), Rangpur ( 6), Sylhet (7)
Religion	Muslim (1), Non-Muslim (2)
Sex of children	Male (1), Female (2)
Place of residence	Urban (1), Rural (2)
Mode of delivery	Vaginal (0), <u>Cesarean</u> (1)
Wealth index	Poor(1), Middle (2), Rich(3)
<u>Mothers' occupation</u>	<u>Housewife (1), Working outside of house (2).</u>
<u>Place of delivery</u>	<u>Home (1), Hospital/Clinic (2).</u>

**Table 2:** Duration of breastfeeding among mothers by socio-demographic factors

Socio-demographic factors		Duration of breastfeeding (months)	
Maternal Education		Less than 6	6 or more
Primary	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Secondary	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Tertiary	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Maternal Age	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
18-24	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
25-34	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
35-44	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
45-54	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
55-64	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Maternal Income	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Low	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Medium	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
High	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Maternal Occupation	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Unemployed	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Self-employed	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5
Employed	Less than 6	10.5	10.5
	6 or more	10.5	10.5
	Total	10.5	10.5

Socio-demographic factors	Group	N (%)	Mean (in Months)	SD	Value of t- statistic/ F- statistic	p- value
Antenatal care	Yes	2768 (78.2)	18.63	7.99	3.89	0.001
	No	773 (21.8)	19.89	8.00		
Religion	Muslim	3250 (91.8)	18.82	7.88	-1.88	0.041
	Non-Muslim	291 (8.2)	20.10	9.11		
Place of residence	Urban	1143 (32.3)	18.71	8.11	-1.00	0.061
	Rural	2398 (67.7)	19.00	7.92		
Sex of child	Male	1807 (51)	18.79	8.06	-0.90	0.082
	Female	1734 (49)	19.03	7.89		
Mode of delivery	Caesarean	831 (23.5)	18.27	7.98	2.64	0.002
	Vaginal	2710 (76.5)	19.10	7.97		
Mothers' educational level	Uneducated	471 (13.3)	19.80	7.96	3.61	0.032
	Primary	975 (27.5)	19.15	8.13		
	Secondary	1705 (48.20)	18.66	7.90		
	Higher	390 (11.00)	18.27	7.85		
Fathers' educational level	Uneducated	828 (23.4)	19.99	8.02	7.10	0.002
	Primary	1059 (29.9)	18.78	7.95		
	Secondary	1109 (31.3)	18.40	7.89		
	Higher	545 (15.4)	18.52	7.98		
Division	Barisal	415 (11.7)	19.17	8.11	3.78	0.001
	Chittagong	674 (19.0)	18.33	7.31		
	Dhaka	626 (17.7)	17.99	8.01		
	Khulna	422 (11.9)	19.38	8.37		
	Rajshahi	436 (12.3)	18.97	8.31		
	Rangpur	446 (12.6)	20.00	8.27		
	Sylhet	522 (14.7)	19.16	7.66		
Wealth Index	Poor	1410 (39.8)	19.29	8.04	3.62	

	Middle	677 (19.1)	18.98	7.95		0.032
	Rich	1454 (41.1)	18.50	7.90		
<u>Mothers' occupation</u>	<u>Working outside of house</u>	862(24.30)	20.14	8.01	5.22	0.001
	<u>Housewife</u>	2679(75.70)	18.51	7.92		
<u>Place of delivery</u>	<u>Home</u>	2163(61.1)	19.18	7.98	2.54	0.011
	<u>Hospital/Clinic</u>	1378(38.9)	18.48	7.97		

**Table 3:** Effect of socio-demographic factors on duration of breastfeeding

Predictors	Coefficients	SE	<u>p-value</u>	95% CI		VIF
				Lower	Upper	
Mothers' age	0.638	0.045	0.001	0.542	0.721	4.058
Mothers' BMI	0.091	0.034	0.002	-0.061	0.073	1.025
Total children ever born	-1.735	0.177	0.001	-2.081	-1.386	3.782
Mothers' age at first birth	-0.633	0.058	0.001	-0.519	0.493	2.028