

Socio-Economic and Demographic Determinants of Low Birth Weight of Newborns among Muslim Minorities of Malda District of West Bengal, India

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ABSTRACT

Low birth weight is one of the most important risk factor for newborn children health vulnerability in developing countries. The main aim of this study is to find out the association between the low birthweight (LBW) and use of ANC services including other socio-demographic characteristics of surveyed Muslim minorities women of Malda District. To find out the results, simple percentage distribution, cross tabulation, Pearson's χ^2 test, and binary logistic regression analysis have been employed based on the primary data for selected socio-demographic variables and ANC Services using Data Science software (STATA 12). Approximately 36% of sample newborn children were born with low birthweight. The findings stated that, the likelihood of low birthweight was significantly lower among those newborn children whose mother had three or more ANC visits (AOR: 0.683, 95% CI: 0.346 - 1.346), ANC visit within first trimester (AOR: 0.865, 95% CI: 0.598 - 1.250), ANC by skilled provider (AOR: 0.761, 95% CI: 0.391 - 1.479), ANC by ASHA workers regularly (AOR: 0.683, 95% CI: (0.346 - 1.346), and who had received health services during pregnancy (AOR: 0.918, 95% CI: 0.614 - 1.371) compared to those mother who had not received those services.

1. Introduction

Low birth weight (LBW) is defined as a birth weight less than 2500g and LBW infants are at greater risk of death and disability (Glass and Costarino et. al., 2015). Low birthweight is one of the most important risk factor for newborn children health vulnerability in developing countries (Maggi and Irwin et. al., 2010). LBW is defined by WHO as weight at birth below 2500 g (5.5 lb) regardless of gestational age. LBW is further categorized into very low birthweight (<1500 g) and extremely low birthweight (<1000 g) (UNICEF & WHO, 2004). The preterm deliveries and low birth weight babies contribute neonatal and infant mortality (Hajizadeh, Ramezani and et. al., 2016; Akanda & Salam, 2010).

Antenatal care (ANC) remains one of the Safe Motherhood interventions that if properly implemented has the potential to significantly reduce maternal and perinatal mortalities (Oladapo & Osiberu, 2009). The antenatal period presents opportunities for reaching pregnant women with interventions to maximize maternal and neonatal health (Ekele & Tunau, 2007 ; Simkhada, Teijlingen, et. al., 2008). Prenatal care is a key strategy for achieving public health goals, primary healthcare objectives, and the Millennium Development Goals (Shayesteh and Tehrani et. al., 2016). Goal 3 of the new Sustainable Development Goals (SDGs) targets broader health topics related to newborn and child health. Because SDGs address a range of socio-economic and environmental risk factors for health-related problems (WHO, 2016), identifying risk factors for low birth weight has many benefits to set preventive and treatment strategies (Wachamo, 2019). Antenatal care (ANC) is provided to improve maternal and child health outcomes (Oulay, Laohasirivong, et. al., 2018).

Various maternal factors such as maternal weight and height, education, parity of the mother, gestational age, caloric intake, quality of antenatal care and sex of the delivered child

were identified as prominent determinants of LBW (Kramer, 1987). The prevalence of Low Birth Weight (LBW) has been determined by several socio-economic, demographic, and environmental factors (Carlson, 1984; Kramer, 1987; Mahumud, Sultana, & Sarker, 2017; Negggers, Goldenberg, Cliver, & Hauth, 2004; Noureddine & Abdellatif, 2015).

The pre-existing literature principally focused on different socioeconomic, demographic and obstetric determinants of LBW. In spite of several strategies has been taken for betterment of the practice of maternal health care, spread out of different ANC services remains a big confront in Malda district as well as in West Bengal and all over the India. . In Malda district, 42.5% of mothers who had received antenatal check-up in the first trimester, 52.6% of mothers who had received full antenatal care visits, i.e. a considerable proportion of women did not get adequate ANC services which may boast significant adverse impact on pregnancy outcomes and birth outcomes (low birth weight). In addition, in determining birth outcomes, very little concentration has been taken on the subject of the use of ANC services. The aim of this study was to identify the Impact of ANC services on Low Birth Weight (LBW) of newborn children among surveyed Muslim women in Malda district of West Bengal.

