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Original Article

Measurement issues of low birth weight in India

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ABSTRACT

Background & Aim: Low birth weight (LBW) is a strong predictor of an individual baby's survival. LBW is defined by the World Health Organization (WHO) as weight at birth of less than 2500 g. The current study aimed to study the pattern of the reporting system of birth weight in India and examine the heaping at certain digits, assess the agreement between actual birth weight and birth weight reported based on recall, and identify key determinants of birth weight reporting in India.

Methods & Materials: The National Family Health Survey (NFHS-3) data was used for the present study. The sensitivity, specificity, positive predictive value and negative predictive value were calculated to assess the magnitude of the misclassification bias. In addition, univariate and multivariable analyses were also analyzed. Chi-square test was used to detect the associations and Cohen's kappa statistic was used for agreement between categories of birth weights and birth sizes.

Results: Mothers' recalled assessment of baby's size as small or normal were in agreement with the categories of birth weight as LBW or normal weight (K = 0.46, P < 0.050). The value of Kappa statistic indicated a moderate agreement between recalled birth size and recorded birth weight.

Conclusion: Due to this poor reporting system prevalent in the country, the actual prevalence of LBW can get affected. Method of reporting can also affect the actual scenario of the LBW due to hypothetical or memory recall base birth size.

Introduction

Low birth weight (LBW) has defined by the World Health Organization (WHO) as weight at birth of less than 2500 g (2.5 kg). LBW is a strong predictor of an individual baby's survival and it is an indicator of infant risk. The LBW infants are at increased risk of early growth retardation, infectious disease, developmental delay, and death during infancy and childhood risk (WHO, 2015). Worldwide, more than 15-30 million infants are born, among which 20% of them have LBW. This share is 96% in developing countries (1).

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In developing countries, data on birth weight are very difficult to obtain, as most births occur outside health facilities. Many infants are not weighed at the time of birth, while those who are may not be given a formal record of birth weight or a birth certificate (2). The method of recording birth weight data can affect birth weight estimates in developing countries. Birth weight data are often difficult to obtain in less developed countries, especially in countries where most infants are born outside formal health systems (3).

The incidence of LBW has been selected as an important indicator for monitoring major health goals by the World Summit for Children (4). Cross-sectional surveys can provide a useful source of data for national estimates of mean

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birth weight and the incidence of LBW, and, if the sample size is sufficiently large, regional estimates within a country can also be made (5). Existing literature reveals that most of the studies related to LBW are a hospital-based data, only few of them are based on nationally representative surveys like National Family Health Survey (NFHS) data, especially on birth weight measurement issues. Realizing the measurement issue of LBW in India and need to catch the attention of researchers and policy-makers, it is decided to explore the subject in detail.

After reviewing the existing literature these key questions arise (i) what are the key measurement issues of birth weight in India? (ii) What is the level of heaping at certain digits in reporting of birth weight in India? (iii) What is the agreement between actual birth weight and birth weight reported based on recall? Looking at the importance of the issue, current study aimed to study the pattern of the reporting system of birth weight in India and examine the heaping at certain digits, assess the agreement between actual birth weight and birth weight reported based on recall, and identify key determinants of birth weight reporting in India.

Methods

NFHS-3 data conducted during 2005-2006 was used for analysis purpose. It provides a comprehensive picture of the population and health conditions in India. Birth weight is an important indicator of a child's vulnerability to the risk of childhood illness and chances of survival. In the absence of birth weight, a mother's subjective assessment of the size of the baby at birth is a useful proxy for birth weight. Birth weight was recorded on the NFHS-3 questionnaire for births in the five years preceding the survey either from a written record or the mother's memory recall. Since birth weight may not be known for many babies, the mother's estimate of the baby's size at birth was obtained for all births (6). The present study is based on the sample of births, five years preceding the date of survey. Questions related to pregnancy outcomes and the health of offspring were mainly administered for last pregnancy and last birth occurring within 5 years of the survey date. Thus, the amount of time between birth and recall ranged from 0 to 5 years.

