

Study of Weight Gain in Pregnancy

by

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SUMMARY. A prospective study on weight gain in pregnancy was carried out in the University Community Health Project Area, Kotte. The mean weight gains observed during four-weekly periods were higher than those observed in some studies in India and lower than those in United Kingdom.

Comparatively lower weight gains in pregnancy were observed among the lower socio-economic groups, as identified by the per capita income of the family and 'occupational category' of the husband.

INTRODUCTION

Pregnant and lactating women, infants and pre-school children are considered the most vulnerable groups from a nutritional standpoint. The nutritional requirements of these groups are proportionately higher and the effects of malnutrition are more severe and have long term effects.^{2,6} The weight gain during pregnancy has been shown to be closely related to the newborn's weight and to maternal nutritional intake.¹ Many studies have shown that, in most developed countries, the average weight gain during pregnancy is around 10 - 12kg.¹¹ Few studies from developing countries indicate that the average weight gain in pregnancy is lower than those observed in developed countries. Limited data available from Sri Lanka^{4,12} show that only about 10% of the women gained more than 8kg and many women failed to gain even an amount of weight equal to the weight of the baby they produced.

As maternal nutritional intake is an important factor in weight gain in pregnancy, the socio-economic differentials between countries and within countries are likely to be important factors influencing maternal weight gain.

MATERIALS AND METHODS

This study was carried out at the antenatal clinics held at the Pita Kotte Health Centre in the University Community Health Project Area, Kotte. All mothers attending the antenatal clinics for the first time, prior to the 24th week of gestation were enrolled in the study. At the first visit, relevant personal and socio-economic information was obtained along with the menstrual history, past obstetric history and past medical history. Height of the mother was measured at the first visit. All mothers were weighed without shoes, on a beam balance (Model - 'Detecto'). The balance was checked for accuracy at regular intervals. Family health workers

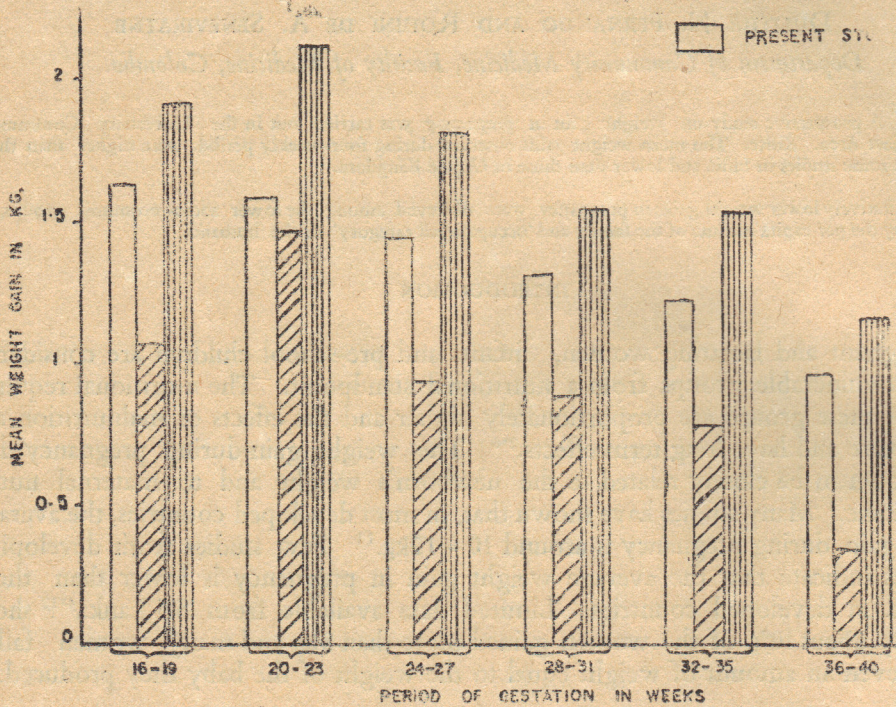


Fig. 1. Comparison of mean weight gain (kg) at four-weekly intervals observed in the present study with those observed in India¹⁰ (▨) and United Kingdom⁹ (▧).

were trained to take the measurements and record them accurately. Random checks were made by one of the investigators to ensure accuracy of measurements. The period of gestation (POG) was assessed from the date of the last regular menstrual period. Findings of the clinical examination were used to verify the period of gestation thus calculated.

