

RECENT BIRTHWEIGHT DISTRIBUTION AND TRENDS IN KUALA LUMPUR

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SUMMARY

The birthweights of 13,614 singleton infants comprising 5376 Malays, 5352 Chinese and 2886 Indians born at the Maternity Hospital Kuala Lumpur, during 1973, 1975 and 1977 have been extracted and analysed.

Male Chinese infants (3.16 ± 0.37 kg) were significantly heavier than Malay and Indian infants while the male Malay infants (3.12 ± 0.41 kg) were significantly heavier than the Indian (2.97 ± 0.41 kg).

Both female Chinese (3.04 ± 0.38 kg) and Malay infants (3.05 ± 0.38 kg) were heavier than the female Indian (2.89 ± 0.39 kg) but there was no difference in birthweight between Chinese and Malay female infants.

The mean gestational period and the proportion of full-term births were similar for all 3 races with averages of 39.9 weeks and 77.8 percent respectively. Maternal age at first birth was also closely similar for the three communities with an average of 22.9 years.

Significant correlations were found between birthweight and length of neonates, birthweight

and gravida, birthweight and maternal age.

Indians have a higher incidence of low birthweight or small-for-gestational age infants (14.5 percent) compared to the Chinese (5.6 percent) and the Malays (7.6 percent); the incidence of low birthweights being higher in girls than in boys.

Present-day Malay and Indian full-term male and female infants are significantly heavier than their counterparts born at the same Hospital two decades ago, but no difference in birthweight was observed for Chinese infants during this time interval.

The gap between the incidence of low birthweight found in Malaysia and those in the developed countries seems to be narrowing and this may be taken to reflect the overall effects of socio-economic development, including the greater availability of general health and ante-natal care throughout the country since its Independence in 1957.

INTRODUCTION

Birthweight in relation to the duration of gestation is regarded as an important index of fetal growth and development. To the great majority of parents, birthweight is the second most important question asked after the sex of the newborn.

In developing countries, birthweights are low and the incidence of infants born with low birthweights is high. Birthweight has now become accepted not only as an indirect indicator of the general health and level of socio-economic

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TABLE I
BIRTHWEIGHTS AND RELATED DATA, MATERNITY HOSPITAL,
KUALA LUMPUR 1973, 1975 and 1977

| n | CHINESE 5325 | MALAYS 5376 | INDIANS 2886 |
|---|-----------------|----------------|-----------------|
| Mean birthweight in kg (term) | 3.10 ± 0.37 | 3.08 ± 0.39 | 2.93 ± 0.40 |
| Mean birthweight in kg (boy, term) | 3.16 ± 0.37 | 3.12 ± 0.41 | 2.97 ± 0.41 |
| Mean birthweight in kg (girl, term) | 3.04 ± 0.37 | 3.05 ± 0.38 | 2.89 ± 0.39 |
| Mean gestation in weeks | 40.0 ± 2.4 | 39.7 ± 2.4 | 39.9 ± 2.5 |
| Proportion of low birthweight (2.5 kg or less) : | | | |
| - term only - | 5.6% | 7.6% | 14.5% |
| - All stages of gestation - | 6.5% | 8.8% | 15.7% |
| Maternal age at first birth (mean in years) | 23.3 ± 3.2 | 23.1 ± 3.5 | 22.1 ± 2.7 |
| Proportion of births : | | | |
| - term (37-42 weeks) - | 77.7% | 78.2% | 77.4% |
| - pre-term (before 37 weeks) - | 8.4% | 9.9% | 9.7% |
| - post-term (after 42 weeks) - | 13.9% | 11.9% | 13.9% |
| Sex ratio (male : female infants) | 1.05 : 1.00 | 1.07 : 1.00 | 1.10 : 1.00 |

development of a country,^{1,2} but also as a reflection on the gap between the privileged and the less privileged in the same community.³

Despite two previous moderately large-scale studies on birthweight and its distribution in Malaysia,^{4,5} the incidence of low birthweight which reflects the extent of intra-uterine growth retardation in Malaysia remains relatively unknown. Neither has there been any recent attempt to monitor trends in birthweight.

The present study derived from the Maternity Hospital, Kuala Lumpur was undertaken to provide information on recent birthweight distribution, pattern, incidence of low birthweight and to examine birthweight in relation to the sex and length of infants, gestational age, gravida and maternal age. The data are also compared with the 1953-1957 birthweight data arising from the same hospital.⁴

MATERIALS AND METHODS

A 30 percent sample of all deliveries conducted at the Maternity Hospital, Kuala Lumpur for the years 1973, 1975 and 1977, comprising 13,614 cases of singleton births (39.5 percent Malays, 39.3 percent Chinese and 21.2 percent Indians) was examined from hospital records. The following were omitted from the sample : (i) uncertainty of the date of last menstrual period (ii) obstetric

history of pre-eclampsia and diabetes (iii) multiple and stillbirths (iv) complications or surgical interference during labour.

