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The Effect of Socio-Economic Status on Birth Weight in Saudi Arabia

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In order to study the effect of socio-economic status on the birth-weight of Saudi newborns, we studied a random sample of 4498 pregnant Saudi women from four major hospitals in Riyadh, Saudi Arabia. Birth-weight was classified into four categories for comparison, using a modified Dowding (1981) classification: low birth weight (< 2500 g), sub-optimal (2500–2999 g), optimal (3000–3999 g) and above optimal (> 4000 g). Measure of the socio-economic status was based on the family income, since in Saudi Arabia this is the most potent indicator which affects living standards.

The results indicate that there is a direct correlationship between family income and birth weight ($P < 0.001$, χ^2 test).

Birth weight is the most important indicator of risk for both mortality and handicap in the neonate.[1] It is, therefore, important to understand the factors which influence birth weight. One such factor is socio-economic status. A variety of studies[2–4] have documented the tendency for economically disadvantaged groups in any society to have smaller babies than the economically more advantaged groups. In this study the effect of family income on the birthweight of the Saudi newborns has been assessed. The study is based on a sample of Saudi pregnant mothers who gave birth in four major hospitals in Riyadh, the capital of Saudi Arabia.

MATERIALS AND METHODS

A random sample of 4498 pregnant women was drawn from four major hospitals in Riyadh between September 1983 and December 1986. A questionnaire was used to obtain information including mother's age, gestational age, infant sex, infant weight, and the family income. Only term singleton births were included in this study. Multiple births and births with congenital malformation were excluded, but babies who were small for gestational age (SGA) and/or babies who had intra-uterine growth retardation (IUGR) were included.

Each newborn was visited by an anthropometrician within 24 h of birth for recording of sex, gestational age and birth weight. Weight was measured using a beam balance. Gestational age was determined by asking the mother about the duration of her pregnancy and the date of her last menstrual period. Gestational age also was determined by paediatrician/neonatologist using the Dubowitz chart.[5] A difference of 2 weeks was accepted. Where there was a difference of more than 2 weeks between maternal dates and Dubowitz assessment babies were excluded from analysis.

Birth-weight was classified into four categories for comparison. Low birth weight (< 2500 g), sub-optimal weight (2500–2999 g), optimal birth weight (3000–3999 g) and above optimal birth weight (> 4000 g). Classification was based according to Dowding (1981) with some modifications.[1]

RESULTS

Birth-weight

The mean birth-weight of the sampled Saudi infants was 3242 g. The incidence of each birth group is given in Table 1.

TABLE 1 *Distribution of birth-weight of the sampled infants*

Birth-weight (g)	Number	Percent
< 2500	183	4.1
2500–2749	404	9.0
2750–2999	628	14.0
3000–3249	1081	24.0
3250–3499	871	19.3
3500–3749	680	15.1
3750–3999	359	8.0
≥4000	292	6.5
Total	4498	100.0

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TABLE 2 *Distribution of gestational ages of the sampled Saudi infants*

Gestational ages (weeks)	Number	Percent
≤37	219	4.9
38	505	11.2
39	595	13.2
40	2491	55.4
41	434	9.6
≥42	250	5.6
No answer	4	0.1
Total	4498	100.0

Gestational Age

Gestational age distribution is given in Table 2.

Mother's Age

The mother's ages ranged from 16 years to 45 years with a mean of 25.9 years.

Socio-economic Status

Family income level was chosen as the indicator to measure socio-economic status of the sampled infants because of our previous experience that family's income does not truly reflect the living standards.[6]

As shown in Table 3, more than half of the sample (51.5%) belonged to the middle income group, with average family income of SR5000–9999 per month. While the high income group accounted for 8.2% of the sample, 38.8% of the families had a monthly income between SR2500 and 4999, and 1–8% of the mothers (or their husbands) gave no information regarding the family income level.

Birth-weight

Comparison between the birth-weight of the sampled infants and the families' income level (Table 4) indicated a direct correlationship between these two variables i.e. the higher the income, the higher the average birth weight.

