ASSESSMENT OF THE EFFECT OF TWIN BIRTHS, REFERENCE PERIODS AND BIRTH SUBSETS ON LOW BIRTH WEIGHT ESTIMATES

MICS METHODOLOGICAL PAPERS

Paper No. 3, 2016

Data and Analytics Section
Division of Data, Research and Policy

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About MICS

The Multiple Indicator Cluster Surveys, MICS, is one of the largest global sources of statistically sound and internationally comparable data on children and women. MICS data are gathered during face-to-face interviews in representative samples of households. The surveys are typically carried out by government organizations, with technical support from UNICEF.

Since the mid-1990s, MICS has supported more than 100 countries to produce data on a range of indicators in areas such as health, education, child protection and HIV/AIDS. MICS data can be disaggregated by numerous geographic, social and demographic characteristics.

As of 2016, five rounds of surveys have been conducted: MICS1 (1995-1999), MICS2 (1999-2004), MICS3 (2004–2009), MICS4 (2009–2012) and MICS5 (2012-2015). The sixth round of MICS (MICS6) is scheduled to take place in 2016–2018. Survey results, tools, reports, micro-data and information on the MICS programme are available at <*mics.unicef.org*>.

About the MICS Methodological Papers

MICS Methodological Papers are intended to facilitate exchange of knowledge and to stimulate discussion on the methodological issues related to the collection, analysis, and dissemination of MICS data; in particular, the papers document the background methodological work undertaken for the development of new MICS indicators, modules, and analyses. The findings, interpretation and conclusions do not necessarily reflect the policies or views of UNICEF.

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1

Summary

Globally, the UNICEF-supported Multiple Indicator Cluster Surveys (MICS) and the USAID-supported Demographic and Health Surveys (DHS) are the main sources of data on low birth weight for developing countries. As large percentages of newborns are not weighed at birth, UNICEF uses MICS and DHS data to estimate low birth weight using a combination of information collected on birth weight and mother's assessment of size of the newborn. While DHS collects data on all births in the last 5 years (before the survey), MICS only collects data on the last birth in the last 2 years and therefore, excludes one twin or two triplets from data collection. Recent evidence shows that rates of twinning and other multiple births vary widely across countries and given that multiple births are known to weigh less at birth than singleton births, this may impact estimates based on MICS due to the exclusion of the first-born twin from estimates. Using DHS data, we examine rates of twinning and multiple births in a number of countries and then estimate if the exclusion of twin births impacts low birth weight estimates. We also examine if the reference period and subset of births (all vs last births in a time period) used in the two survey programmes causes any differences in estimates. Results indicate that low birth weight estimates, regardless of the inclusion of one or both twins, do not differ in any notable way. Estimates based on denominators of all births in the past 5 years and those based on the last birth in the last 2 years before the survey also produce comparable estimates. Similar findings are seen when estimates based on all birth in the last 2 years are compared with those based on the last birth in the last 2 years. Further adjustments to the current subset of births used in MICS surveys to estimate low birth weight are not necessary at this time, although further refinement of the approach used for estimating low birth weight should include means to assess the precision of the resulting indicator.

2

Introduction

Low birth weight, defined by the World Health Organization (WHO) as a birth of less than 2,500 grams (1), is a key indicator of nutrition. Empirical evidence demonstrates that low birth weight infants are 20 times more likely to die than those weighing more than 2,500 grams (2) and numerous other reviews and articles suggest that low birth weight has long-term effects on the health, physical and cognitive development of the child (3,4). The reduction of the incidence of low birth weight is recognized as a formal development goal by “A World Fit for Children” which targeted a decrease of low birth weight incidence by at least one third between 2000 and 2010. While low birth weight was not an official indicator to monitor the progress of the Millennium Development Goals (MDGs), the important role of low birth weight in determining underweight and mortality ensured that this indicator continued to be important in informing MDG1 which focussed on reducing underweight among children under the age of 5, and MDG 4 which targeted the reduction of under-five mortality rates. In the 2030 agenda, while birth weight is not currently listed as a key indicator, data on birth weight will certainly be needed to inform Sustainable Development Goal 3 (Ensure healthy lives and promote well-being at all ages), under target 3.2 (by 2030, end preventable deaths of newborns and children under five years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births).

