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RECENT STATISTICS OF MULTIPLE BIRTHS IN ENGLAND AND WALES

by

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The Registrar General's Statistical Review, England and Wales, for 1938 (Part II, Civil, pages 117-124, 134-136) contained an analysis of the 7521 multiple births registered during the first six months of the Population (Statistics) Act which came into operation on July 1st, 1938. The frequency of a twin maternity was calculated at different ages of the mother for monozygotic and dizygotic twins according to the method of Weinberg (i. e. assuming the number of like-sexed dizygotic pairs to equal the number of pairs of unlike sex, all of whom must be dizygotic); and in dealing with each sex separately a correction was applied to allow for the slight excess of males born compared with females. The analysis confirmed that frequency of twin births is maximal at ages 35-40, as Dahlberg had demonstrated from birth statistics in Finland, Denmark, France and Hungary; and also that the curious relation with age of mother is very pronounced for dizygotic twins whereas monozygotic twins show little, if any, change in frequency with mother's age, as Lotze had demonstrated. In 1940 Yerushalmi and Sheerar arrived at a somewhat similar conclusion from a study of 1830 pairs of twins born in New York State, but owing to the small numbers the data failed to show that the fall in frequency after age 40 occurs amongst the dizygotic twins and not amongst the monozygotic. The 1938 analysis for England and Wales covered other factors also, including the relation with number of previous children and proportions of twins stillborn, but little notice was taken of this work.

An extended analysis of 5,038,662 births, registered from July 1938 to December 1945 and including 59,300 pairs of twins, 496 sets of triplets and 9 sets of quadruplets, has been published in 1951 in the Registrar General's Statistical Review for 1940-45 (Text, Vol. II, Civil, pages 116-125, 129-130); and since the data are detailed and extensive it seems worth while to call the attention of research workers in other countries to it. The present paper summarizes the salient figures, and also makes use of the raw data for another two years 1946 and 1947, published in Tables CC and DD of the Registrar General's Reviews (Part II) for those years. Reference is also made to some comparative data on the frequency of stillbirth amongst multiple births in Canada during 1945-48, recently published

by the Dominion Bureau of Statistics in the Summary of Vital Statistics, 1951. The word « maternity » signifies a confinement resulting in birth of one or more live or stillborn children; « birth » refers to each individual child, and « stillbirth » to a dead foetus delivered after a gestation period of 28 weeks or more.

Table 1 compares the frequency of twin, triplet and quadruplet maternities in England and Wales (during 9½ years from mid 1938 to the end of 1947) with those in Canada in 1945-48 and in the United States of America in 1931-35. Twins occurred once in 83 total maternities, triplets once in 10,050, and quadruplets about once in half a million.

Table 1 - Frequency of Single and Multiple Maternities

Type of Maternity	England and Wales 1938-47		Canada 1945-48		U.S.A. 1931-35	
	Totals	Per 1000	Totals	Per 1000	Totals	Per 1000
Single	6,620,794	987.885	1,323,684	988.846	10,725,786	988.342
Twin	81,133	12.105	14,918	11.143	126,401	11.646
Triplet	667	010	142	011	1,253	012
Quadruplet	14	0002	4	0003	19	0002
Total	6,702,608	1000.000	1,338,748	1000.000	10,853,459	1000.000

In the five year period 1943-47 in England and Wales 3,827,410 children were born at single maternities, and of these 100,770 were stillborn, a proportion of 2.6 per 100. In the same period there were 95,516 twins of whom 5,730 were stillborn, or 6.0 per 100; 1,125 triplets, of whom 105 were stillborn, or 9.3 per 100; and 52 quadruplets, of whom 7 were stillborn, or 13.5 per 100. In Canada, 1945-48 the corresponding proportions stillborn are recorded as 2.0, 4.0, 7.8, 6.3 per 100.

Table 2 shows the frequency, during the 7½ years from mid 1938 to the end of 1945 in England and Wales, of twin maternities, with distinction of monozygotic, dizygotic, legitimate and illegitimate, at various ages of the mother.

The rates in the table are derived from totals of about 4½ million legitimate and 0.3 million illegitimate maternities. Of the legitimate maternities the numbers (in thousands) at the successive age groups were 147, 1123, 1403, 1115, 638, 200, 16. The standard errors of the monozygotic legitimate rates were, therefore, about 0.20, 0.08, 0.09, 0.11, 0.15, 0.24 and 0.63 at the seven age groups. A straight line can be fitted to all the monozygotic rates from which none of the observed values (either for legitimate or illegitimate) diverge by an amount which is statistically significant. This straight line, representing the trend of frequency of monozygotic twinning with increasing age of mother, passes through points given by 3 per 1000 at age 16 and 4 per 1000 at age 47. There seems to be a very slight

Table 2 - Frequency of Monozygotic and Dizygotic Twins according to Legitimacy and Age of Mother