The study began in 1976 but because birthweight and obstetric histories were separately recorded and stored, the extraction of the study population took a ½ man-day almost 4 years to complete. It had been the original intention of this study to examine birthweights dating back to the early years of the Maternity Hospital. Unfortunately all records prior to 1973 were no longer available when this study began.

The data were processed by a Data General MicroNOVA system MP 200 computer using FORTRAN.

The definition of low birthweight is taken as those weighing 2.5 kg or less.⁶ Pre-term is defined as before 37 weeks of gestational age (calculated from the first day of the last menstrual period), term as from 37 to before 42 weeks and post-term as from 42 weeks.⁷

RESULTS

The results of this study are summarised in Table I.

Mean Birthweights

The mean birthweights of 5352 Chinese, 5376 Malay and 2886 Indian term infants delivered

during 1973, 1975 and 1977 are :-

Boys:

| | |
|---------|---------------------------|
| Chinese | 3.16 ± 0.37 kg (n = 2741) |
| Malays | 3.12 ± 0.41 kg (n = 2785) |
| Indians | 2.97 ± 0.41 kg (n = 1510) |

Girls :

| | |
|---------|---------------------------|
| Chinese | 3.04 ± 0.37 kg (n = 2611) |
| Malays | 3.05 ± 0.38 kg (n = 2591) |
| Indians | 2.89 ± 0.39 kg (n = 1376) |

For boys, the Chinese were significantly heavier than the Malays and Indians ($p < 0.001$ for both) while in turn, the Malays were significantly heavier than the Indians ($p < 0.001$).

For girls, both Chinese and Malays were heavier than the Indian ($p < 0.001$ for both) but there was no statistically significant difference between Chinese and Malay girls. Boys are heavier than girls irrespective of race ($p < 0.001$).

Incidence of Low Birthweight

At term, the Indians have the highest incidence of low birthweight babies, being 14.5 percent, followed by Malays, 7.6 percent and Chinese, 5.6 percent. The incidence of low birthweight being greater in girls than in boys - Chinese : 7.2 percent girls and 4.1 percent boys ; Malays : 7.9 percent girls and 7.3 percent boys and Indians : 16.8 percent girls and 12.4 percent boys.

Proportion of Births at Term, Pre-term & Post-term.

The proportion of term births was 77.7 percent for Chinese, 78.2 percent for Malays and 77.4 percent for Indians. Those born pre-term or premature were 8.4 percent for Chinese, 9.9 percent for Malays and 9.7 percent for Indians. While those born post-term were 13.9 percent for Chinese, 11.9 percent for Malays and 13.9 percent for Indians.

Gestation Period

There was no difference in the mean gestation period for the various races, being 40.0 ± 2.4 weeks for Chinese, 39.7 ± 2.4 weeks for Malays and 39.9 ± 2.5 weeks for Indians.

Maternal Age at First Birth

There was no difference in maternal age at the time of first birth for the three racial groups. The mean ages at first birth were 23.3 ± 3.2 years for Chinese, 23.1 ± 3.5 years for Malays and 22.1 ± 2.7 years for Indians.

Birthweight Distribution Pattern

The mean birthweight and percentile birthweight distribution curves for Chinese, Malay and Indian infants (combined sexes) are shown in Fig. 1 and 2. There appears to be little difference in the shape and pattern of the birthweight curve for the Chinese, Malay and Indian infants between 37-44 weeks except to note the relatively smaller Indian infants at all gestational periods. Birthweight seems to peak at 42 weeks for all three races.

It has been suggested that infants falling below the 10th percentile or outside the mean - 2SD range may be considered to have suffered intra-uterine growth retardation and are "high risk" infants. However it has also been argued that such "cut-off" may exclude a large number of infants of potential risk. ⁸ This is indeed so and can be exemplified by the 10th percentile birthweight curve of our Indian infants which falls below the international "cut-off" line of 2500 g or less for low birthweight.

Relation of Birthweight to Length of Neonates

There was a significant positive correlation between birthweight in kg (y) and length in cm of neonates (x). The correlation coefficient r was 0.65 ($p < 0.001$) irrespective of whether races are separate or combined.

Relation of Birthweight to Gravida

There was a highly significant positive correlation between gravida (x) and birthweight (y). The correlation coefficients (r) being 0.76, 0.75 and 0.80 for Chinese, Malay and Indian respectively ($p < 0.001$ for all).