Monitoring low birth weight is a challenge for many developing countries. The most apparent source of data on low birth weight is health facility records. However, close to half of newborns globally are not weighed at birth, often because these births are delivered outside of health facilities (5). Those births that do occur in health facilities are likely to be a biased sample of newborns of more urban, wealthier and educated families which may be of higher birth weights (6).

An alternative source of data on low birth weight is retrospective information collected in sample surveys. While sample surveys can overcome the coverage issue of health facility statistics, one of the major drawbacks is that many mothers may not recall the birth weight of children, and of course, not all newborns are weighed at birth and therefore data on these births cannot be provided. Initial attempts to use sample surveys to estimate low birth weight occurred in the 1986 Peru Demographic and Health Survey which showed that retrospectively collecting birth weight alone underestimated low birth weight incidence (7). Boerma et al. devised an estimation strategy using reported birth weights and the mother’s assessment of the child’s size (typically collected as “very large”, “larger than average”, “average”, “smaller than average” and “very small”) (8). For births with only size assessments, the proportion with low birth weight in each size category is multiplied by the total proportion of births in the equivalent category. This is added to the proportion of low weight births (for births with weight data) to obtain estimates of low birth weight. Blanc and Wardlaw examined similar data and found evidence of significant heaping of weights at multiple of 500 grams, which can bias estimates especially given that the cut off for low birth weight is at 2,500 grams (9). Based on the distributions of birth weights between 2,000 and

2,999 grams and after removing those at 2,500 grams, these authors further refined the original weighting procedure for heaping by suggesting that one-quarter of births classified as 2,500 grams should be reclassified as low birth weight.

Since these methods were developed, the UNICEF-supported Multiple Indicator Cluster Surveys (MICS) and the USAID-supported Demographic and Health Surveys (DHS) have included standardized questions on the mother's assessment of the size and the weight of the newborns. These surveys have facilitated the development of country-level and global estimates of low birth weight which are maintained by UNICEF. For 2008-2012, close to two-thirds of the global data on low birth weights estimates were derived from MICS and DHS data using this method while 9 percent were from other household survey sources and 28 percent were from administrative records.

While the DHS and MICS surveys collect comparable data on low birth weight, questionnaire designs used by survey programmes differ. Typically, the DHS collects and presents size assessment and birth weights of all children born in the 5 years preceding the survey date while MICS collects and presents this information only for the last born child in the 2 years preceding the survey. To illustrate this difference, we examine the births of three women and examine what data are collected under the DHS and MICS scenarios.

Woman A, B and C had 3, 5 and 4 births respectively over their lifetimes. DHS typically would collect data to produce low birth weight estimates for 2, 5 and 3 births for these women. Woman A, who had 3 births over her lifetime, had 2 births in the last 5 years, both of which are captured by the DHS while in MICS, only information on the last birth is captured. Woman B, on the other hand, had 5 births in the last 5 years, of which two are twins. DHS collects data on all 5 births while MICS would collect data on the last born only, which is a singleton birth. Women C has 4 lifetime births, 3 of which were born in the five years before the survey. These 3 are captured by DHS. The last of these births were twins and were born within two years before the survey. In this case, MICS collects data only on the last-born twin. In the event that the last-born of the twins died, interviewers are instructed to interview on the living twin.