Children whose birth weight were less than 2.5 kilograms, or children reported to be very small or smaller than average were considered to have a higher than average risk of early childhood death. Information on mother's perception of birth size was obtained by asking, ''when (NAME) was born was he/she very large, larger than average, average, smaller than average, or very small? Was (NAME) weighed at birth? (IF YES), how much did (NAME) weigh?'' The response categories were small size, smaller than average, average, larger than average and large. This question was asked before the question about actual birth weight, to minimize the influence of maternal knowledge about actual birth weight on assessment of birth size.

For the purpose of analysis mothers perception of birth size was categorized in two groups of normal birth weight which is large + larger than average + average, and LBW which is smaller than average + small size. The survey gathered information on birth weight either from the child's health card or mother memory recall. Birth weight variable was used as a dichotomous dependent variable and selected socioeconomic, demographic and health variables as explanatory variables, including place of residence, education, economic status, caste, religion, birth order, age, place of delivery, working status and region.

The consistency between mother's assessment of the birth size and recorded birth weight were analyzed by comparing the birth size (small and normal size) with birth weight categorized as LBW (< 2500 g) and normal (> 2500 g). The analysis focused on the usefulness of the less than normal size or small size category, as an indicator of LBW. Mothers' reports were considered accurate when the reported size of the baby as small or normal corresponded exactly to low or normal birth weight. The sensitivity, specificity, positive predictive value and negative predictive value of maternal recall of birth size as small as an indicator of LBW were calculated to assess the magnitude of the misclassification bias.

In addition, univariate and multivariable analyses were conducted to identify the significant differentials and determinants of having birth weight records. In multivariable analysis, logistic regression was performed with birth weight recorded or missing as dichotomous dependent variable and socioeconomic, demographic variables as explanatory variables. The chi-square test was used to detect associations between two categorical variables and Cohen's kappa test was used to test for agreement between categories of birth weights and birth sizes. Kappa value equals to (observed agreement - expected agreement) / (1- expected agreement) (7). Validation of the maternal self-report with the birth weight taken from health card was measured by calculating the sensitivity and specificity for measuring bias and kappa score for measuring precision. Kappa coefficients were considered to represent excellent agreement if the value was greater than 0.75, the moderate agreement if the value was between 0.40 to 0.75 and poor agreement if the value was less than 0.40 (8).

Results

Recorded birth weight and mother's recall birth size: Among the survey respondents, nearly one-third reported birth weight during the 5 years preceding the survey date. However, out of reported birth weight, birth weight was reported 87% through mother memory recall method and 13% through health card method. Information reported through both methods either birth weights and birth size were available for 34% births. For the other 66% cases, mothers could not produce the health card, which was recorded under missing cases. Since the accuracy of mother's subjective evaluation of birth weight can be assessed only for births for which actual birth weight was available by Boerma et al. (5). The data on actual birth weight, recorded in grams, exhibited heaping on multiples of 500 g (Figure 1). Heaping is a typical pattern of misreporting or recording of certain information, such as age, height, or birth weight, showing a large concentration of particular values (9). The frequency distribution of recorded birth weights shows unusually large frequencies of values of birth weight ending in 0 or 5. In India, 19% of the birth weights were recorded at exact weight 2500 g. This indicates that the medical personnel who weigh the infants often round birth weight to the nearest 500 g. Heaping is also important for estimating the percentage of infants with LBW (10). When there is heaping at 2500 g, the cut-off point for LBW, it affects the estimate of the prevalence of LBW.