Relation of Birthweight to Maternal Age

There is a direct relation between birthweight and maternal age up to 44 years (Table II). When parity was fixed such as when only primagravidae are considered, the association between birthweight and maternal age was equally marked. The correlation coefficient r, being 0.98 ($p < 0.001$) for combined races. The linear regression equation is

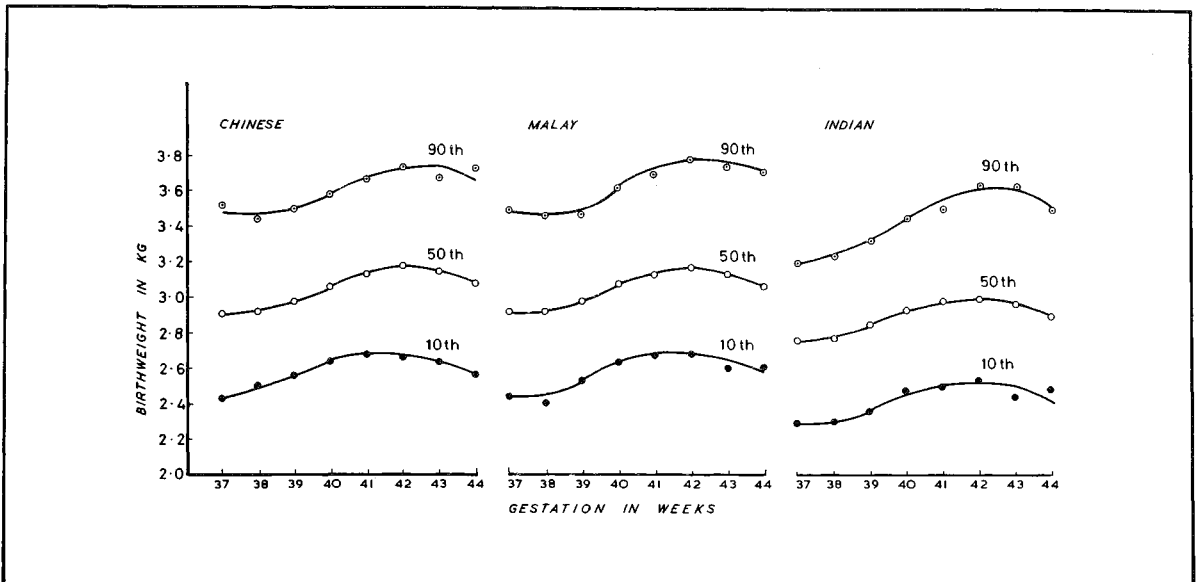


Fig. 1 Percentile Birthweight curves for Chinese, Malays & Indians at the maternity hospital K.L., 1973, 1975 & 1977.

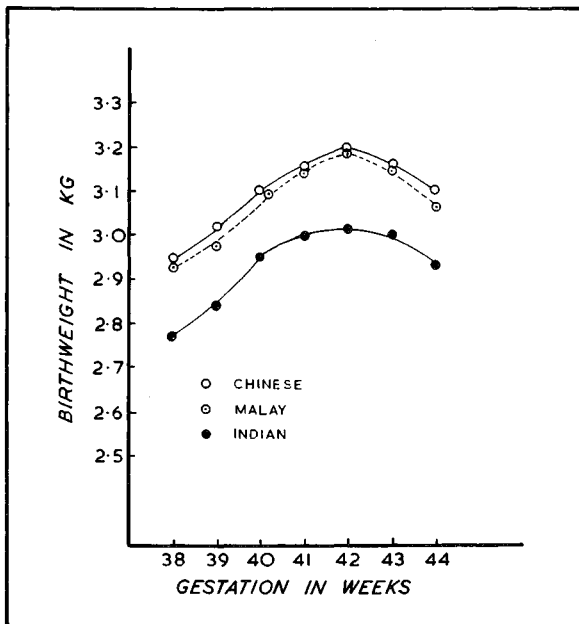


Fig. 2 Mean birthweight curves.

given by $y = 0.0095 + 0.1281 x$ where y is birthweight in kg and x is maternal age in years.

DISCUSSION

The weight of an infant at birth is an important predictor of its survival, neonatal morbidity or subsequent early childhood development. It is

however important to recognise that infants can be small either because of prematurity (pre-term) or when there is fetal malnutrition. The latter results in a low birthweight in relation to gestational age and has been referred to as small-for-gestational age or growth retarded fetus.^{7,9,10} In developing countries, the greater proportion of low birthweight infants belong to the category of small-for-gestational age. Such children are shorter and lighter than their peers until the age of 10 years, but premature infants of low birthweight were able to overcome their initial disadvantage by the time they were 5 years.^{10,11}

In the present study, Indian infants born at term were smaller (mean birthweight 2.93 ± 0.40 kg, compared to 3.10 ± 0.37 kg for Chinese and 3.08 ± 0.39 kg for Malays). Their incidence for low birthweight was also highest at 14.5 percent compared to 7.6 percent for the Malays and 5.6 percent for the Chinese.