The families studied contained a mean of 4.4 children (range 1.0–20.0) and 44.7% of mothers attended antenatal clinics in all the trimesters of pregnancy, while 19.2% did not attend any antenatal clinics; 23.4% attended only in the last trimester, 9.5% only in the second trimester and 3.1% only in the first trimester.

Finally, the assessment of the distributions of birth weight and family income levels as shown in Table 5. Result of the χ^2 test obtained a value of 85.52, which is significant at the probability level of 0.001.

TABLE 3 *Distribution of the sampled Saudi infants by family income level*

Average monthly family income (SR)	Number	Percent
2500–4999	1749	38.8
5000–7499	1749	39.0
7500–9999	546	12.5
>1000	370	8.2
No answer	83	1.8
Total	4498	100.0

DISCUSSION

There were 183 infants (4.1%) with a birth weight of 2500 g or less; slightly lower than the incidence reported from Austria, New Zealand, Japan and parts of USA, (WHO report, 1978). The mean birth-weight (3242 g) was also slightly lower than in other reports.

Classification of birth-weight into low, suboptimal, and optimal categories provides a useful tool for assessing performance. Difference in economic status accounts for a significant variation in occurrence of these weights. It should be noted that the proportion of low and suboptimal birth-weights increased substantially as income level fell. A relatively smaller proportion of optimal birth-weight babies was observed in lower income groups. The occurrence of above-optimal weight (4000 g) showed a similar direct relationship. Socio-economic status (measured by the family monthly income) showed a direct correlation with the incidence of low, suboptimal and optimal weights. This observation is consistent with the results of other studies,[3,6] but contrary to the report by Serinius *et al.*[7] who studied 1507 infants in one hospital in Riyadh and concluded that socio-economic factors may not be determinant of birthweight.

In this study the mean birth-weight of term Saudi singletons was similar to the mean birth-weight in upper social class families in Riyadh.[8]

It should be noted that the variable 'educational level' as an indicator of socio-economic status cannot be applied for analysis in the Kingdom of Saudi Arabia as there is a generous free education system and open access to the higher education institutions to all interested and qualified citizens, both males and females. In another report we have shown how the level of education relates to birth-weight and other factors.[9]

We are aware that the results of this study cannot be taken as representative for the Kingdom of Saudi Arabia as a whole, since many segments of the Saudi popu-

TABLE 4 *Average birth-weight by family income level of the sampled Saudi infants*

Average monthly family income (SR)	Average birth-weight (g)
2500–4999	3181.00
5000–7499	3242.00
7500–9999	3329.00
>10 000	3402.00
Mean birth-weight	3242.00

TABLE 5 *Distribution of birth-weight by family income level of the sampled Saudi infants*

	Family income level (SR)				
Birth-weight (g)	2500–4999	5000–7499	7500–9999	>10 000	Total
2500	89	70	15	7	181
2500–2999	494	361	90	62	1007
3000–3499	803	722	207	176	1918
3500–3999	383	376	136	125	1020
4000	83	111	46	43	288
Total	1857	1640	494	423	4414*

*There were 84 cases (1.9%) without valid observation records of either variables.
Statistical test results: $\chi^2 = 85.52$, df = 20, significant level = 0.001.

lation are largely nomadic and rural and differ in many ways from the population of Riyadh. However, it is suggested that the rate of occurrence of the optimal weight category is the best indicator of progress achieved in the birth-weight performance of a population. Dowding points out that this weight category is particularly useful because the 'explaining' power of socio-economic status is as high as 93% (1981).[1] Since difference in income level accounts for significant variation in occurrence of the birth-weight, it is suggested that optimal birth-weight can be achieved by improving the income level of a population. On the other hand, the direct correlation found between income and birth-weight can indirectly reflect the effect of family income on the ability of the mother to obtain antenatal care, and the mother's nutritional status.[9] In this respect, Sibert and his co-workers (1978) have shown that, in India, there is a positive correlation between maternal anthropometric measurements and infant measurements (1978). Furthermore, Sibert's observation that social class variations reflect difference in birth-weight confirm this point as many of the Indian mothers were appreciably malnourished. We did not, however, perform anthropometric measurements on the mothers in our study.

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