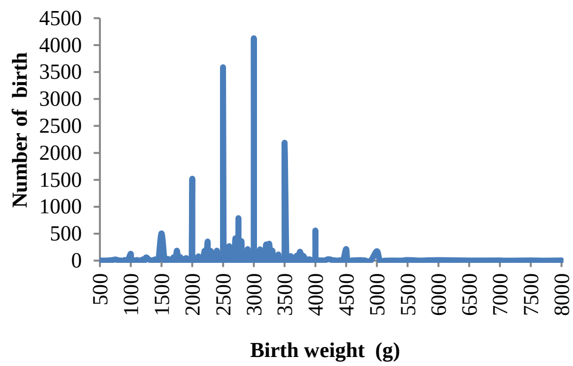

Figure 1. Heaping of reported birth weights on multiple of 500 g, India

Table 1 presents the distribution of the reported birth weight and not reported (missing) birth weight according to different explanatory variables. In India, only 34% birth weight reported either from a health card or mother's memory recall and not reported birth weight was 66%. Urban respondent reported birth weight was more than rural respondent (60% and 25%, respectively). It was found that missing records are less in urban than rural respondents. The distributions of birth weight reporting and not reporting (missing) according to explanatory variables are shown in table 1. The results of chi-square analysis indicated that all predictor variables were significantly associated with having birth weight records and missing records. Table 2 shows the heaping of birth weight, which is reported on exact weight of 2500 g either by health card or mother memory recall. In India, 19% of birth weight is reported on exact weight. Reported weight varies from health card (16%) which is less than mother memory recall (19%). The reported birth weight on exact weight of 2500 g varies in either health card or mother memory recall according to explanatory variables.

Table 1. The percent and sample distribution of the reported birth weight and missing records, according to background characteristics, India, 2005-2006

Variable	BW reported [n (%)]	Missing records [n (%)]	P-value*
Place of residence			< 0.001
Urban	8623 (60.3)	5680 (39.7)	
Rural	10626 (25.2)	31509 (74.8)	
Education of mother			< 0.001
No education	3944 (14.0)	24293 (86.0)	
Educated < secondary	11310 (48.6)	11985 (51.4)	
Secondary and above	3995 (81.4)	910 (18.6)	
Economic status			< 0.001
Poor	4163 (15.4)	22868 (84.6)	
Middle	3757 (33.6)	7424 (66.4)	
Rich	11337 (62.2)	6889 (37.8)	
Caste			< 0.001
Schedule caste	3322 (28.3)	8405 (71.6)	
Schedule tribe	1142 (21.2)	4247 (78.8)	
Other backward class	7417 (32.3)	15545 (67.7)	
Others	6829 (46.9)	7731 (53.1)	
Religion			< 0.001
Hindu	15365 (34.8)	28787 (65.2)	
Muslim	2622 (27.2)	7019 (72.8)	
Others	1285 (48.6)	1360 (51.4)	
Birth order			< 0.001
1st order	8553 (50.0)	8553 (50.0)	
2nd order	6376 (41.7)	8913 (58.3)	
3rd order	2404 (26.3)	6736 (73.7)	
4th order	1018 (17.7)	4734 (82.3)	
5th and above order	888 (9.7)	8262 (90.3)	
Age of mother			< 0.001
15-24 years	8424 (35.5)	15300 (64.5)	
25-34 years	9842 (35.3)	18022 (64.7)	
35-49 years	983 (20.3)	3867 (79.7)	
Place of delivery			< 0.001
Home	2515 (7.3)	31945 (92.7)	
Institutional	16834 (76.6)	5143 (23.4)	
Working status			< 0.001
Working	4789 (28.9)	11794 (71.1)	
Nonworking	14432 (36.3)	25325 (63.7)	
Method of reporting			< 0.001
From card	531 (12.8)	3615 (87.2)	
From recall	13170 (87.2)	1933 (12.8)	
Region			< 0.001
North	2038 (27.9)	5276 (72.1)	
East	3545 (24.9)	10693 (75.1)	
North East	557 (26.1)	1582 (73.9)	
West	4528 (64.1)	2537 (35.9)	
South	6480 (72.6)	2441 (27.4)	
Central	2101 (12.5)	14659 (87.5)	
Total	19250 (34.1)	37188 (65.9)	

Data are shown as number (%); *Chi-square test; Total number may not be matched for each variable due to the missing case; BW: Birth weight

Table 2. Represents the percentage and number of the reported birth weight from health card and mother memory recall on exact weight 2500 g, according to background characteristics, India, 2005-2006

