

PREMATURITY IN EDINBURGH

BY

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During the period 1952 to 1954 a group of babies born prematurely to mothers delivered in two Edinburgh maternity hospitals, together with a group of full-time infants, were enrolled in a long-term developmental survey. In order to provide some comparative information about all babies born during that period certain data were obtained about all births in Edinburgh during the 12 months October, 1953, to October, 1954. This information was considered of sufficient interest to be presented in a separate paper.

All births in Edinburgh are notified to the Public Health Department of the Corporation as being under or over 5½ lb. at birth. Access to these records was allowed. Every premature birth together with one in 10 of all mature births was recorded. To reconstruct the total births in the subsequent analysis the figures for mature births have been multiplied by 10.

The following information was recorded about each birth: (1) birth weight, (2) legitimacy, (3) age of the mother, (4) parity, (5) occupation of the father in legitimate births, (6) date of marriage.

Birth weight, age of mother and parity were given in hospital records. When the baby was born at home this information was obtained by the Health Visitor at her first post-natal visit. In those cases in which the baby died or a stillbirth resulted in domiciliary confinements, the general practitioner or midwife attending the birth was asked to supply the information. During the period under review about 75% of births in Edinburgh took place in hospital and the recorded birth weights are likely to be accurate. In the case of domiciliary confinements, weights were usually recorded on a spring balance and will therefore be less accurate. The occupation of the husband and the date of marriage was obtained from birth certificate records by permission of the Registrar General for Scotland. The husband's occupation was classified according to the Registrar General's Index of Occupations, 1950, into five social classes (General Register

Office, 1951). All the information was completed in about 95% of the total births.

Distribution of Birth Weight

During the period under review there were 7,157 births registered to mothers usually domiciled in Edinburgh. Births to mothers whose homes were outside the city boundaries were excluded.

A premature infant is taken to be one with a birth weight of 5½ lb. or less irrespective of the length of gestation, which was not recorded in many cases.

Table 1 gives the figures for premature and mature

TABLE 1
TOTAL BIRTHS IN EDINBURGH, OCTOBER, 1953, TO OCTOBER, 1954

	Premature	Mature	All Births
Number	471	6,686	7,157
Neonatal deaths	63	48	111
Stillbirths	80	88	168
Percentage total births	6.58*	93.42°	100°
Neonatal deaths per 1,000	134	7.2	15.5
Stillbirths per 1,000	170	13.2	23.5

births, neonatal deaths and stillbirths in each group. Table 2 gives the birth weight distribution for

TABLE 2
BIRTH WEIGHT DISTRIBUTION OF LEGITIMATE AND ILLEGITIMATE BIRTHS

Birth Weight (lb. oz.)	Legitimate			Illegitimate		
	No.	% of Known Birth Weight	Cumulative %	No.	% of Known Birth Weight	Cumulative %
Premature (birth weight not known)	2					
2-8 and under	39	0.55	0.55	3	0.66	0.66
2-9-3-8	58	0.86	1.41	5	1.11	1.77
3-9-4-8	83	1.36	2.77	7	1.56	3.33
4-9-5-8	242	3.62	6.39	24	5.34	8.67
5-9-6-8	1,065	15.92	22.41	91	20.22	28.89
6-9-7-8	2,124	31.74	54.15	136	30.22	59.11
7-9-8-8	1,934	28.91	83.06	122	26.12	85.23
8-9-9-8	879	13.14	96.10	40	8.88	94.11
9-9 and over	258	3.90	100.00	22	4.89	100.00
Mature (birth weight not known)	13			2		
Total	6,697			452		

* This work was done during the tenure of a grant from the Advisory Council for Medical Research of the Department of Health for Scotland.

legitimate and illegitimate births. It will be seen that the percentage of premature births in the illegitimate group is 8.7 compared with 6.4 of legitimate births. This difference is statistically significant.

The Effect of Age on Birth Weight

Fig. 1 shows the proportion of babies 5½ lb. or less at birth, those weighing 5 lb. 9 oz. to 7 lb. 8 oz. and those over 7½ lb. in five age groups.

