An evaluation of use of maternal recalled birth size as a proxy measure of birth weight

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Birth weight is one of the key predictor of child survival, health and future development of child. The incidence of low birth weight (LBW) - defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams (i.e. 2.5 kgs or 5.5 pounds) has been selected as an important indicator for monitoring the major health goals by the World Summit for Children.

In developing countries data on birth weight are very difficult to obtain, as most births occur outside health facilities, and many infants are not weighed at the time of birth, while those weighed at birth are often not given a formal record of birth weight or birth certificate. As an alternative solution, recent population based national level surveys collect information on birth weight by posing a question regarding the physical size of the baby at birth, which can be used as a proxy for birth weight. A mother may be ignorant about the numeric birth weight of her baby or face difficulty in recalling the birth weight, but she can easily remember the size of her baby. The well known Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), Pan Arab Project for Child Development (PAPCHILD) and Reproductive Health Surveys (RHS) are increasingly using the question on physical size of the infant at birth as a proxy for birth weight in many developing countries.

In the population-based surveys, mothers are asked to classify the size of their newborn into different categories, ranging from very small to very large. It is, therefore, important to evaluate the usefulness of mother's subjective assessment of birth size as a proxy measure of numeric birth weight.

This study examines the utility of maternal recalled birth size as a proxy measures for numeric birth weight in Oman using the population based survey data from the 2000 National Health Survey (NHS) of Oman. The 2000 NHS in Oman has collected both mothers' retrospectively recalled size of the baby and the numeric measure of birth weight. The survey data thus provide a unique opportunity to examine the utility of maternal subjective assessment of birth size as a proxy measure for numeric birth weight. In addition, the study examines whether there is a systematic bias in having recorded birth weight that may affect the estimate of LBW.

The study considered only the singleton last live birth under age five. Twin births were excluded from the analysis. Information on mother's perception about birth size was obtained by asking the question "How do you evaluate the size of your child at birth?" The response categories were: 1. less than normal size (small size), 2. normal size, and 3. bigger than normal size. The above question was asked before asking the question related to the actual birth weight to minimize the influence of mother's knowledge about numeric birth weight on her assessment of birth size.

The survey gathered information on birth weight from child's health card issued by health facility. As Oman has an universal free health care system, almost all the deliveries occur in health facilities, mostly in public health facilities, and the birth weight of new born babies are recorded by the health personnel. It is worth mentioning that the recorded birth weights in health cards are more reliable than maternal recalled birth weights.

The consistency between mother's assessment of birth size and recorded birth weight measures from health card were analyzed by comparing the birth size (categorizing into small size and normal size) with birth weight categorizing as: LBW

(<2.5 kgs) and normal birth weight ($\geq 2.5 kgs$). The analysis focused on the usefulness of the category "less than normal size or small size" as indicator of LBW. Mothers' reports were considered in close agreement when the reported size of the baby as small or normal corresponded to the categories of birth weight, LBW and normal weight, respectively.

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, a one-way analysis of variance (ANOVA) was conducted to test the null hypothesis that all the three categories of maternal evaluation of birth size have the same mean numeric birth weight. Both bivariate and multivariate analyses were conducted to identify the significant differentials and determinants of having birth weight records. For multivariate analysis, logistic regression was performed with birth weight recorded or missing as dichotomous dependent variable and selected socioeconomic, demographic and health variables as explanatory variables. The chi-squared test was used to detect associations between two categorical variables and κ (Kappa) statistic was used to test for agreement between categories of weights and sizes. All analysis were done using Predictive Analytics Software (PASW) Statistics 18 version (SPSS Inc.).

Based on reported birth weight from health card, the estimated prevalence of LBW in Oman was 9% in 2000. The estimated prevalence of LBW is likely to be downward bias for mainly two reasons. Firstly, it is based on a subgroup of infants for whom birth weights were available. Secondly, it is affected by heaping of reported birth weights that occur on weights of exactly 2.50 kg, the cut-off point for LBW.

Maternal recalled birth size as small is not a sensitive indicator of LBW. The sensitivity and specificity analysis indicate that 55% of babies reported by their mothers as small size were actually LBW, while only 44% of LBW babies were accurately assessed by their mothers as small size. The analysis indicate that any estimates of LBW on the basis of maternal recalled birth size as small should be considered as underestimates of the actual prevalence of LBW.

Ninety-two per cent mothers provided concordant results i.e. the categories of sizes (small size and normal size) they recalled were in agreement with the categories of recorded birth weight (LBW and normal weight). The agreement may be considered as moderate (Kappa=.442, p<0.001) for the detection of LBW babies. Although mothers' perception of birth size appeared to be consistent with the recorded birth weight in aggregate level, there are substantial amount of misclassifications of birth weights, particularly in small size category, and it may be concluded that maternal recalled small size category is not a satisfactory proxy indicator of LBW. This finding is in agreement with the finding of many previous studies.

Although maternal recalled birth size is not appeared as a satisfactory proxy indicator of low birth weight, nonetheless, it may be used as a proxy indicator to assess the health at birth or monitor the birth weight in countries where there is no complete record of birth weight from any sources. It can also be used for differential analysis, programme design, and development of service delivery programme related to birth weight.