The mothers were followed up at the clinic at regular intervals. In some instances, when mothers did not attend the clinics on the appointed date, they were contacted by the field-level health workers and requested to attend the clinic. Recording of weight and a full clinical examination were done at each visit to identify any complications. All mothers were given the food supplements available at the antenatal clinics (Thripasha) and oral iron supplements. After delivery, information on the date of delivery, type of delivery and birth weight of the newborn were noted.

RESULTS

A total of 200 mothers were enrolled in the study, of whom 26 had to be excluded from the study due to two main reasons, viz. irregularity of attendance and development of complications. A total of 174 mothers who did not develop any complications associated with pregnancy and had single pregnancies and delivered live babies were included in the analysis.

The age of the mothers ranged from 16 - 40 years and 62% of them were between 20 - 30 years. 44% attended the clinic for the first pregnancy and another 34% for the second pregnancy. 63% of the mothers were enrolled before the 20th week of pregnancy.

The mean weight gain for 4-weekly intervals was calculated from 16 - 40 weeks. The number of mothers from whom data were available for each 4-weekly intervals varied, the lowest being for the 36 - 40 weeks period. One of the likely reasons for this observation is the fact that 48% of the mothers had delivered during the 36 - 40 week period.

The mean weight gains observed in this study were highest for the 16 - 19 week period and gradually decreased, as the period of gestation advanced (Table 1). Comparison with weight gains available in India¹⁰ and in the United Kingdom⁹ shows that the values observed in this study are higher than those in India but lower than those in United Kingdom, for each 4-weekly interval (Fig. 1). However, in the latter studies, the maximum weight gain was observed in the 20 - 24 week interval, and the weight gain gradually reduced as POG increased.

TABLE 1. The mean weight gain at 4-weekly intervals (numbers on which the mean values are based are given in parentheses).

Period of gestation in weeks	Mean in kg.	SE
16 — 19	1.632 (80)	0.099
20 — 23	1.584 (154)	0.075
24 — 27	1.44 (161)	0.065
28 — 31	1.32 (149)	0.066
32 — 35	1.22 (124)	0.085
36 — 40	0.96 (69)	0.14

Total weight gain for the POG 20-36 weeks was calculated for 120 women who had continuous weight records at regular intervals during this period. Even though this could not be taken as the total weight gain during pregnancy, it is justifiable to assume that it is an indicator of the total weight gain.

Study of the frequency distribution of the weight gain during the period 20 - 36 weeks of gestation shows that 38.5% of the women gained less than 5 kg in weight and an approximately equal proportion gained 7 kg or more. However, the weight gains varied widely, the range being 0.5kg to 14 kg (Table 2). For the purpose of studying some factors influencing the weight gain between 20 - 36 weeks, the mothers were divided into three groups as follows:

- Group I — those gaining less than 5 kg.
- Group II — those gaining between 5kg and 6.99 kg.
- Group III — those gaining 7 kg or more..

TABLE 2. Frequency distribution of total weight gain (kg) between the 20th and 36th weeks.

Weight gain kg.	n	%
<3	14	11.5
3—	32	27.0
5—	41	34.0
7—	19	16.0
≥9	14	11.5
Total	120	100

Range 0.5 — 14.1 kg

Per capita income and the occupation of the husband are indicative of the socio-economic status. Per capita income seems to significantly influence the weight gains in that the higher the per capita income, the higher the proportion in Group III (Table 3). In studying the influence of occupation of the husband, three main occupational categories were identified as shown in Table 4. There were no persons who could be categorised as belonging to the group "Agricultural workers", probably because the study was carried out in an "urban" area. Only 8% of the women studied

were formally 'employed'. The proportion with lower weight gain was significantly higher among the women whose husbands' occupation was grouped as "production and related work" (majority of this group were labourers).