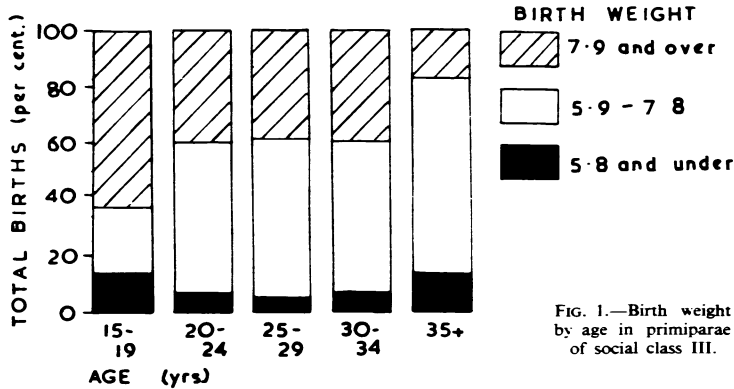


FIG. 1.—Birth weight by age in primiparae of social class III.

In subsequent sections it is shown that both parity and social class have an effect on birth weight, so in considering the effect of age only primiparae of social class III have been included.

It will be seen that the birth weight distribution is similar over the age period 20 to 34 years but in those under 20 years and over 35 years the prematurity rate is about twice as high. This increase is statistically significant.

A more striking difference is shown in the proportion of big babies, i.e., those over 7½ lb. at birth. More than 60% of all babies born to girls under 20 years were over 7½ lb. compared with 40% in the age group 20 to 34, and less than 18% in mothers of 35 years and over, at the time of their first birth.

The greater number of premature births in the youngest age group may be associated with the high incidence of premarital conception. Fig. 2 gives the frequency of premarital conception according to the age of mother for all births in Scotland in 1953 (Annual Report of the Registrar General for Scotland, 1953). It will be seen that 60% of all births to mothers under 20 years of age occurred less than eight months after marriage and 33% occurred less than six months after marriage.

In this analysis the baby was considered to have been conceived before marriage when the date of birth was less than 32 weeks after marriage in the

case of full-time infants, and less than 24 weeks in the case of premature infants. On this basis in social class III, 36% of all babies were conceived before marriage in girls under 20 years, 15% in those between 20 and 24 years and 4% in those of 25 and over.

The birth weight distribution in the under-20 age group for premarital conceptions and others is shown in Table 3. The percentage of premature births in those infants conceived before marriage is 13.0 compared with 11.3 in the rest. The numbers are small and the difference is not statistically significant. However, the difference in the proportion of big babies, 43.5% in the premarital conception group and 76.3% in the rest, is highly significant.

Premarital conception increases steadily from social class I to social class V and it therefore seems probable that within social class III, which includes a wide variety of occupations, those who conceive before marriage tend to come from a poorer economic background. This would seem to be the explanation of the different birth weight dis-

TABLE 3
BIRTH WEIGHT DISTRIBUTION IN THE AGE GROUP 15 TO 19 YEARS IN SOCIAL CLASS III

Birth Weight (lb. oz.)	Premarital Conceptions (%)	All Births excluding Premarital Conceptions (%)
5.8 and under	13.0	11.3
5.9-7.8	43.5	12.4
7.9 and over	43.5	76.3



FIG. 2.—Premarital conception by age of mother in Scotland, 1953.

tribution between those who conceive before and after marriage. It is striking that after the exclusion of premarital conceptions over three-quarters of all babies born to these young mothers were over $7\frac{1}{2}$ lb. at birth.

A possible explanation of the higher prematurity rate amongst young mothers combined with a high proportion of big babies is that in some cases premature labour may be induced by efforts to get rid of an unwanted pregnancy.

It appears that from the biological point of view the youngest mothers are most successful in their pregnancies, though this does not mean that these babies do better subsequently. In the developmental study now in progress it has been found that the youngest mothers in general are less efficient in the handling of their babies, and for that reason later pregnancy is probably to be preferred.

The Effect of Social Class on Birth Weight

Fig. 3 shows the birth weight distribution in primiparae between the ages of 20 and 34 years in three social groups.

It will be seen that the prematurity rate in social classes I and II is less than one-half that in social classes IV and V; this difference is significant. The numbers of premature births in social classes I and II are so small that they have been amalgamated, but the percentage of large babies can be analysed in five social groups and is even more striking, as shown in Table 4. The proportion of large babies is more than twice as high in social class I as in social class V, after the effect of age and parity has been allowed for. This difference is highly significant.

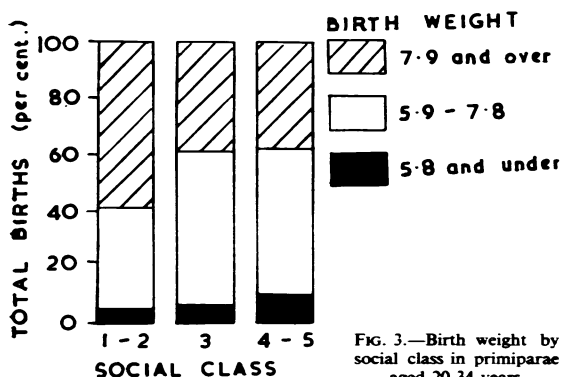


FIG. 3.—Birth weight by social class in primiparae aged 20-34 years.