National data on the incidence of low birthweight have since become available subsequent to this study. The information is provided by the Department of Statistics from a nationwide birthweight returns. The data however differ from those of the present study in two major ways :-

- i) The national data did not take into account the gestational age of infants.

TABLE II
RELATION BETWEEN MATERNAL AGE AND BIRTHWEIGHT

| Maternal Age Years | Mean Birthweight (Kg) | | |
|--------------------|-----------------------|-------|--------|
| | Chinese | Malay | Indian |
| 20 - 24 | 2.87 | 2.78 | 2.71 |
| 25 - 29 | 2.94 | 2.88 | 2.76 |
| 30 - 34 | 2.99 | 3.00 | 2.85 |
| 35 - 39 | 3.01 | 3.04 | 2.92 |
| 40 - 44 | 3.02 | 3.06 | 2.99 |
| 45 and greater | 2.99 | 3.03 | 2.74 |

(ii) The national data did not exclude multiple births or infants born of mothers with an unsatisfactory obstetric history.

Despite the above, the national data are now compared with the present series in Table III. From this Table, it may be noted that the national incidence for low birthweight for the three ethnic groups parallels the present Kuala Lumpur based study. As one would expect, the national data show a slightly higher incidence for low birthweight. For all races, the national incidence of low birthweight was 11.5 percent and 10.6 percent for 1977 and 1978 respectively compared to 8.3 percent for the combined years 1973, 1975 and 1977 for Kuala Lumpur.

It is important to note here that the overall incidence of low birthweight for Malaysia, and Kuala Lumpur in particular, is much more favourable than those reported for many other developing countries where it may range between 20 percent to above 30 percent. ²

Indeed the incidence of low birthweight for the Chinese (5.6 percent) and Malays (7.6 percent) in Kuala Lumpur are comparable to the figure of 6 percent reported in recent years for U.S.A, Britain and the Democratic Republic of Germany. ^{2,12}

Although it is not possible to attribute with certainty the satisfactory incidence of low birthweight to better maternal nutrition, it is certainly a valid reflection of the overall effects of socio-economic development including the greater availability of general health care and antenatal care throughout the country since Malaysia's independence. Comparison of the present data with those reported by Thomson ⁴ from the same hospital shows birthweight increments of between 60-70 g for Malay infants and 90 - 120 g for Indian infants compared to their counterparts born two decades before (Table IV).

Despite the above, it is readily admitted that there is still much room for improvement in the birthweight of the Indian infants whose poorer performance may be associated with their relatively less favourable socio-economic status. In view of this and the country's current rapid pace of socio-economic development, there is a continued need to monitor birthweights and relevant information at both the national and local level.

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TABLE III
INCIDENCE OF LOW BIRTHWEIGHT

| | Year | No | % Incidence of Low Birthweight | | | |
|---|------|---------|--------------------------------|-------|--------|-----------|
| | | | Chinese | Malay | Indian | All races |
| National (Department of Statistics) | 1977 | 200,269 | 8.6 | 11.7 | 19.5 | 11.5 |
| | 1978 | 205,829 | 7.9 | 10.8 | 17.5 | 10.6 |
| Kuala Lumpur (Present study) | 1973 | 13,614 | 5.6 | 7.6 | 14.5 | 8.3 |
| | 1975 | | | | | |
| | 1977 | | | | | |

TABLE IV
BIRTHWEIGHTS AFTER TWO DECADES AT KUALA LUMPUR
MATERNITY HOSPITAL

| | THOMSON (1953 - 1959) | | PRESENT DATA (1973, 1975 and 1977) | |
|--------------|----------------------------|--------------------------------|---|--------------------------------|
| | n | Mean & S.D. Kg (at term) | n | Mean & S.D. Kg (at term) |
| BOYS | | | | |
| Malay | 1186 | 3.05 ± 0.51 | 2785 | *3.12 ± 0.41 |
| Chinese | 1104 | 3.12 ± 0.56 | 2741 | 3.16 ± 0.37 |
| Indians | 853 | 2.85 ± 0.51 | 1510 | *2.97 ± 0.41 |
| GIRLS | | | | |
| Malay | 1081 | 2.99 ± 0.51 | 2591 | *3.05 ± 0.38 |
| Chinese | 983 | 3.04 ± 0.51 | 2611 | 3.04 ± 0.37 |
| Indians | 810 | 2.80 ± 0.49 | 1376 | *2.89 ± 0.39 |

* Statistically significant difference ($p < 0.001$) between present and Thomson's ⁴ mean birthweights.

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