2. Materials and Methods

2.1. Data source

Primary data, collected from the different blocks of Malda district through fieldwork (conducted during 2018-2019) have been used for this study. The stratified multistage sampling technique has been used for the collection of primary data relating to the LBW and its associated determinants.

2.2. Study participants

Total 1037 Muslim women aged 15-49 years had been taken from various socio-economic and demographic

characteristics by using the questionnaire from the Malda district. The final sample was taken to 530 (Muslim women) most recent newborn births preceding the survey.

2.3. Outcome variable

In this study low birthweight is a dependent variable. Birth weight of children variable was re-coded as birth weight <2500 gram (assigned as '1') and \geq 2500 gram (coded as '0') for smooth running of binary logistic regression. The data on birth weight of newborn children were collected from structured written record during primary field survey.

2.4. Explanatory variables

Important demographic and socio-economic characteristics were selected as control variables and ANC services considered as the key explanatory factor for the analysis of the study. Mother's use of ANC services was assessed from the following indicators: (i) Number of ANC visit (Never visit, 1-2 visits, and 3 and more visits); (ii) ANC visit within first trimester i.e. within 3 months (yes and no); (iii) ANC by skilled provider i.e. doctor, auxiliary nurse midwife (ANM), nurse, midwife, and other lady health visitor (yes and no); (iv) ANC by ASHA workers regularly (yes or no); (v) health services received during pregnancy (yes or no).

Sex of the child (male and female) and birth order (first order, second order, and more than second order) included as child demographics. Current age of the mother (15–24 years, 25–34 years, and 35–49 years), maternal age at marriage (<18

years [legally defined as child marriage] and \geq 18 years [adult marriage]), maternal education (no education, primary, and secondary), maternal body mass index [BMI] (thin, normal, and obese) are included as maternal demographics. BMI is a simple index of weight for height (kg/m²), which measures nutritional status among adults. The cut-off points of BMI are <18.5 kg/m² (thin or under-nourished), 18.5 to 24.9 kg/m² (normal), and \geq 25.0 kg/m² (obese). Socio-economic characteristics include place of residence (rural and urban) and below poverty line (BPL) of household.

2.5. Statistical analyses

The sample survey data were taken to represent the impact of antenatal care (ANC) utilization or ANC services and different socio-demographic characteristics of women on low birthweight. In initial section, univariate or general descriptive nature of analysis has been used to explain the percentage of respondents, cumulative percentage of respondents and also number of respondents (Total sample, n=530) with their socio-economic and demographic characteristics and ANC visits. To explain the low birthweight differentials among newborn bivariate association and Pearson's chi square test analyses were used to fulfill the objective. Binary logistic regression model is used to identify the socio-economic and demographic characteristics and ANC services which affect the low birthweight of newborn. To evaluate primary sample survey data the Statistical Package and Data Science software STATA version 12.1 (StataCorp LP, College Station, TX, USA) was used.

3. Results

Table 1 Socio-Economic and Demographic Characteristics of the Respondents (n=530)

Characteristics	Number (n)	Percentage	Cumulative %
Sex of child			
Male	271	51.13	51.13
Female	259	48.87	100
Birth order			
1	155	29.25	29.25
2	190	35.85	65.09
\geq 3	185	34.91	100
Age of mother in years			
15–24	278	52.45	52.45
25-34	225	42.45	94.91
35-49	27	5.09	100
Maternal age at marriage			
<18 years	319	60.19	60.19
\geq 18 years	211	39.81	100
Maternal education			
No education	512	96.6	96.6
Primary	6	1.13	97.74
Secondary	12	2.26	100
Maternal BMI			
Thin	137	25.85	25.85
Normal	305	57.55	83.4
Obese	88	16.6	100

Place of residence			
Rural	343	64.72	64.72
Urban	187	35.28	100
Below Poverty Line (BPL)			
No	258	49.33	49.33
Yes	265	50.67	100
Total	530	100	