The Effect of Parity on Birth Weight

Fig. 4 shows the percentage of premature births according to the parity of the mother for all births and separately for social classes I and II, and social

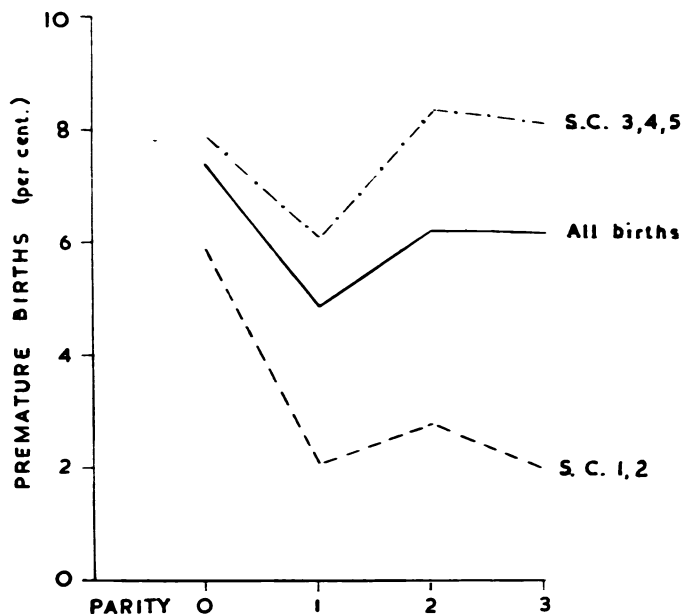


FIG. 4.—Prematurity by parity and social class.

classes III, IV and V. It is seen that for all births the highest prematurity rate is found with first births and the lowest with second births; subsequently the

TABLE 4
PROPORTION OF LARGE BABIES ACCORDING TO SOCIAL CLASS

Social Class	Total Births	Percentage of Babies over $7\frac{1}{2}$ lb. at Birth
1	217	74.2
2	381	50.7
3	1,233	39.4
4	124	40.3
5	196	36.2

incidence of prematurity rises. However, when comparing mothers of social classes I and II with those in social classes III, IV and V, it is seen that the more prosperous mothers maintain their low prematurity rate with all births after the first. High birth ranks are infrequently encountered in this social group and the figures cannot be further analysed after the fourth birth, but in social classes III, IV and V the prematurity rate for sixth and subsequent births rises to nearly 18%. The obvious conclusion is that in the poorer homes every

additional baby brings added financial strain and extra work and worry to the mother. An additional factor in the increase of prematurity with parity in this group is the short time between pregnancies in many cases. In middle class homes planned pregnancies are much more common and extra domestic help is usually available to the mother as her family increases.

A similar picture is seen when the national figures for stillbirth rates are analysed. Fig. 5 is based on the figures for stillbirths according to parity and social class given in the Annual Report of the Registrar General for Scotland, 1953. Here again in social class V the incidence of stillbirth rises

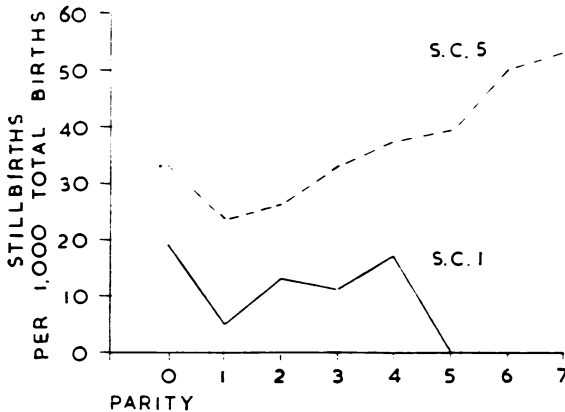


FIG. 5.—Stillbirth rates by social class and parity in Scotland, 1953.

steadily after the second birth whereas in social class I, although there is also a rise, the rate never reaches that of the first birth. The figure of 17 per 1,000 for fifth births is based on one case, and no stillbirths were recorded in subsequent parities in social class I.