Variables	From card (2500 g)	From recall (2500 g)	Total heaping at (2500 g)
Place of residence			
Urban	237 (16.90)	1379 (19.10)	1616 (18.70)
Rural	212 (15.70)	1760 (19.00)	1972 (18.60)
Education			
No education	62 (17.30)	723 (20.20)	785 (19.90)
Educated < secondary	278 (17.30)	1847 (19.00)	2125 (18.80)
Secondary and above	110 (13.90)	570 (17.80)	680 (17.00)
Economic status			
Poor	74 (19.80)	783 (20.70)	857 (20.60)
Middle	84 (17.20)	628 (19.20)	712 (19.00)
Rich	291 (15.40)	1729 (18.30)	2020 (17.80)
Caste			
Schedule caste	74 (19.10)	599 (20.30)	673 (20.20)
Schedule tribe	18 (13.00)	174 (17.30)	192 (16.80)
Other backward class	169 (15.40)	1181 (18.70)	1350 (18.20)
Others	169 (16.50)	1113 (19.20)	1282 (18.80)
Religion			
Hindu	353 (16.80)	2553 (19.30)	2906 (18.90)
Muslim	60 (13.70)	399 (18.30)	459 (17.50)
Others	36 (16.40)	188 (17.70)	224 (17.40)
Birth order			
1^{st} order	236 (17.70)	1404 (19.40)	1640 (19.20)
2^{nd} order	145 (15.30)	1031 (19.00)	1176 (18.40)
3^{rd} order	49 (16.70)	416 (19.70)	464 (19.40)
4^{th} order	10 (9.60)	156 (17.00)	166 (16.30)
5^{th} and above order	09 (12.90)	133 (16.30)	142 (16.00)
Age			
15-24 years	194 (18.30)	1495 (20.30)	1689 (20.00)
25-34 years	225 (14.70)	1502 (18.10)	1727 (17.60)
35-49 years	31 (18.90)	143 (17.50)	174 (17.70)
Place of delivery			
Home	40 (17.80)	423 (18.50)	463 (18.40)
Institutional	410 (16.20)	2716 (19.10)	3124 (18.70)
Working status			
Working	77 (14.50)	826 (19.40)	903 (18.90)
Nonworking	372 (16.70)	2312 (18.90)	2684 (18.60)
Region			
North	32 (18.00)	365 (19.60)	397 (19.50)
East	87 (22.70)	618 (19.60)	705 (19.90)
North East	05 (7.60)	76 (15.50)	81 (14.50)
West	104 (18.70)	792 (19.90)	896 (19.80)
South	184 (13.50)	863 (16.90)	1047 (16.20)
Central	37 (18.00)	427 (22.50)	464 (22.10)
Total	450 (16.30)	3140 (19.00)	3590 (18.60)

Data are shown as number (%); Total number may not be matched for each variable due to the missing case

Heaping of the birth weight: The data on numerical birth weight exhibited considerable heaping on digits that were multiples of 500 g. Heaping refers to a pattern of misreporting in which the distribution of a number reported by respondents, such as age or birth weight, shows implausible large frequencies of particular values, usually values ending in 0 or 5 (10). A typical example of the frequency distribution of birth weights from India is shown in figure 1, in which the heaping is clearly visible. The heaping indicates that birth weights are often rounded, either by medical personnel who weigh the infants and write the weight on health card or by mothers themselves when recalling the figure. Magnitude of birth weight heaping tended to increases the pattern of low birth weight. This pattern suggests that there is some diminution in mother's ability to recall the exact weight as time since the birth increases. In addition, heaping is substantially worse (i.e. there are more birth weights that are multiples of 500 g) for infants whose weights were reported from mother's recall than when birth weights were recorded on a health record. Although heaping is an indication of overall data quality, for the purposes of estimating the percentage of infants with LBW, it is the heaping at 2500 g, the cut-off point for LBW which is most important. Across the survey, approximately 19% of infants were reported to have weighed exactly 2500 g at birth. Assuming that a proportion of the newborn reported as weighing 2500 g actually weighed less than 2500 g, some LBW babies would be misclassified as having had a normal birth weight and the prevalence of LBW will be biased downwards. Heaping of the birth weight is an issue in reported birth weight because at time of reporting respondent reported a hypothetical weight, so it may be misleading in the estimation of overall LBW data.

Birth weight pyramid: Birth weight pyramid showing the proportion of weights in each birth weight category by the method of recall and health card in India. The observed heaping patterns are graphically illustrated in the form of birth weight pyramid (Figure 2), which are analogous to population pyramid. This pyramid clearly shows that for most heaping was common for memory recalled birth weights and health card. The distribution of reported birth weights, although not perfectly normally distributed, was very close to the unimodal bell-shaped distribution of weights. However, the weights recorded from health cards and memory recall were highly heaped at weight recorded between (2501-3000 g). The pyramid indicated that there was the proportion of infants in the groups of the birth weight distribution when the birth weight was recalled from memory. This is clearly equal to the birth weight reported through health card.

