# Average birth weight of term newborn babies: a hospital based study in Thimphu, Bhutan

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## ABSTRACT

**Introduction:** The birth weight of every new born is a key predictor of its immediate outcome and indirect indicator for later development. There were no studies done in Bhutan to look at the average term birth weight. This study was under taken to estimate the average term birth weight of new born in Jigme Dorji Wangchuck National Referral Hospital in Thimphu and to study its correlation with maternal factors and sex of the new born. **Methods:** This was a retrospective study with data collected from the birthing center record for those delivered between January 2011 to December 2014. A total of 13,647 singleton babies were included. Other variables studied maternal age, parity, education level, family income, antenatal booking visits, sex of baby and maternal ethnic origins. Data were analysed for correlations. **Results:** From the 13,647 singleton cases, the overall average term birth weight for new born was 3,177± 435 g with boys (mean weight 3,228± 435g) being heavier than girls (mean weight 3,121 ± 429 g). This study also proved the expectation that birth weight will improve with improvements in economic situation and female literacy level. The term birth weight was positively correlated with parity, number of antenatal visits, family income, maternal education level and age. **Conclusions:** The average term birth weight of new born in JDWNRH is 3,177± 435 g. The mean birth of North Bhutanese (mean as 3,260 ± 436g) is heavier by 200g than the South Bhutanese (mean as 3,060 ± 411 g).

**Keywords:** Newborn; Term birth weight; Thimphu.

## INTRODUCTION

The maturity of the newborn is estimated from the birth weight (BW)[1]. The birth weight is an important indicator of the probability of newborn not only to survive but also whether the baby will experience healthy growth and development[2].

The contribution to the total infant mortality rate is about 20 times more for babies with low birth weight than the normal group[3]. World health organization has defined low BW as BW of <2500g[4]. Low birth weight babies have high perinatal morbidity and mortality.

The Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) have about 4000 births per year. However, we don't have any studies done to know the average term birth weight. The present study was undertaken with the objective to find out the average term birth weight of singleton babies born in JDWNRH.

## METHODS

This study was a retrospective study. Data were collected from the birthing center record of the Department of Obstetrics and Gynecology of JDWNRH. During the study period from January 2011 to December 2014 there was total of 15,927 births. Exclusion criteria was used to exclude cases of multiple pregnancy, Intrauterine growth restrictions (IUGR), Intrauterine fetal deaths (IUFD)/Stillbirths, fetal anomalies and all cases with medical complications eg PIH/DM/ Heart Diseases. Finally, 13,647 singleton babies were recruited into the study who delivered between period of gestation (POG) from 37 completed weeks to 41 weeks 6 days. Expected date of delivery (EDD) was calculated based on reliable last normal monthly period (LNMP) that agrees with early ultrasound dating with 7 days or the EDD was based on ultrasound dating done before 20 weeks of POG. The birth weight was taken by SECA 354 baby weighing scale.

Variables studied maternal age, parity, education level, family income, antenatal booking visits, sex of baby, fetal birth weight in grams. There are two major ethnic groups in Bhutan are North Bhutanese and South Bhutanese/Lhotsampa. Information about the mothers' ethnicity was also collected. Simple analysis of the data for correlation and means were calculated using SPSS version 17. Permission was obtained from the hospital authority to use the patient data. Ethical clearance was obtained from the Research Ethics Board of Health, Ministry of Health, Bhutan.

## RESULTS

From the 13,647 singleton live born babies during the study period, 7,095 (51.9%) were males and 6,579 (48.1%) were females. The overall mean term birth weight was 3177± 435 g; boys (mean weight 3,228± 435g) were heavier than girls (mean weight 3,121 ± 429 g).

The mean age of the mother are shown in Table 1. The mean age of the mothers in Northern Bhutanese (mean age 26.1 ± 4.8 years) and South Bhutanese (mean age 25.6 ± 4.8 years). The mothers in the South Bhutanese were younger by nearly half a year than in the North Bhutanese group.

The distribution of mean birth weight according to age of the mother is depicted in Table 2. The mean birth weight increased with the increasing age of the mother ($p< 0.001$).

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**Table 1. Mean Maternal Age**

| Category | No | Mean (Age) | SD |
|---|---|---|---|
| Combined average age | 13647 | 26.1 | 4.8 |
| Northern Bhutanese | 10920 | 26.3 | 4.8 |
| Southern Bhutanese | 2727 | 25.6 | 4.8 |

**Table 2. Mean Birth Weight in Relation to Maternal Age**

| Maternal age (yrs) | No | % | Mean (g) | ±SD (g) |
|---|---|---|---|---|
| ≤ 19 | 846 | 6.2 | 3083.1 | 400 |
| 20 - 24 | 4602 | 33.7 | 3150.3 | 424 |
| 25 - 29 | 5214 | 38.3 | 3205.4 | 434 |
| 30 - 34 | 2164 | 15.9 | 3214.8 | 457 |
| 35 - 39 | 651 | 4.7 | 3175.5 | 443 |
| ≥ 40 | 170 | 1.2 | 3042.1 | 484 |

The mean birth weight according to the parity is shown in Table 3. The mean birth weight increased with parity and found statistically significant ($p< 0.001$).