Source: ICSSR Major Research Project (MRP) Primary field survey, 2018-19

Table 1 depicts socioeconomic and demographic characteristics of respondents. More than half of the children (51.13%) were male. More than one-fourth of the sample newborn children (34.91%) were born in birth order of 3 or more. About more than half of women (52.45%) [278/530] of the women were young aged 15-24 years, and 42.45% [225/530] of them were aged 25-34 years). More than half percentage (60.19%) [319/530] of women got married before the legal age 18 years, 39.81% [211/530] of women were

married after 18 years of age. More than one-ninth (96.6%) [512/530] of the women were illiterate, and only 1.13% (6/530) had completed only primary level of Education. More than one-fourth sample women (25.85%) were undernourished (BMI <18.5 kg/m²). Most of the sampled women lived in rural areas (64.72% [343/530] and 35.28% [187/530] in urban areas. More than half percentage (50.67%) [265/530] of women were in below poverty line (BPL) group.

Table 2 Indicators of ANC utilization and birth weight for sample children (n=530)

Characteristics	Number (n)	Percentage	Cumulative %
Number of ANC visits			
Never visit	61	11.51	11.51
1-2 visits	174	32.83	44.34
≥3 visits	295	55.66	100
ANC visit within first trimester			
No	257	48.49	48.49
Yes	273	51.51	100
ANC by skilled provider			
No	53	10	10
Yes	477	90	100
ANC by ASHA workers regularly			
No	315	59.43	59.43
Yes	215	40.57	100
Health services received during pregnancy			
No	166	31.32	31.32
Yes	364	68.68	100
Birthweight of children			
<2500 g	189	35.66	35.66
≥2500 g	341	64.34	100
Total	530	100	

Source: ICSSR MRP Primary Field Survey, 2018-19

Table 2 presents occurrence of different indicators of ANC services and children's low birthweight. More than half the sample women (55.66%) [295/530] were received three and more ANC visit, 32.83% [174/530] of women were received one to two ANC visit. Alike, more than half percentage of women 51.51% of the women reported that they had ANC visit within first trimester of pregnancy. Majority of them (90%) were

received ANC by skilled health worker; and more than two-fifth percentage of women (40.57%) were reported that they had ANC by ASHA workers regularly. Majority of women (68.88%) were received health services during pregnancy. Approximately 35.66% of sample newborn children were reported as low birthweight.

Table 3 Percentage distribution of explanatory variables by outcome variable for sample children (n=530)

Explanatory variables	Total sample (n)	Birthweight (%)		P-value
		<2500 g	≥2500 g	
Utilization of ANC services				
Number of ANC visits				
Never visit	61	45.9	54.1	0.000
1-2 visits	174	35.25	64.75	
≥3 visits	295	32.76	67.24	
ANC visit within first trimester				
No	257	38.13	61.87	0.000
Yes	273	33.33	66.67	
ANC by skilled provider				
No	53	45.28	54.72	0.000
Yes	477	34.59	65.41	
ANC by ASHA workers regularly				
No	315	39.53	60.47	0.005
Yes	215	33.02	66.98	
Health services received during pregnancy				
No	166	35.71	64.29	0.005
Yes	364	35.54	64.46	
Control variables				
Sex of Child				
Male	271	33.59	66.41	0.000
Female	259	37.64	62.36	
Birth order				
1	155	25.80	74.20	0.000
2	190	31.58	68.42	
≥3	185	37.84	62.16	
Age of mother in years				
15-24	278	36.33	63.67	0.005
25-34	225	34.67	65.33	
35-49	27	37.04	62.96	
Maternal age at marriage				
<18 years	319	36.68	63.32	0.000
≥18 years	211	34.12	65.88	
Maternal education				
No education	512	83.33	16.67	0.000
Primary	6	50	50	
Secondary	12	34.38	65.63	
Maternal BMI				
Thin	137	37.96	62.04	0.000
Normal	305	36.36	63.64	
Obese	88	34.43	65.57	
Place of residence				
Rural	343	37.90	62.1	0.000
Urban	187	31.55	68.45	
Below Poverty Line (BPL)				
No	258	34.5	65.5	0.000