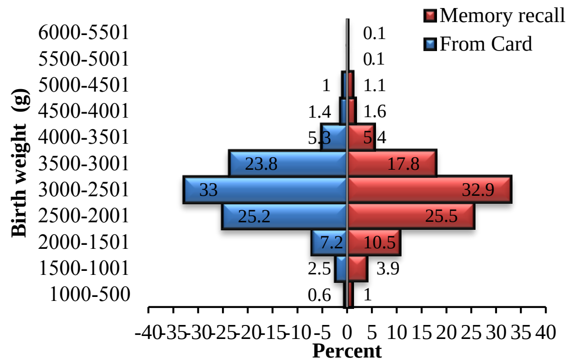

Figure 2. Birth weight pyramid showing the proportion of weights in each birth weight category by method of recall, India

Sensitivity and specificity of birth size in predicting LBW: The sensitivity, specificity, positive predictive value, and negative predictive value of small maternal recalled birth size as an indicator of LBW are calculated according to different background characteristics based on the contingency table. It is evident from the availability of data about 87% of cases, mothers' recalled assessment of baby's size as small or normal were in agreement with the categories of birth weight as LBW or normal weight ($K = 0.46$, $P < 0.050$). The value of Kappa statistic indicated a moderate agreement between recalled birth size and recorded birth weight. The sensitivity analysis indicated that 53% of LBW babies were accurately assessed by their mothers as small, and the specificity indicated that 91% of normal birth weight infants were correctly assessed by their mothers as not being small. The positive predictive value of small size revealed that more than half (61%) of infants whose mothers considered them to be small had actually LBW. The negative predictive value is 88% of normal size who remained normal as per recorded birth weight in India. According to different background characteristics, sensitivity, specificity, positive and negative predictive values (PPV and NPV), and kappa value with confidence interval (CI) has shown in table 3.

Table 3. The percentage of the validity and agreement of maternal self-reported birth size compare to birth weight taken by different background characteristics.

Variables	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Kappa statistic	CI for Kappa statistic	
						Lower	Upper
Place of residence							
Urban	53.4	90.7	57.9	89.0	0.45	0.44	0.46
Rural	53.4	90.8	63.8	86.5	0.46	0.45	0.47
Education							
No education	53.6	90.2	66.0	84.6	0.46	0.45	0.48
Educated < secondary	54.5	90.3	61.3	87.6	0.46	0.45	0.47
Secondary and above	48.8	92.3	54.1	90.6	0.42	0.41	0.44
Economic status							
Poor	57.7	88.6	63.3	86.0	0.47	0.46	0.49
Middle	56.2	90.3	64.2	86.9	0.48	0.47	0.50
Rich	50.3	91.6	59.0	88.4	0.44	0.43	0.45
Religion							
Hindu	53.5	90.5	61.1	87.5	0.46	0.45	0.47
Muslim	52.7	92.7	64.7	88.6	0.48	0.47	0.50
Others	54.3	89.6	57.8	88.3	0.45	0.44	0.48
Birth order							
1^{st} order	53.9	89.9	60.6	87.2	0.45	0.44	0.46
2^{nd} order	51.5	91.5	59.8	88.5	0.45	0.44	0.46
3^{rd} order	56.9	90.6	62.0	88.6	0.49	0.48	0.51
4^{th} order	51.3	90.7	61.4	86.7	0.44	0.43	0.47
5^{th} and above order	53.9	93.7	75.5	85.0	0.52	0.51	0.55
Caste							
Schedule Caste	52.4	90.1	62.0	86.1	0.45	0.44	0.47
Schedule tribe	57.9	87.6	58.8	87.2	0.46	0.45	0.49
Other backward class	53.6	90.7	60.7	87.9	0.46	0.45	0.47
Others	52.5	91.6	61.7	88.2	0.47	0.46	0.48
Age							
15-24 years	54.9	89.2	61.6	86.2	0.45	0.44	0.46
25-34 years	51.8	91.9	61.3	88.5	0.46	0.45	0.47
35-49 years	55.2	91.9	57.9	91.0	0.48	0.47	0.51
Place of delivery							
Home	53.5	91.3	66.1	86.1	0.47	0.46	0.49
Institutional	53.3	90.7	60.5	87.9	0.46	0.45	0.47
Working status							
Working	53.8	90.6	61.2	87.7	0.46	0.45	0.47
Nonworking	52.6	91.0	61.5	87.5	0.46	0.45	0.47
Region							
North	49.9	90.2	65.9	82.5	0.43	0.42	0.45
Central	51.0	90.5	62.1	85.8	0.44	0.43	0.46
East	60.2	92.5	70.8	88.6	0.56	0.55	0.58
Northeast	65.4	91.7	63.5	92.3	0.56	0.55	0.60
West	50.8	90.8	60.9	86.7	0.44	0.43	0.45
South	52.5	89.9	53.5	89.6	0.43	0.42	0.44
Total	53.4	90.7	61.3	87.7	0.46	0.45	0.47

