Birth Weights and Gestational ages of Malawian Newborns at Queen Elizabeth Central Hospital – Blantyre Malawi – A Retrospective Analysis

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Abstract

Objective: to determine the distributions of birth weight (BW) and gestational age (GA) and calculate rates of still birth (SB) of four years delivery in the Queen Elizabeth Central Hospital(QECH)

Methods: Retrospective analysis was carried out on data of deliveries conducted between January 2000 and December 2003. Mean BW, mean GA, rates low birth weight (LBW), preterm delivery and SB as well as sex ratio were determined.

Results: There were 36439 singleton deliveries weighing 1000-- 5830g. Male to female ratio was 106. Seventy-nine percent were spontaneous vaginal deliveries and 13.3% were delivered by Cesarean sections. Stillbirths accounted for 3.4%. The overall mean BW for live births was 2964g (SD 526g). Males were heavier (3015g), than females (2911g), P value< 0.01. About fourteen percent of live births were Low birth weight (LBW), but only 2 % weighed more than 4000g. More females (15.3%) were born as LBW than males (12.3%), P<0.001. The mean GA was 37.1 weeks, (SD= 2.25). 32.6% were delivered before 37weeks. A small proportion of males were born preterm than females, while the opposite was found of post term deliveries.

Conclusion: Mean BW and GA were low; LBW and preterm deliveries are high compared with regional and global figures. There was also a high SB rate. It is time to consider programmes to reduce the risks for unfavourable birth outcomes.

Introduction

Birth weight is an important determinant of newborn survival, healthy growth and development. It is an index of mother's health and nutritional status during pregnancy. Low birth weight is associated with high rate of infant mortality and impacts on future development (1, 2,). Therefore, data on birth weight distribution are needed for monitoring and evaluating strategies for lowering perinatal/infant mortality and morbidity.

Birth weights vary worldwide based on socio-demographic, socio economic, ethnic, and clinical factors (1,2). Low socio-economic status is often associated with insufficient nutrition, inadequate perinatal care, and poor maternal health. These impair the rate of foetal growth. Maternal age and parity as well as altitude affect BW (2, 5, 6). Globally, one in six live births is LBW; over 90% are from developing countries. Indeed many developing countries have LBW rates of twice those found in developed countries (7). Mean BW for hospital deliveries in sub-Saharan African is reported as 3132 g; while LBW rate was 8.4% (8). Mean BW for the developed world is reported as 3631g; with 20% of deliveries over weight (4) but only 5.4% are LBW (1)

Gestational age is also an important factor determining neonatal survival. Preterm delivery is one of the most important factors contributing to perinatal mortality (3, 10, 12, 13). However, obtaining accurate GA, especially in retrospect, may be unreliable (20).

A stillbirth rate of 4.5% was reported from rural Malawi (9). This is in contrast to reports from other developing countries with SB rates between 0.53% to 2.4% (9, 15, 16,21).

In Malawi there are several important risk factors for LBW, Preterm delivery and SB; hence, a high rate of perinatal mortality and morbidity might be expected.

We undertook this retrospective analysis to determine the BW and GA characteristics of singleton live births at QECH during the period January 1st 2000 to December 1st 2003. Rates of SB, the sex ratio and mode of delivery were also assessed. The finding of this report will describe birth outcome at QECH. It may help in planning and executing preventive measures against the high perinatal mortality and morbidity. It can also serve as background material for further studies.

Materials and method:

At QECH, deliveries are attended by midwifes, clinical officers, interns and medical officers. On admission to the labour ward, GA was estimated by the attendant usually based on menstrual calendar. At times GA estimations are made by ultrasound or by extrapolation from earlier antenatal records based on positive pregnancy tests, first date of quickening or first date of foetal heart beat detection. The GA estimated by the attendant was recorded in a specially designed delivery record book. After delivery, the newborn was weighed in grams and the weight, sex, mode of delivery, outcome (alive or dead) were recorded in the delivery record book. The maternal socio demographic data were also noted. This data was transferred to a computer by a trained data entry clerk. The records of 39002 deliveries conducted from January 1st 2000 to December 31st 2003, were retrieved. Data were cleaned for errors and biologically implausible entries. Variables were recoded to standardize names and labels. Thirteen thousand two hundred and seven (3.40%) were sets of twin deliveries and 27 (0.07%) were triplets. These multiple deliveries were excluded from this analysis.