Yes	265	37.74	62.26
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Note: P-value is derived from Pearson's chi-square tests.
 Source: ICSSR MRP Primary field survey, 2018-19

Table 4 represents bivariate association and Pearson's chi-square test between different socio-economic and demographic variables and use of ANC services of sample Muslim women related to low birthweight of newborn children in Malda district. The incidence of low birthweight (<2500 gram) was higher among those newborn children women who were never ANC visit (45.9%) compared with those Muslim women who had 1-2 ANC Visit (35.25%) and also lower among those Muslim women who had 3 and more ANC visits (32.76%) ($P<0.001$). The prevalence of low birthweight was lower among those Muslim women who had ANC visit within first trimester of pregnancy (33.33%) compared those women who hadn't receive within first trimester of pregnancy (38.13%) ($P<0.000$). The incidence of low birthweight (<2500 gram) was lower among those newborn children women who received ANC by skilled provider (34.59%) compared with those Muslim women who didn't receive ANC by skilled provider (45.28%) ($P<0.000$). Likewise, the prevalence of low birthweight was lower among those Muslim women who were regularly received ANC by ASHA workers (33.02%) compared those women who didn't receive ANC by ASHA workers regularly (39.53%) ($P<0.005$). Similarly, the prevalence of low birthweight was lower among those Muslim women who were received health services during pregnancy (35.54%) compared those women who didn't

received health services during pregnancy (35.71%) ($P<0.005$). Significant variations in low birthweight were also found by socioeconomic and demographic characteristics of newborn children and women. Female newborn child (37.64%) low birthweight was significantly higher compared to male newborn child (33.59%) ($P<0.000$). The incidence of low birthweight was significantly higher among those Muslim women who had 3 and more birth order i.e. number of children alive to a woman (37.84%) compared to women who had two number of children alive (31.58%) or one number of children alive (25.80%) ($P<0.000$). A higher percentage of Muslim women had low birthweight child whose current age was less than 25 years during survey compared to 35 years or older. The prevalence of low birthweight among newborn children was higher among those Muslim women who were married before legal age at marriage i.e. below 18 years age (36.68%) compared to those women who were married at legal age at marriage i.e. 18 years and above (34.12%) ($P<0.000$). The prevalence of low birth was higher among those Muslim women who had no education (83.33%), low body mass index (37.96%), live in rural areas (37.90%) and belongs to below poverty line group (37.74%) compared to other group, and these associations was significant at ($P<0.000$) level.

Table 4 Crude and adjusted odds ratios from binary logistic regression models assessing the association between ANC utilization and low birth weight (<2500 g), ICSSR MRP Primary field survey, 2018-19

Variables	Model I		Model II	
	Crude OR	95% CI	Adjusted OR	95% CI
Number of ANC visits				
Never visit®	1		1	
1-2 visits	0.6428*	(0.368 - 1.121)	0.773*	(0.400 - 1.494)
≥3 visits	0.574*	(0.317 - 1.041)	0.683*	(0.346 - 1.346)
ANC visit within first trimester				
No®	1		1	
Yes	0.811*	(0.568 - 1.158)	0.865*	(0.598 - 1.250)
ANC by skilled provider				
No®	1		1	
Yes	0.639*	(0.360 - 1.133)	0.761*	(0.391 - 1.479)
ANC by ASHA workers regularly				
No®	1		1	
Yes	0.736*	(0.505 - 1.074)	0.754*	(0.526 - 1.081)
Health services received during pregnancy				
No®	1		1	
Yes	0.893*	(0.676 - 1.456)	0.918*	(0.614 - 1.371)

OR=Odd Ratio; CI= Confidence Interval, All odds are significant at $p < 0.01$

®-Reference Category

Note: Adjusted models were controlled for sex of child, birth order, age of mother, maternal age at marriage, maternal education, maternal BMI, place of residence, BPL status of household.

Table 4 presents binary logistic regression models for the association between use of ANC services and low birthweight.