Figure 1. Data collection for the same births using MICS and DHS surveys

All births

Number of years prior to the survey:

	0	1	2	3	4	5+
Woman A	$X^{M,D}$	X^{D}				X
Woman B	$X^{M,D}$	$X^{D}X^{D}$		X^{D}	X^{D}	
Woman C		$X^{M,D}X^{D}$	X^{D}			X

X: singleton birth
XX: twin births
M: data collected by MICS
D: data collected by DHS

This kind of difference in eligibility for questions across MICS and DHS is usually not cause for concern for many indicators. However, recent analysis shows that rates of twinning and multiple births vary across countries and furthermore, multiple births are more likely to be born preterm and small in size to comparable singletons (10-13). These findings suggest a potential downward bias of low birth weight estimated from MICS surveys due to the exclusion of data from all twins and other multiple births. In this paper, we first assess if there is any difference in estimates if data on a twin is excluded from estimates as done by MICS. Then we examine if estimates differ by the reference period used. Finally, we compare estimates using all births in a reference period to using the last birth in the reference period.

3

Data and Methods

We use data from 22 DHS surveys from several geographic regions for the analysis. The selection of these countries was guided by the need to first provide geographic variation which reflects the context within which MICS operates and to select countries that provide variations in the rates of multiple births. For each birth recorded in the DHS, the status as a singleton or multiple birth is captured, which we use to produce unadjusted singleton and multiple birth rates. Singleton rates, for example, are calculated by dividing the number of singleton births by the total number of births, and expressed per 1,000 births. DHS also collects birth weight and size assessment of newborns on all births in the 5 years prior to the survey which allows us to vary the denominators used in the estimation of low birth weight using the estimation technique revised by Blanc and Wardlaw (8). This adjustment procedure is used to calculate low birth weight estimates for each country and for each of four birth sub-groups:

- Approach 1: All births in the 5 years preceding the survey (data collected in DHS surveys and presented in DHS survey reports),
- Approach 2: All births in the 2 years preceding the survey (births during the reference period used in MICS, but inclusive of all births during that period, including all multiple births),
- Approach 3: The last delivery in the last 2 years, including both twins if the birth was not singleton (the third triplet is excluded), and
- Approach 4: The last birth in the last 2 years (data collected in MICS surveys and presented in MICS survey reports).

These sub-groups allow us to examine DHS-MICS differences in estimates as well as the effect of twins on estimates. These estimates allow us to understand if estimates vary due to:

- different reference periods used,
- the inclusion or exclusion of twin births in estimates, or
- the inclusion of all births or only the last birth in a specific reference period.

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Results

Rates of twinning and other multiple births are generally low across countries though there is marked variation in these rates (Table 1). The highest rate of twinning is observed in Benin (55.3 twins per 1000 live births), followed by Ghana and Cameroon (43.3 and 42.8 twins per 1000 live births). The lowest rates are in Bolivia, the Philippines and Honduras, with rates below 15 twins per 1000 live births. In 10 countries, no triplet births were recorded and in the remaining countries, rates were below 2 per 1000 live births, except in Jordan (2.2 per 1000 live births). These rates are so low that any effect on low birth weight estimates are expected to be minimal.

Table 1. Rates of single and multiple births in selected countries

	Rates of single and multiple births per 1,000 live births			Number of births
Survey	Single	Twins	Triplet[1]	
Albania 2010	979.9	18.8	1.3	1,576
Armenia 2005	963.4	36.6	0.0	1,512
Benin 2006	943.7	55.3	1.0	15,929
Bolivia 2008	987.1	11.9	0.7	8,726
Burkina Faso 2003	970.8	28.7	0.6	10,852
Cameroon 2004	955.6	42.8	1.6	8,097
CAR 1996	979.5	20.5	0.0	2,836
Chad 2004	975.2	24.8	0.0	5,989
Colombia 2005	982.1	17.7	0.2	13,801
Congo 2005	959.6	38.6	1.8	4,948
Egypt 2008	960.9	37.8	1.3	10,590
Ghana 2008	956.7	43.3	0.0	2,909
Haiti 2005	976.4	23.6	0.0	5,727
Honduras 2007	986.0	13.7	0.3	10,167
Jordan 2007	966.5	31.0	2.2	9,864
Kazakhstan 1999	976.7	23.3	0.0	1,449
Mozambique 2003	966.9	32.8	0.3	10,620
Nigeria 2008	965.9	33.2	0.9	28,100
Philippines 2008	987.0	13.0	0.0	6,359
Swaziland 2004	973.9	26.1	0.0	2,829
Ukraine 2007	976.6	23.4	0.0	1,177
Zimbabwe 2006	970.1	29.9	0.0	5,231