The remaining 37,627 (96.52%) deliveries were singletons, 36,439 of these weighed between 1000 and 5830g; others were excluded as either nonviable pregnancies or biologically implausible entries. Sex ratio, mode of delivery and rate of SB and live birth deliveries were calculated on this group. Thirty-five thousand and twenty (96.6%) newborns were live births; BW and GA were analyzed for these live births.

Analysis was carried out using descriptive procedures of SPSS statistical software (version 11). Mean BW and GA were compared between male and female newborns using independent sample t-test. Birth weight was categorized as LBW, NBW, and OBW; and GA was categorized as preterm, term and post term. Comparisons were then made between the two sexes using Chi-square test. Birth weight and GA were compared with categories of maternal age and parity using one-way analysis of variance.

In this report terms used are defined as follows: LBW is the weight of a newborn between 1000 and 2499g; Normal Birth Weight (NBW) is between 2500 and 3999; OBW is when BW is > 4000g. Preterm delivery is defined as GA between 28 and 36 weeks. Term delivery is defined as GA between 37 completed weeks to 41 weeks; Post term > 42 completed weeks. Stillbirth is delivery of a foetus weighing at least 1000g and recorded as dead by the delivery attendant. A pregnancy is considered viable if it has attained GA of 28 weeks and foetal weight of 1000g. Primipara is a mother without prior experience of viable pregnancy; a multipara has had up to four or and a grand multipara has had five or more viable pregnancies.

Results

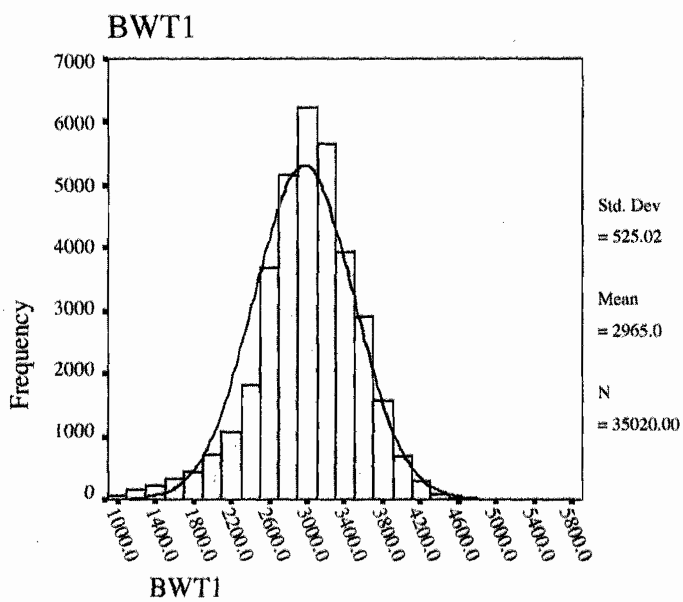
There were 36439 singleton deliveries weighing 1000- 5830 g. One thousand eight hundred and eight (51.5%) were males and 17528 (48.5%) were females. Data on sex was missing for 333 deliveries and these were excluded from analysis. Seventy–nine percent of the deliveries were spontaneous vertex vaginal births. Other modes of deliveries were: cesarean section 13.3%, vaginal breech 2.2%, vacuum 5.2%, forceps 0.1% and laparotomy 0.1 %. Destructive deliveries were very few (<0.01%). One thousand two hundred and four (3.4 %) of the deliveries were still-born; 35020 (96.6%), live born. In 198 deliveries it was not recorded whether they were born alive or dead. Birth weight and GA were analyzed for the 35020 viable live births.