PPV: Positive predictive value; NPV: Negative predictive value; CI: Confidence interval

And kappa statistic indicates moderate agreement for each predictor between mother recall of the birth size and numerical birth weight recorded. Kappa values for all predictors belonged to the range between 0.42 and 0.56. For each predictor variable, kappa statistic was calculated and significant P was considered as less than 0.050. These were statistically significant for all predictor variables.

The actual birth weight was not available for 66% of the infants, as their mothers could not produce health cards. This might have introduced a selection bias in the data analysis because infants with recorded or missing birth weights are likely to have different characteristics. Univariate analysis provides unadjusted effects of predictor variables on the response variable without controlling the effects of other predictor variables. The adjusted effect of a predictor variable is obtained through multivariable logistic regression analysis using recorded or missing birth weight as response variables and all significant factors identified in the univariate analysis as predictors. The results of the logistic regression analysis showing the extent of the effects [odds ratio (OR)] of predictors on having birth weight recorded. Except for Hindu, age group 35-49 and western region of India, all other significant predictors of having birth weight records from the univariate analysis remained significant in the multivariable analysis. Controlling for other factors, Infants of mothers who live in urban places were 1.40 times (OR: 1.40, 95% CI: 1.31-1.50, P < 0.050) as likely to have birth weight recorded than those living mothers in rural places. Rest explanatory variables shown in (Table 4).

Table 4. The results of logistic regression predicting odds of having birth weight record, India, National Family Health Survey (NFHS), 2005-2006.

Variables	Unadjusted		Adjusted		
	OR	95% CI	OR	95% CI	P-value
Place of residence					
Rural**	1.00	-	1.00	-	-
Urban	4.50	4.33-4.69	1.40	1.31-1.50	< 0.001
Education					
No education**	1.00	-	1.00	-	-
Educated < secondary	5.81	5.57-6.06	2.04	1.91-2.17	< 0.001
Secondary and above	27.04	24.97-29.28	4.62	4.10-5.21	< 0.001
Economic status					
Poor**	1.00	-	1.00	-	-
Middle	2.78	2.64-2.93	1.14	1.06-1.23	< 0.001
Rich	9.06	8.67-9.48	1.61	1.49-1.75	< 0.001
Caste					
Others**	1.00	-	1.00	-	-
Schedule caste	0.45	0.43-0.47	0.92	0.85-1.00	0.060
Schedule tribe	0.31	0.28-0.33	1.21	1.08-1.35	< 0.001
Other backward class	0.54	0.51-0.56	0.86	0.80-0.92	< 0.001
Religion					
Others®	1.00	-	1.00	-	-
Hindu	0.56	0.52-0.61	0.94	0.82-1.07	0.330
Muslim	0.39	0.36-0.43	0.80	0.68-0.93	< 0.001
Birth order					
1st order**	1.00	-	1.00	-	-
2nd order	0.72	0.69-0.75	0.87	0.81-0.94	< 0.001
3rd order	0.36	0.34-0.38	0.71	0.65-0.77	< 0.001
4th order	0.22	0.20-0.23	0.63	0.56-0.71	< 0.001
5th and above order	0.11	0.10-0.12	0.53	0.53-0.47	< 0.001
Age of mother					
15-24 years**	1.00	-	1.00	-	-
25-34 years	0.99	0.96-1.03	1.16	1.08-1.24	< 0.001
35-49 years	0.46	0.43-0.50	1.11	0.96-1.28	0.150
Place of delivery					
Home**	1.00	-	1.00	-	-
Institutional	40.54	38.52-42.66	19.83	18.67-21.07	< 0.001
Working status					
Working**	1.00	-	1.00	-	-
Nonworking	1.40	1.35-1.46	1.23	1.15-1.31	< 0.001
Region					
South**	1.00	-	1.00	-	-
North	0.15	0.14-0.16	0.19	0.17-0.21	< 0.001
East	0.13	0.12-0.13	0.30	0.28-0.33	< 0.001
North East	0.13	0.13-0.15	0.31	0.27-0.37	< 0.001
West	0.67	0.63-0.72	0.92	0.83-1.01	< 0.001
Central	0.05	0.05-0.06	0.11	0.10-0.12	< 0.001