[1]No cases of multiple births higher than triplets observed

Table 2 shows the percentage of newborns who were weighed at birth and the mean weights of singletons, twins and triplets. It should be noted that this table does not attempt to compare individual weights of singletons, twins and triplets but to compare only at the aggregate level. The percentage of newborns who are weighed at birth varies widely across countries. In Chad, less than 10 percent of births were weighed compared with close to 99 percent in Jordan and Ukraine. Among newborns who were weighed, twins and multiple births weigh less than singleton births and are more likely to be underweight, as expected. However, our results also indicate that the first of multiple births does not necessarily weigh more than the second or third multiple births. In a number of countries, the second born twin or triplet, on average, weighs more than the first multiple birth and in 5 countries, the difference is over 100 grams. For example, in Armenia where virtually all births are weighed, the mean weight of the first multiple birth is 2,338 grams while the mean weight of the second multiple birth is 2,452 grams. Consequently, the inclusion of the last born twin as part of low birth weight estimates does not necessarily indicate a direction of bias in estimates that include only 1 twin.

Table 2. Comparison of mean birth weights among singleton and multiple births in selected countries

Country	Percent weighted at birth	N	Mean weight[1] of:							
			Singleton	N	1st twin/ triplet	N	2nd twin/ triplet	N	3rd triplet	N
Albania 2010	98.0	1,576	3,349	1513	2,634	15	2,515	15	1,700	1
Armenia 2005	98.0	1,512	3,197	1435	2,338	24	2,452	23	-	0
Benin 2006	58.7	15,929	3,051	8760	2,499	286	2,474	297	1,550	4
Bolivia 2008	71.5	8,726	3,347	6158	2,480	38	2,351	38	1,600	2
Burkina Faso 2003	27.1	10,852	2,981	2853	2,237	42	2,240	43	2,140	2
Cameroon 2004	55.9	8,097	3,371	4284	2,659	118	2,716	122	1,848	2
CAR 1996	51.3	2,836	3,111	1421	2,394	15	2,505	15	-	-
Chad 2004	9.8	5,989	3,439	575	2,868	6	2,904	6	-	-
Colombia 2005	73.9	13,801	3,235	10002	2,501	98	2,361	99	2,300	1
Congo 2005	85.1	4,948	3,229	4049	2,407	76	2,379	80	2,098	3
Egypt 2008	41.7	10,590	3,047	4209	2,540	102	2,490	104	1,679	2
Ghana 2008	42.9	2,909	3,265	1176	2,632	35	2,646	34	-	-
Haiti 2005	20.3	5,727	3,580	1108	3,493	28	3,461	27	-	-
Honduras 2007	68.8	10,167	3,327	6882	2,513	51	2,422	52	2,100	1
Jordan 2007	99.1	9,864	3,165	9457	2,518	153	2,418	156	1,118	7
Kazakhstan 1999	97.0	1,449	3,311	1374	2,252	15	2,367	15	-	-
Mozambique 2003	46.2	10,620	3,045	4745	2,377	84	2,279	82	1,600	1
Nigeria 2008	18.2	28,100	3,309	4917	3,062	93	3,017	88	2,609	2
Philippines 2008	72.5	6,359	2,997	4554	2,181	29	2,128	29	-	-
Swaziland 2004	83.8	2,829	3,223	2304	2,648	33	2,505	31	-	-
Ukraine 2007	99.2	1,177	3,300	1140	2,530	14	2,608	14	-	-
Zimbabwe 2006	71.7	5,231	3,128	3640	2,466	54	2,425	54	-	-

[1] Only for children weighed at birth

Various estimates of low birth weight using several different populations are presented in table 3, along with the percentage of newborns that are weighed at birth. These estimates allow us to understand if estimates vary due to:

- the inclusion or exclusion of twin births in estimates,
- different reference periods used, or
- the inclusion of all births or only the last birth in a specific reference period.