Age Group	Legitimate			Illegitimate		
	Average age of all mothers	Per 1000 Maternities		Average age of all mothers	Per 1000 Maternities	
		Monozygotic	Dizygotic		Monozygotic	Dizygotic
Under 20	19.0	3.05	3.30	18.4	3.32	2.04
20-	22.8	3.23	5.26	22.5	3.48	4.91
25-	27.5	3.31	7.91	27.3	2.53	10.10
30-	32.3	3.51	10.82	32.3	2.89	14.29
35-	37.2	3.86	12.79	37.3	2.44	15.97
40-	41.8	3.55	9.47	41.9	3.17	10.02
45 & over	46.3	4.29	2.61	46.5	3.91	5.22

tendency for the rate to increase with advancing age, which might be caused by a diminishing tendency for twin pregnancy to result in abortion as age advances.

Very different is the relation between the frequency of dizygotic twinning and age of mother, which is represented mathematically and graphically by two straight lines meeting about age 37-38, at which age period the frequency suddenly ceases to increase with advancing age and begins to decrease. These lines for legitimate maternities are as follows:

1) From 2 per 1000 at age 17 to 14 per 1000 at age 38 (a straight line which meets the base line of zero frequency at age $13\frac{1}{2}$).

2) From 14 per 1000 at age 38 to 5 per 1000 at age 45 (a straight line which meets the base line of zero frequency at age 49).

For illegitimate maternities the upward trend appears to be slightly steeper (perhaps due to a higher abortion rate for illegitimate twin pregnancy at the younger ages); but the downward trend is not significantly different from that for legitimate maternities.

These data seem to show more conclusively than any previously published that ageing of the maternal organism has little or no effect on monozygotic twinning, and that it is associated with a pronounced and steady increase in liability to dizygotic twinning until age 38, after which a rapid decline in that liability occurs.

Since hereditary factors are involved which increase the likelihood of a multiple pregnancy amongst mothers who have already experienced one or more, it is to be expected that mothers about to be delivered of twins will have had more previous children on the average than mothers of the same age about to be delivered of a single child. Table 3 shows that this was in fact true at each age group.

Since the age distribution of mothers experiencing twin maternities is not the same as that of mothers experiencing single maternities, the average numbers

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Table 3 - Previous Children of Mothers experiencing Single and Multiple Maternities

Age Group	Single		Twin		Triplet and Quadruplet	
	Number of mothers delivered	Average previous children per mother	Number of mothers delivered	Average previous children per mother	Number of mothers delivered	Average previous children per mother
Under 20	146,477	0.11	939	0.13	5	} 1.02
20-	1,113,867	0.42	9,540	0.48	60	
25-	1,387,520	0.93	15,757	1.05	118	
30-	1,098,695	1.59	15,976	1.82	147	1.88
35-	627,413	2.61	10,629	2.93	118	3.25
40-	197,129	4.18	2,601	4.54	23	5.39
45-	15,734	5.97	109	6.13	1	7.00
50 and over	179	5.84	0	—	0	—
Not stated	12,080	1.73	135	2.33	3	9.33
All ages	4,599,094	1.33	55,686	(1.69)	475	(2.12)

Table 4 - Sex ratios for Single, and Multiple Births

	Single births	Twins	Triplets	Quadruplets
<i>No. of Males</i>				
Liveborn	1,920,374	45,522	485	16
Stillborn	54,253	3,167	55	3
Total	1,974,627	48,689	540	19
<i>No. of females</i>				
Liveborn	1,806,269	44,264	535	29
Stillborn	46,516	2,563	50	4
Total	1,852,785	46,827	585	33
<i>Males per 100 females</i>				
Liveborn	106.3	103	91	(55)
Stillborn	116.6	124	110	(75)
Total	106.6	104	92	(58)

of previous children at all ages combined need to be standardized by first applying the « single » averages at each age group to the numbers of « twin » mothers at that age. It is found that the expected average previous children would then be 1.50 for the twin maternities and 1.70 for other multiple maternities; and consequently, there was an excess of 0.19 previous children (13 per cent) at a twin maternity and of 0.42 (25 per cent) at a triplet maternity. This would be accounted for if 1 out of 8 previous maternities of mothers giving birth to twins had been multiple, instead of 1 out of 80, the average frequency. If this is the whole expla-

nation of the excessive average number of previous children it signifies that for a mother who has already experienced a multiple maternity the probability that a subsequent maternity will be multiple is about ten times as great as it is for the average woman. If, however, there is also some obscure effect of parity (that is number of previous deliveries no matter whether single or multiple) on the tendency to produce multiple births, in addition to the existence of an inborn tendency to multiple pregnancies in some mothers, the excess noted in Table 3 would be due to the combined operation of both effects. Which of these explanations is the correct one cannot be deduced from the data.