TABLE 3. The relationship between weight gain from the 20th and 36th week of pregnancy and different income categories (rupees per month)

Per capita income Rs.	Weight gain in kg			Total
	<5	5—	≥7	
<250	24	8	3	35
250—	12	19	11	42
≥500	5	12	15	32
Total	41	39	29	109

(No information — 11)

$X^2 - 25.8$ df — 4

$p < 0.001$

TABLE 4 The relationship between weight gain from the 20th to the 36th week of pregnancy and occupation of husband

Category	Weight gain in kg			Total
	<5	5—	≥7	
I Professional, technical, administrative and managerial workers .	6	4	8	18
II Sales and service workers	9	22	18	39
III Production and related workers	27	12	3	42
IV Others	5	3	3	11
Total	47	41	32	120

$X^2 - 31.7$ df - 6 $p < 0.001$

The height of the mother (which is an indicator of the mother's nutritional status in the growing phase of her life) does not seem to be significantly related to the weight gain (Table 5), nor does the influence of parity show any significance (Table 6).

TABLE 5. The relationship between weight gain during pregnancy and the height of the mother.

Height cm	Weight gain in kg			Total n
	<5	5—	≥7	
<145	15	6	4	25
145—	6	5	4	15
150—	11	14	10	35
≥155	4	7	6	17
Total	36	32	24	92

(No information — 28)

$X^2 - 7.5$ df - 4

$p > 0.10$

TABLE 6. The relationship between weight gain during pregnancy and parity.

Parity	Weight gain in kg			Total n
	<5	5—	≥7	
1	15	18	18	51
2	17	13	10	40
≥3	15	10	4	29
Total	47	41	32	120

$$X^2 - 6.125, df - 4, p > 0.10$$

The overall prevalence of low-birth-weight babies (less than 2500 gms.) in this series was 20%. The weight gain during the period 20 - 36 weeks does seem to influence the birth weight of the newborn (Table 7)

TABLE 7. The relationship between weight gain during pregnancy and the birth weight of the newborn

BirthWeight kg	Weight gain in kg			Total
	<5	5—	≥7	
<2.5	18	4	2	24
2.5—	16	15	14	45
≥3.0	13	22	13	48
Total	47	41	29	117

(No information - 3)

$$X^2 - 15.66, df - 4, p < 0.01$$

DISCUSSION

It has been well established that there is a marked variation in weight gain in pregnancy among women who have not been on a restricted diet for therapeutic reasons during pregnancy.⁸ Such observations have been made between countries and within countries. Many factors influence the weight gain in pregnancy, among which the importance of the relationship between energy intake and weight gain (when energy expenditure has been equated) has been well established. Hytten and Leitch⁸ observed the average weight gain during various periods of pregnancy to be as follows:- 0.36 kg / week up to 16 - 18 week, 0.45 kg / week from 18 - 26 weeks and 0.36 - 0.41 kg / week, between 28 - 40 weeks.

Clements⁴ reports that, in his study done in Sri Lanka in 1957, the percentage of women who gained less than 5 kg in weight during pregnancy was 58%, among whom 5% actually lost weight. In the present study however, there were no

mothers who lost weight during the observed period and only 38.5% gained less than 5 kg during the 20 - 36 week period. The difference between the two sets of observations might be due to the fact that mothers in the present study attended the antenatal clinic regularly and were beneficiaries of a food supplementation programme.

The importance of the socio-economic status on the weight gain is indicated by the significant influence on weight gain by per capita income and by occupation of the husband (Tables 3 and 4). Studies from India,¹⁰ Nigeria⁷ and Guatemala³ also indicate that low maternal weight gains are common among the lower socio-economic groups.

In view of the importance of weight gain in pregnancy as a factor influencing low birth-weight and the higher morbidity and mortality among low birth-weight babies, any programmes aimed at improving infant health should be directed at improvement of maternal weight gain. It is very likely that the socio-economic environment of the mother influences the weight gain in pregnancy in many different ways, among which inadequate intake in the face of increased requirement would be an important factor. Increased physical work due to increasing body weight with little or no reduction in activity, common among the women of lower socio-economic groups, is also considered to have an influence on total weight gain.

In Sri Lanka, 29.9% of the employed population belong to the group "production and related workers" and 64% have household income levels below Rs. 800 per month.⁵ Any intervention programmes aimed at improving infant health should be specially geared towards these groups.

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