Comparison of ***Approach 4 and 3***
How much would estimates change if twins are excluded from analysis?

The effect of excluding twins from estimates can be quantified by comparing approach 3 (last delivery in the last 2 years, including twins) with approach 4 (last birth in the last 2 years). Approach 3 and 4 produce similar estimates for the vast majority of countries and differences are below 1 percentage point. It should be noted that Approach 4 produces lower estimates for all countries except for Albania where there is no difference. For example, in Bolivia, approach 3 produces an estimate of 5.8 percent while approach 4 for the same country yields 5.5 percent. In Benin, Ghana, Mozambique and Swaziland, the exclusion of twins from estimates caused a difference of 1.1 to 1.2 percentage points, which are not appreciably large. This is an expected pattern given that rates of twinning is quite high in Benin and Ghana. However, twinning rates are moderate in Mozambique and Swaziland and among several countries with similar or even higher levels of twinning such as Cameroon, Congo, Egypt and Zimbabwe, the exclusion of twins produces much more minor effects. This may indicate that other determinants of low birth weight are operating to offset differences due to twins. Overall, as twinning is rare, we see little change in estimates.

Comparison of ***Approach 1 and 2***
What is the effect of changing the reference period on low birth weight estimates?

Comparing approach 1 with approach 2 shows differences in estimates due to reducing the reference period from births in the previous 5 years to births in the previous 2 years. The range of differences is rather small, from only 0.1 to 2.4 percentage points. In all countries studied, differences are minimal (below 1 percentage point). The outliers are Congo and Kazakhstan (2.4 and 1.1 percentage point differences respectively). In half of the countries, the reduction in reference period produced a higher estimate of low birth weight (for e.g., Benin) and in the other half of the countries, the opposite occurs (see Mozambique). The percentage of births weighed is also indicated in Table 3. Not surprisingly, the percentage of births weighed in the previous 5 or previous 2 years are similar, indicating that differences in estimates can be due to differences in reference period rather than the percentage of births weighed. An alternate possibility is that these differences are due to differential data quality from survey to survey, though this remains untested in this analysis.

Comparison of ***Approach 4 and 2***
What is the effect of excluding twins and preceeding singleton births in the same reference period?

The inclusion of all births in the two years before the survey (approach 2) compared to using data on only the last birth in the last 2 years (approach 4) shows that changing the population of study in this manner produces again small differences in estimates. In the vast majority of countries, differences in estimates are all below 1 percentage point except in Benin, Chad, Ghana, Mozambique and Swaziland where differences in estimates are at most 1.4 percentage points. The additional use of all births in the last 2 years produces higher estimates compared with estimates using the last birth in the last 2 years. These differences may be indicative of improving nutrition status of younger cohorts of births.

*<u>Comparison of **Approach 1 and 4**</u>*

How much would the estimates change if all births in the previous 5 years are used compared with the standard MICS approach (last birth in the last 2 years)?

A composite comparison of the subset of births included in analysis, exclusion of twins and differences in reference periods can be viewed through a comparison of estimates using all births in the previous 5 years (approach 1) and using only the last birth in the previous 2 years (approach 4). This comparison shows that differences in estimates are below 1 percentage point in all but 7 of the 22 countries. The most extreme example is Congo where the point difference in estimates is 3.0 while the differences in the remaining 6 countries are less than 2 percentage points. The comparison also reveals that approach 1 (all births in the 5 years preceding the survey) produces estimates that are universally higher than approach 4, except for the Philippines where the difference is only 0.2 percentage points lower.