Table 4 shows the sex ratios for single, twin and other multiple births occurring in England and Wales during the five years 1943-47. The fall in the proportion of males as the number of children born at one time increases is statistically significant, and may be due to a greater tendency for male embryos to die at an early stage of pregnancy (producing an abortion) when the pregnancy is multiple than when it is single.

SUMMARY

Analysis of the statistics of multiple births in England and Wales between July, 1938 and December, 1945 proves that the frequency of monozygotic twin births is virtually constant, at about 3 per 1000 pregnancies, for all ages of mothers. The frequency of dizygotic twinning, however, increases with maternal age from 2 per 1000 pregnancies at 17 to a maximum of 14 per 1000 pregnancies at 38, and then decreases gradually to 5 per 1000 maternities at 45. Comparison of the average numbers of previous children to mothers at each age shows that the twin pregnancies were associated with a greater number of previous children than were the single maternities. While the reasons for this difference cannot be deduced from this data, if the tendency to multiple births is governed entirely by heredity and is independent of a woman's parity, this greater number of previous children to mothers of twins would indicate that the probability of repetition of a twin birth is ten times as large as the total population frequency of twins births.

RIASSUNTO

L'analisi della statistica dei parti multipli in Inghilterra e Wales dal luglio 1938 al dicembre 1945 dimostra che la frequenza dei parti gemellari MZ è pressapoco costante, cioè 3 su 1000 gravidanze per ogni anno di età delle madri. Invece la frequenza dei parti gemellari DZ cresce con l'età della madre da 2 su 1000 gravidanze nell'età di 17 anni, a 14 su 1000 nell'età di 38 anni, per poi decrescere gradualmente a 5 su 1000 gravidanze nell'età di 45 anni. Il confronto delle cifre medie dei parti precedenti nelle madri di ogni grado d'età dimostra che le gravidanze gemellari sono in rapporto con un maggior numero di parti precedenti nei confronti delle gravidanze singole. Malgrado ciò la tendenza ai parti multipli dipende soltanto da fattori ereditari e non dal numero dei parti precedenti; però questo maggiore numero dei figli nati in precedenza dalle madri di gemelli dimostra che la possibilità di ripetizione del parto gemellare è 10 volte più grande di quanto non sia la frequenza normale dei parti gemellari per la media delle madri.

RÉSUMÉ

L'analyse des statistiques des naissances multiples en Angleterre et au pays de Galles, de Juillet 1938 à Décembre 1945, montre que la fréquence des accouchements gémeillaires monozygotiques est presque constante, c'est-à-dire 3 sur 1000 grossesses pour chaque degré d'âge des mères. Au contraire, la fréquence des accouchements gémeillaires dizygotiques augmente avec l'âge de la mère: de 2 sur 1000 grossesses à l'âge de 17 ans jusqu'à 14 sur 1000 à l'âge de 38 ans, pour descendre ensuite lentement à 5 sur 1000 grossesses à l'âge de 45 ans.

La comparaison des chiffres moyens des accouchements précédents chez les mères à chaque degré d'âge démontre que les grossesses gémeillaires sont en rapport avec un plus grand nombre de grossesses précédentes que les grossesses simples. Bien que la tendance aux accouchements multiples dépende seulement de facteurs héréditaires et non du nombre des grossesses précédentes, néanmoins le nombre plus grand d'enfants nés précédemment de mères qui ont des jumeaux montre que la possibilité de la répétition de l'accouchement gémeillaire est 10 fois plus grande que la fréquence normale des accouchements gémeillaires pour la moyenne des mères.

ZUSAMMENFASSUNG

Wie eine Untersuchung der Statistik über Mehrgeburten in England und Wales in der Zeit von Juli 1938 bis Dezember 1945 dartut, ist die Häufigkeit der monozygotischen Zwillingsgeburten fast konstant, nämlich 3 auf 1000 Schwangerschaften für jedes Lebensjahr der Mütter. Die Häufigkeit der dizygotischen Zwillingsgeburten hingegen steigt mit dem Alter der Mutter von 2 auf 1000 Schwangerschaften im Alter von 17 Jahren auf 14 pro 1000 im Alter von 38 Jahren, um dann langsam zurückzugehen auf 5 pro 1000 Schwangerschaften im Alter von 45 Jahren.

Ein Vergleich der Durchschnittsziffern der vorhergegangenen Geburten bei Müttern jeder Altersstufe zeigt, dass Zwillingsschwangerschaften mit einer grösseren Anzahl früherer Geburten verbunden sind als die Einzelchwangerschaften. Obgleich die Tendenz zu Mehrgeburten nur von Erbfaktoren abhängt und nicht von der Anzahl früherer Geburten, so zeigt die grössere Anzahl früher gebohrer Kinder bei Müttern die Zwillinge haben doch an, dass die Möglichkeit einer Wiederholung der Zwillinggeburt 10 mal so gross ist als die normale Häufigkeit für den Durchschnitt der Mütter.

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