In the model I, crude or unadjusted association between the use of ANC services and children's low birthweight has been

assessed. Crude association revealed that the odds of low birthweight were significantly lower among those newborn births whose mother received adequate ANC care during pregnancy. On the other hand, after addition of important socio-demographic variables in the final model slightly reduced odds of ANC services. The outcome point out that the likelihood of low birthweight was significantly lower among those newborn children whose mother had three or more ANC visits (AOR: 0.683, 95% CI: (0.346 - 1.346)), ANC visit within first trimester (AOR: 0.865, 95% CI: 0.598 - 1.250), ANC by skilled provider (AOR: 0.761, 95% CI: 0.391 - 1.479), ANC by ASHA workers regularly (AOR: 0.683, 95% CI: (0.346 - 1.346)), and who had received health services during pregnancy (AOR: 0.918, 95% CI: 0.614 - 1.371) compared to those mother who had not received those services after controlling for sex, birth order, maternal age, maternal age at first marriage, maternal education, maternal BMI, place of residence, BPL status of household which suggests importance of ANC services in reducing low birthweight.

4. Discussion

The present study has examined the association between mother's use of ANC services, different socio-economic and demographic characteristics and low birthweight of most recent birth using primary field survey data. Approximately 36% of sample newborn children were born with low birthweight in Malda district among Muslim women. Five measures of ANC services; those are Number of ANC visits, ANC visit within first trimester, ANC by skilled provider, ANC by ASHA workers regularly, and Health services received during pregnancy have been considered in this study. After that the impact of each ANC services indicator on likelihood of low birthweight using bivariate and multivariate analyses have been used. Low birth weight of newborn children was higher among those Muslim women who were not received adequate ANC services during pregnancy. The findings of this study are similar to the findings of several other studies. This study revealed that the use of ANC services and different socio-economically and demographically developed Muslim groups are significantly associated with lower likelihood of newborn children's LBW. The findings of this study are similar to the findings of several other studies conducted in lower-middle income countries (Assefa et al., 2012; Mahumud et al., 2017; Mbuagbaw & Gofin, 2011).

The prevalence of low birth weight was higher among female newborn children compared to male newborn children. This finding is similar to the findings of several other studies. Muslim women those were have high birth order, have high low birth weight newborn children, as in other previous studies, the study also found similar results. As in other previous studies, this study also found that young age group (below 25 years age) Muslim women have a considerably higher low birth weight of newborn children. In this study it was revealed that, low birth weight of newborn children among Muslim minorities is negatively associated with level of education of women or mother. It was found that the higher (Secondary) educated

women were less likely to have low birth weight newborn children compare to illiterate women i.e. illiterate women were more likely to have low birth weight newborn children. Education also raises knowledge, empowered women and engaged them in working and for that very reason they were more aware to take health facilities and well-known about different health related services which are provided by different health institutions, which are negatively associated with the low birth weight of newborn children among women. The study finding is alike to many several previous studies that age at marriage before 18 years played significant role in reduction in low birth weight of newborn children among Muslim women.

Low maternal weight gain reflects poor child growth, which puts both mother and child at risk for morbidity and mortality (Usawadee, Piyathida, & Orawun, 1791; Karamzad et al., 2016). The prevalence of higher low birth weight of newborn children was found among those Muslim women have low body mass index and this study also alike to several other previous studies. This present study depicts that Muslim women those were lived in rural areas have high prevalence of low birth weight of newborn children than the Muslim women of urban areas. Our study results also alike to several other previous studies. The reason might be the women who were lived in rural areas have a high tendency to marry before legal age at marriage i.e. before 18 years than urban women (Zarate, 1967). Those Muslim women belong to below poverty line group have high prevalence of low birth weight among newborn children.

5. Conclusion

This study revealed that socio-economic and demographic, maternal/obstetric and child characteristics were risk factors for low birth weight in the study areas. This study was conducted in Malda district among Muslim women and indicated that adequate ANC services and improvement of child and maternal socio-economic and demographic characteristics could help reduce LBW of newborn child. Therefore, policy should be implemented to aware to receive full ANC services for all pregnant women. Lastly, targeted involvement is required especially among vulnerable women to improve the socio-economic and demographic conditions which could reduce the occurrence of LBW newborn child among those Muslim women.

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