**Table 3. Mean Birth Weight in Relation to Parity of the Mother**

| Parity of the mother | No | % | Mean (g) | SD (g) |
|---|---|---|---|---|
| 0 | 6314 | 46.3 | 3133.8 | 426 |
| 1 | 4484 | 32.9 | 3212.7 | 430 |
| 2 | 1835 | 13.4 | 3223.6 | 444 |
| 3 | 661 | 4.8 | 3228.6 | 462 |
| ≥ 4 | 353 | 2.6 | 3349.4 | 499 |

The mean birth weight according to the Antenatal visits is shown in Table 4. The mean birth weight increased with increased antenatal visits and found to be statistically significant ($p< 0.001$).

**Table 4. Mean Birth Weight in Relation to Antenatal visits**

| Antenatal Visit | No | % | Mean (g) | SD (g) |
|---|---|---|---|---|
| < 4 | 804 | 5.9 | 3063.8 | 431 |
| 4 to 8 | 11734 | 85.9 | 3178.9 | 433 |
| > 8 | 1109 | 8.2 | 3242.6 | 449 |

The mean birth weight according to the maternal income is shown in Table 5. The mean birth weight increased with increased family income and was found to be statistically significant ($p< 0.001$).
The mean birth weight according to the maternal education level is shown in Table 6. The mean birth weight increased with increased maternal education level and was found to be statistically significant ($p< 0.001$).

The mean birth weight according to the two major maternal ethnic origin of North Bhutanese and South Bhutanese (Lhotsampa) is shown in Table 7. The mean birth weight for North Bhutanese is heavier by 200g than babies born to South Bhutanese and the difference was found to be statistically significant ($p< 0.001$).

**Table 5. Mean Birth Weight in Relation to Family Income Level**

| Income Level | No | % | Mean (g) | SD (g) |
|---|---|---|---|---|
| ≤ Nu 5000 | 1171 | 8.6 | 3.13254 | 453 |
| Nu 5000 - 10,000 | 5236 | 38.3 | 3.12979 | 426 |
| > Nu 10,000 | 7240 | 53.1 | 3.21895 | 435 |

*$p < 0.001$;  *1 US$ = Nu 63.00*

**Table 6. Mean Birth Weight in Relation to Maternal Education Level**

| Education level | No | % | Mean (g) | SD (g) |
|---|---|---|---|---|
| Nil | 3784 | 27.7 | 3122.8 | 435 |
| Non-formal education | 676 | 4.9 | 3153.6 | 425 |
| Primary level | 1948 | 14.3 | 3159.9 | 430 |
| Secondary level | 6052 | 44.4 | 3202.8 | 432 |
| Tertiary level | 1182 | 8.7 | 3262.2 | 444 |

*$p< 0.001$*

**Table 7. Mean Birth Weight in Relation to Maternal Ethnicity**

| Ethnicity | No | % | Mean (g) | SD (g) |
|---|---|---|---|---|
| Northern Bhutanese | 10920 | 80.1 | 3260.5 | 436 |
| Southern Bhutanese | 2727 | 19.9 | 3060.6 | 411 |

*$p < 0.001$*

## DISCUSSION

This is one of the biggest study in involving 13,647 singleton babies without any antenatal complications covering 4 years. The overall mean term birth weight of all singleton babies born in Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) between 2011 and 2014 was 3,177± 435g. The mean birth weight is 122g less than babies in USA but 445g heavier than babies born to Indians[1]. Findings from the annual reports of the department indicate that about 40% of the patients who delivered in JDWNRH were booked in other 12 different districts for antenatal care. They came only to deliver here due to better facilities and the findings from this study may be used as representative of the national figure with caution until another better study comes out.

The mean birth weight for boys (mean weight 3,228± 435g) is heavier than girls (mean weight 3,121 ± 429 g) by 107g.

The mean birth weight is 138g for boys and 91g of girls heavier than South Indian babies[5].

This study also proved the expectation that birth weight will improve with improvements in economic situation and female literacy level. The term birth weight was positively correlated with maternal age 34 years and then tends to fall after 35years as shown in Table 2. Parity (Table 3), number of antenatal visits (Table 4), family income, maternal education level (Table 6) were positively correlative with the birth weight of the babies. Other people have also found parity[4], antenatal care[6] and income[7] were positively correlated. Similar study also shows that boys are heavier than the girls[4].

The secondary findings based on the two major ethic groups of North Bhutanese (mean birth weight 3,260.5 ± 436g) and South Bhutanese/ Lhotsampa (mean birth weight 3,060.6 ±411g) on mean birth weights differ by 200g less for South Bhutanese babies. Other have also found variation of birth weight with ethnicity[8-10].

As a retrospective study, there was limited information that was collected from the Birth Register for the study.

Being a single hospital based study, limitations do exist if the finding are to be used for national level. Therefore, I recommend to do a multicentre study in future in Bhutan to get the true picture of the mean term birth weights.

## CONCLUSIONS

The average term birth weight of babies born in JDWNRH is 3,177± 435 g. The birth weight is correlated with parity, number of antenatal visit, family income, maternal education level and ethnicity.


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### AUTHORS CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

**PD:** Concept, design, , literature search, data collection and analysis, manuscript writing and review.

Author agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.


### CONFLICT OF INTEREST

**None**

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