Birth weight (N=35020)

The overall mean BW was 2965g (SD 525g). The BW was nearly normally distributed

Mean BW for the males was 3016g, [SD=535 (95% CI= 3008-3023)]; for females 2911, [SD=507(95% CI= 2904-2919)], P < 0.001.

Fig.1: Histogram showing the distribution of BW for singleton live births.



Four thousand eight hundred and seven (13.8%) of the viable singleton live births were LBW, 29508 (84.3 %) were NBW and 695 (2 %) were OBW. 2187 (12.3%) of males were LBW and 485 (2.7%) were OBW; whereas, 2578(15.3%) of females weighed less than 2500 g, but only 200 (1.2%) were OBW. These differences in BW as LBW and OBW between the sexes were statistically significant (P<0.001).

Maternal age was 12-50 years (mean =23 years, SD=5). Teenagers account for 26.6% of mothers. Birth weight and GA were significantly low among the teenager mother compared with other age groups (Table 1).

Table 1: Mean BW by maternal age

Maternal age	N	Mean	Std. Dev.	Std. Error	95% CI for Mean	
					Lower Bound	Upper Bound
12-19	9087	2825	493	5	2815	2835
20-29	20070	2999	525	4	2991	3006
30-39	4622	3086	531	8	3071	3101
40-50	399	3032	535	27	2980	3085
Missing	842	2976	520	18	2941	3011
Total	35020	2965	525	3	2959	2970

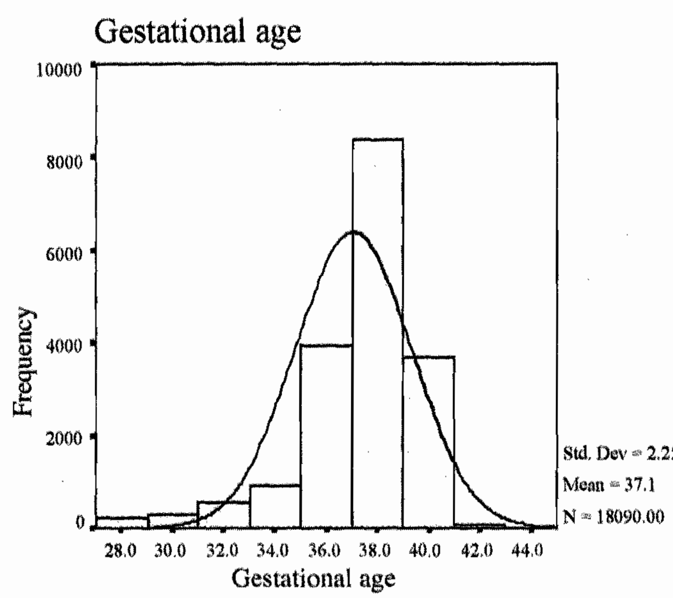
The difference in mean BW between all groups was statistically significant P<0.001.

Mean BW was also assessed by parity: for primiparas = 2858g (SD=491); for multiparas, 3043g (SD=535g); for grand multiparas, 3040g (SD=536). The differences between primipara and multipara as well as grand-multipara were statistically significant, p<0.001. However there was no such differences between multiparas and grand multiparas, P>0.05.

Gestational age (N= 18090):

Records on GA were available for 18090 of the 35020 singleton live births: data were missing for 16835 deliveries. An additional 105 cases were excluded because of definition of viability or implausible entries. The mean GA for both sexes was 37.1 weeks (SD= 2.25) weeks. Mean GA for males was 37.11 weeks (SD of 2.27) and 37.00 weeks for females, (P =0.001, 95 % CI 0.17-0.42), [figure 2].

Fig 2: Histogram showing the distribution of GA.



About one third (32.6%) of deliveries were preterm and 67.1% term, but only 0.3% was post term. Males were delivered preterm in 31.6% of cases, term in 68.1% and post term in 0.2%. In females 33.7% were preterm, 66.1% term and 0.1% were post term. The difference was statistically significant $p<0.01$

Mean GA is lowest among the primiparas, 36.93 weeks (SD=2.19) and increases to 37.13(SD=2.31) among multiparas and 37.36 weeks (SD=2.18) for the grandmultipara group. The differences in mean GA are significant between the three groups, $P< 0.001$.