Table 3. Comparison of various low birth weight estimates

	Low birth weight estimates using:											
	Approach 1			Approach 2			Approach 3			Approach 4 (MICS)		
Survey	All births in previous 5 years	% weighed at birth	N	All births in previous 2 years	% weighed at birth	N	Last delivery in previous 2 years, including twins	% weighed at birth	N	Last birth in the previous 2 years	% weighed at birth	N
Albania 2009	4.1	98.0	1,576	3.7	98.6	541	3.6	98.6	527	3.6	98.6	523
Armenia 2005	8.4	98.0	1,512	8.3	98.7	641	8.5	98.7	615	7.9	98.7	603
Benin 2006	14.9	58.7	15,929	14.3	65.9	6,661	14.2	66.1	6,572	13.0	65.9	6,380
Bolivia 2008	6.3	71.5	8,726	5.8	74.2	3,552	5.8	74.3	3,448	5.5	74.2	3,418
Burkina Faso 2003	18.7	27.1	10,852	19.1	29.6	4,303	19.1	29.8	4,262	18.4	29.9	4,201
Cameroon 2004	13.2	55.9	8,097	13.5	58.0	3,321	13.5	58.0	3,235	12.7	57.8	3,173
CAR 1996	14.3	51.2	2,836	13.9	51.1	1,895	13.7	50.9	1,857	13.4	51.0	1,841
Chad 2004	21.7	9.8	5,989	21.6	9.8	2,335	21.2	9.8	2,286	20.5	9.8	2,251
Colombia 2005	9.4	73.9	13,801	9.6	80.4	5,512	9.5	80.7	5,366	9.2	80.8	5,310
Congo 2005	13.5	85.0	4,948	11.2	85.4	2,099	11.1	85.8	2,045	10.5	85.8	2,017
Egypt 2008	12.9	41.7	10,590	13.3	44.7	4,659	13.3	44.8	4,532	12.8	44.7	4,444
Ghana 2008	13.4	42.8	2,909	13.3	46.6	1,228	13.1	46.8	1,205	11.9	46.6	1,178
Haiti 2005	24.6	20.3	5,727	25.0	23.5	2,408	24.8	23.9	2,349	24.3	23.7	2,319
Honduras 2005	10.2	68.7	10,167	10.0	71.8	3,986	10.0	72.1	3,883	9.6	72.0	3,852
Jordan 2007	12.6	99.1	9,864	12.7	99.1	3,940	12.4	99.1	3,732	11.9	99.1	3,673
Kazakhstan 1999	8.2	97.0	1,449	7.2	97.9	536	7.0	97.8	519	6.3	97.8	515
Mozambique 2003	15.4	46.3	10,620	15.9	49.4	4,386	15.7	49.6	4,339	14.6	49.8	4,245
Nigeria 2008	11.6	18.2	28,100	12.1	19.3	11,570	12.0	19.3	11,229	11.1	19.2	11,027
Philippines 2008	20.9	72.5	6,360	21.7	73.6	2,559	21.3	73.8	2,437	21.1	73.8	2,423
Swaziland 2004	8.9	83.7	2,829	9.7	85.0	1,191	9.5	85.1	1,164	8.3	85.0	1,147
Ukraine 2007	4.2	99.2	1,177	3.4	100.0	424	3.4	100.0	419	3.2	100.0	417
Zimbabwe 2006	11.4	71.6	5,231	11.6	70.5	2,198	11.5	70.6	2,173	10.9	70.5	2,144

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Discussion

Household surveys are currently the major source of data for the production of low birth weight estimates for many developing countries where records of birth weight are incomplete. This analysis shows that excluding a twin birth, changing the reference period or including all or last births in the analysis produces only small effects on point estimates of low birth weight. These small effect do not have implications for policy or programmes to improve birth weight. The inclusion of only the last born in low birth weight estimates compared to other estimates does not appreciably alter levels of the indicator. We also note that MICS estimates are lower in three of the four comparisons (excluding twins, excluding twins and other singletons, and the composite comparison of all births in the previous 5 years to only the last birth in the last 2 years), the differences are not appreciably large.