* Multivariable logistic regression analysis; ** Reference category
OR: Odds ratio; CI: Confidence interval

Discussion

This paper deals with reporting of birth weight in India including heaping at certain digits and key determinants. This study has three objectives, first one is to study the pattern of the reporting system of birth weight in India and examine the heaping at certain digits. The result showed that only one-third of births in India were weighted at birth either from health card or from recall and remaining two-third births were missing. Further, reporting of birth weight was found lower in rural areas, among uneducated mothers, households with poor economic status, schedule tribes, Muslims, and for higher order births. Birth weight was also reported in less proportion among mothers belong to higher age group, for births that took place at home and in the Central region of India. Significant differential in birth weight reporting between home delivery and institutional delivery suggest that promoting institutional delivery in India may improve birth weight reporting in the country. Further, data revealed that substantial heaping of reported birth weight occurs on weights of exactly 2500 g, the cut-off point for LBW. Some of the birth weights reported as being exactly 2500 g might be of less than 2500 g; thus, not including them could lead to biased estimates of the prevalence of LBW downwards. The birth weight is reported either through health card or mother memory recall, maternal recall of infant characteristics and events occurring during labor and delivery were excellent at four months post-partum (11). The proportion of infants not weighed at birth is routinely reported. Efforts are needed to increase the weighing of newborns and the recording of their weights (10). Infants with missing birth weight records were more likely to have LBW. Maternal recalled birth size appeared to be a poor proxy for birth weight. Estimates of LBW based on maternal assessments of birth size as small should be considered as an underestimate of its actual prevalence. As infants with missing birth weight data have different characteristics from those with recorded birth weight, estimates of LBW depending solely on available birth weight records will produce a biased prevalence (12). Channon found that there were substantial differences in the distribution of birth weights by the method of reporting (2).

Second objective deals with an agreement between low birth based on actual reported weight and LBW approximated using reported birth size based on recall. Agreement analysis showed moderate level ($K = 0.46$, $P < 0.050$) agreement between actual birth and hypothetical birth size. The sensitivity and specificity analysis indicated that 53% of babies reported by their mothers as small were actually LBW, while 91% of LBW babies were accurately assessed by their mothers as small. Although mothers' perception of birth size appeared to be consistent with the recorded birth weight at the aggregate level, there are a substantial number of misclassifications of birth weight, particularly for babies considered small, and it may be concluded that small maternal recalled size is not a satisfactory proxy for LBW. This finding is in agreement with many previous studies (3, 5, 10, 13-15).

Third objective deals to identify key determinants of birth weight reporting. Results suggest that birth weight of infants with missing vs. reporting is likely to have different characteristics. Univariate analysis provides unadjusted effects of predictor variables on the response variable without controlling the effects of other predictor variables. The adjusted effect of a predictor variable was obtained through multivariable logistic regression analysis using missing vs. reporting birth weight as response variables and all significant factors identified in the univariate analysis. All predictors were significant in terms of birth weight records through univariate and multivariable analysis. Subramanyam et al. had also focused to describe the population data, represent and compare the birth weight reported from health cards with maternal recall data in terms of its socioeconomic patterning and as a risk factor for childhood growth failure (16).

Conclusion

Our study summaries that reporting system is poor in India. Due to this poor reporting system prevalent in the country, the actual prevalence of LBW can get affected. Method of reporting can also affect the actual scenario of the LBW due to hypothetical or memory recall base birth size.

Conflict of Interests

Authors have no conflict of interests.

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