The lowest mean GA was found in teenager mothers; it is highest in mothers age 30-40 years and decreases in the age group 40-50 years. The difference in GA between babies of teenagers and mothers in their twenties and thirties is statistically significant, $P <0.001$. However the difference was not significant between the teenagers and forties age group, $P> 0.05$ (Table 2).

Table 3: Mean GA by maternal age category

Maternal age	N	Mean	Std. Dev	Std. Error	95% CI for Mean Lower Bound	95% CI for Mean Upper Bound
12-19	4958	36.84	2.24	0.03	36.77	36.90
20-29	10306	37.09	2.26	0.02	37.04	37.13
30-39	2304	37.39	2.20	0.05	37.30	37.48
40-50	194	37.01	2.35	0.17	36.68	37.34
Missing	328	36.91	2.34	0.13	36.66	37.17
Total	18090	37.05	2.25	0.02	37.02	37.09

Discussion

Birth weight is an important predictor of survival and future development of a newborn and varies widely around the world with socio-demographic, socio-economic and clinical factors (1, 2, 3, 4). Our finding of mean BW of 2965g was much lower than those from the western world (1, 2, 4), but it was similar to that of some Asian studies (9). However, the Asian reports were based on a viability definition of 20 weeks GA or 500g BW. The authors did not indicate whether multiple pregnancies and SBs were included or not. Our analysis shows lower mean BWs and higher LBW rates of deliveries at QECH than other similar institutes within the region. In similar institute in Addis Ababa, Ethiopia, mean BW of 3126 g, and LBW rate of 8.4% were reported (8). A lower prevalence of malaria in that population might in part explain this discrepancy. Birth weight increases with decrease in altitude (6). Thus one would expect heavier newborns in Blantyre (altitude 1000 meters) than in Addis Ababa (altitude 2,400m). In Tanzania, in a population with high rate of infection of malaria, HIV and intestinal parasites BW was found to be 3015g, and LBW rate of 11.1 %(11). Our BW finding is 60 g less than that of the Tanzanian report.

Low socio economic status, malnutrition, anaemia, malaria, HIV/AIDS, hypertensive disorders of pregnancy, low maternal weight and stature, teenage pregnancy are known risk factors for LBW. As in many developing countries, these factors are common in Malawi and low mean BW, and high rate of LBW may be explained by these. Our data is from a central referral hospital and it may not represent the rates in the general community. The relevance of these factors may need further investigation.

This study also found that on average male newborns were heavier (by 105g) than females. This agrees with other reports (5, 7). Obtaining accurate information on GA is a challenge in perinatal research especially in retrospective studies (20). In this study GA was taken as recorded by the delivery attendant and may suffer from lack of standardization, completeness or accuracy. Indeed the GA record was missing for many deliveries (N=16835). Missing GA records were randomly distributed in the study population. The mean GA in our study was low and, the pre-term delivery rate of 32 % was high compared with other reports (12, 13). Our audit of GA was based on subjects from a central referral hospital with probably higher rate of preterm delivery. As a result, low mean GA and high rate of preterm delivery were not unexpected, and need further confirmation.

The male to female ratio of 106 to 100 is in agreement with the global ratio (14). A still birth rate of 3.4% was lower than previously reported (4.5%) from southern Malawi (15). However this is very high when compared with other reports (8, 16, 17).

The average caesarean section (CS) delivery rate was reported as 7·4% in Trinidad; but 20% in some urban communities in India (18, 19). Most rates from the developing world lie between these two extremes. Our CS rate of 13.3% is with in this range. However, this audit shows operative vaginal deliveries (vacuum and forceps) appear to be under utilized (22).

We found low mean BW and low GA as well as high rates of LBW, Preterm delivery and SB. These findings should be considered seriously in order to reduce perinatal mortality and ensure healthy future for newborns in Malawi. Further studies should be carried out to give more complete information for clinicians, policy makers and public health advocates.

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