One of the limitations of this analysis is that estimates are produced without confidence intervals which can be used to directly test if estimates from one population to another are statistically different. The lack of confidence intervals is not a choice in the analysis but an inherent limitation of this estimation technique which does not allow for such calculation. Further work to improve the measurement of low birth estimates should include means of identifying levels of precision of this indicator. A second potential bias may occur in our comparison of subsets of births. While the results show that overall, the effect of changing the subset of births is minimal, there is the possibility that the nutritional status of women, gestational age of newborns and other determinants of low birth weight have improved during the reference periods used (from 5 to 2 years, for example). However, we expect that these changes are not large and more so, they are gradual. Consequently, the impact of these changes on indicator levels should also be minimal. We do not control explicitly for parity which may affect results. However, since the number of multiple births are small, even parity effects may not result in large differences in results. Further, in this analysis we do not control for the quality of the data; both data from the mother's report and that of cards are known to show heaping of data which can vary across country. Accounting for this is perhaps beyond the scope of this analysis. Finally, we assume that the method of estimating low birth weight is not sensitive to changing the subset of births. Further analysis of this assumption should be done.

The MICS approach is in some ways advantageous compared with other approaches outlined in this paper as data requirements using MICS methods are lower; the mother's assessment of the newborn's size and birth weight need be collected only for the last born child in the last two years compared with multiple data points for numerous births. The MICS approach eliminates recall problems for births that occurred in the distant past (4 or 5 years before the survey). However, the MICS approach uses smaller sample sizes compared with other approaches and therefore confidence intervals around estimates should be theoretically larger.

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References

(1) World Health Organization. International statistical classification of diseases and related health problems. : World Health Organization; 2004.

(2) Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. Bull World Health Organ 1987; 65(5):663-737.

(3) Hack M, Klein NK, Taylor HG. Long-term developmental outcomes of low birth weight infants. The future of children 1995:176-196.

(4) Barker DJP editor. Fetal and infant origins of disease, London: BMJ books; 1992.

(5) Low birthweight: Current Status and Progress. UNICEF, 1 Nov. 2014. Web. Accessed: 3 Mar. 2015. <http://www.data.unicef.org/nutrition/low-birthweight>.

(6) Goldstein H. Factors related to birthweight and perinatal mortality. Br. med. BUN. 37, 259-264, 1981.

(7) Moreno L, Goldman N. An assessment of survey data on birthweight. Soc Sci Med 1990; 31(4): 491-500.

(8) Boerma JT, Weinstein KI, Rutstein SO, Sommerfelt AE. Data on birth weight in developing countries: can surveys help? Bull World Health Organ 1996;74(2):209-216.

(9) Blanc AK, Wardlaw T. Monitoring low birth weight: an evaluation of international estimates and an updated estimation procedure. Bull World Health Organ 2005;83(3):178-185d.

(10) Blondel B, Kogan MD, Alexander GR, Dattani N, Kramer MS, Macfarlane A, et al. The impact of the increasing number of multiple births on the rates of preterm birth and low birthweight: an international study. Am J Public Health 2002 Aug;92(8):1323-1330.

(11) Kiely JL. What is the population-based risk of preterm birth among twins and other multiples? Clin Obstet Gynecol 1998;41(1):3-11.

(12) Powers WF, Kiely JL. The risks confronting twins: a national perspective. Obstet Gynecol 1994;170(2):456-461.

(13) Smits J, Monden C. Twinning across the developing world. PLoS One 2011;6(9):e25239.

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