Social Class Differences in Age of Mother at the First Birth

Fig. 6 shows the proportion of first births occurring in five age groups in three social classes. In social classes III, IV and V about half of the first births occur during the period 20 to 24 years though a substantial number, especially in social class V, occur before the age of 20. There were no births to primiparae under 20 years in social classes I and II. Here about half of the births occur in the age period 25 to 29 years.

The Interval Between Marriage and the First Birth

Fig. 7 shows the incidence of prematurity according to the interval between marriage and the first

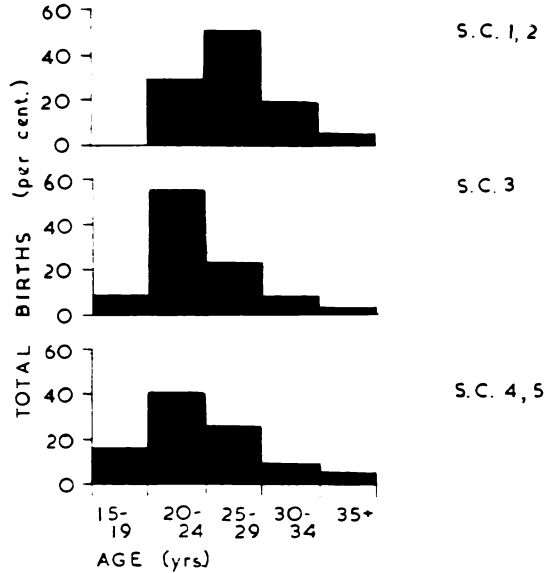


FIG. 6.—Age at first birth by social class.

birth in social classes I and II, and social classes III, IV and V in women aged between 20 and 34 years. It will be seen that a high incidence of prematurity (13.3%) occurred in cases of premarital conception in social classes III, IV and V. There were no recorded premarital conceptions in social classes I and II in the premature group. The incidence of prematurity is also significantly higher in all social classes in the case of birth occurring in the first year of marriage and also in those cases where the first birth was delayed until more than three years after marriage. In primiparae over the age of 34 years there is a high proportion of premature

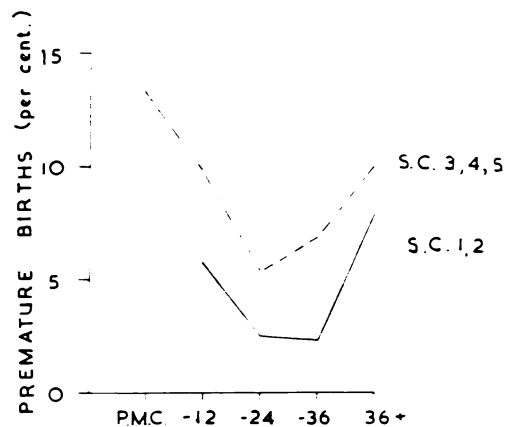


FIG. 7.—Incidence of prematurity in primiparae by time married.

births to mothers who have been married longer than three years, but these have been excluded to remove the effect on birth weight which may be due to age alone. It would be interesting to know the incidence of previous abortions, as it seems probable that subfertile mothers and those with an increased liability to miscarriage are also more likely to produce a premature infant.

Martin (1954), working on the figures for prematurity collected in the national enquiry into maternity in Great Britain carried out in 1946, also found a definite correlation between delay in conception and prematurity, although the frequency of prior miscarriage did not appear to differ significantly in the mature and premature groups.

A possible explanation of the higher prematurity rate in those who conceive shortly after marriage is that those from a more prosperous background may deliberately delay conception until they have settled into a home of their own.

One-third of all mothers in social classes III, IV and V conceived either before or shortly after marriage compared with one-quarter in social classes I and II, although the same proportion in all social classes (nearly 70%) had their first baby before the fourth year of marriage.

Summary

A statistical analysis of all births in Edinburgh, over a 12-month period, indicates the following:

(1) A significant increase of prematurity is found in illegitimate births.

(2) Under 20 years of age and over 34 years, the prematurity rate is twice that for the age period 20 to 34 years. The youngest mothers have a high proportion of big babies especially after excluding cases of premarital conception when three-quarters of the babies were over 7½ lb. at birth compared with one-fifth in mothers over 34 years.

(3) There is a significantly lower prematurity rate, and higher proportion of big babies born to mothers from a more prosperous economic background.

(4) The prematurity rate rises steadily after the second birth in the lower social classes. Mothers from social classes I and II maintain their low prematurity rate with all births after the first. Similar findings were observed for stillbirth rates using national figures.

(5) A high prematurity rate was found in babies conceived before marriage or shortly afterwards. The prematurity rate rises again with births delayed for more than three years after marriage.

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