

Section of Obstetrics and Gynæcology

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DISCUSSION ON STILLBIRTH AND NEONATAL MORTALITY

Professor D. Baird : On making a statistical analysis great differences are found in the stillbirth and neonatal mortality rate as between one country and another and between different areas of the same country. In 1936 in England and Wales there were 25,045 stillbirths and 18,200 neonatal deaths, a total of 43,245. This compares with 28,000 deaths from tuberculosis and 56,000 from cancer. The figure for Scotland shows a similar tendency. The stillbirths and neonatal deaths in Scotland are approximately equal, individually exceeding the combined deaths from scarlet fever, measles, whooping-cough and diphtheria, and as the expectation of life at birth is nowadays about 60 years, we see that the effective years of life lost are very great.

It has been recognized for a long time that the infantile mortality rate is largely dependent on poverty and a low standard of living, and the stillbirth and neonatal death-rates may be similarly influenced. A study of the Registrar-General's reports shows that for certain years, as we go down the social scale, infant mortality increases from 38 per 1,000 births among the well-to-do to 103 per 1,000 among the lowest class economically—the "unoccupied". The neonatal mortality is similarly affected, varying from 22 per 1,000 in the upper and middle class to 55 in the "unoccupied".

A great deal can be learned from a statistical study of biological groups, and a recent publication by Mrs. C. M. Burns entitled "Infantile and Maternal Mortality in Relation to Size of Family and Rapidity of Breeding" (Carr, Newcastle-on-Tyne, 1942) is of great interest. She shows that there is a steady rise in the stillbirth rate with the age of the mother and also a decrease with parity, except in cases in which there is a parity of seven or over. The neonatal mortality rate is similarly influenced. Another factor is the influence of the rate of reproduction. At each size of family there is a maternal age which gives the children the greatest chance of survival. It is important in shaping national policy that the conclusions to be drawn from this valuable contribution should be carefully studied.

The exact cause of stillbirth is often difficult to determine, especially in domiciliary practice, and even in a hospital with the aid of routine post-mortem examinations it is often difficult to make a diagnosis. The appendix to the Registrar-General's report for 1939 dealing with Scotland gives his estimate of the main causes of stillbirth in order of relative importance. He classifies 27% as ill-defined and 10% as of unknown cause. In 37% of the cases therefore he could not determine why the baby was not born alive. Then 14% of the deaths were due to difficult labour, 13% to foetal deformities, and the other causes are ante-partum hæmorrhage, toxæmia, and general diseases.

MacGregor in Edinburgh drew attention to the high incidence of pneumonia not only in the neonatal period but also amongst stillbirths. I have made an analysis of stillbirths and neonatal deaths, in "booked" cases, in the Aberdeen Maternity Hospital, and as it is the only maternity hospital in the area it should give a satisfactory cross-section of the death-rates in the City during the period investigated. The stillbirth rate was about 33 per 1,000 births, and the causes of death corresponded fairly well with those given in the Registrar-General's statistics. The biggest individual factor was again "cause unknown". In 30 cases out of a total of 82 the cause could not be identified. In 24 cases the cause was difficult labour, in 9 toxæmia, in 6 accidental hæmorrhage, in 5 foetal deformities, and in one placenta prævia. There was also a miscellaneous group of 7.

With regard to the stillbirths following difficult labour very few are avoidable since many are due to prolapse of the cord and uterine dysfunction.

Premature babies are much more liable to die during the course of labour and every effort should be made to prevent prematurity. Of 65 stillbirths in premature babies the cause of the premature onset of labour was undetermined in 21, in 11 it was due to toxæmia, in 11 to intercurrent disease, in 6 to accidental hæmorrhage and in 6 placenta prævia.

In emergency cases difficult labour is frequent, and if placenta prævia is added to difficult labour, nearly 50% of the cases are accounted for. Some of these deaths could have been avoided if the patient had been admitted earlier to hospital. Toxæmia was the most common cause of the onset of premature labour in emergency cases.

Neonatal mortality.—In Scotland at any rate, 50% of infantile deaths occur during the first month of life, and faulty feeding during this time leads to marasmus and increased susceptibility to infection later. Neonatal mortality varies greatly from one country to another, and also within the same country. In 1937 the neonatal rate of mortality was 38 per 1,000, in the North of England 34, in the South East of England 24, and, taking large cities, it varied from 43 in Glasgow to 24 in London. The London figure is about the same as for New York and Chicago.

Amongst "booked" hospital cases almost half of the deaths in full-time babies were due to infection, but most of these occurred after dismissal from hospital and are avoidable. Few of the remainder are avoidable. Half of the neonatal deaths were in premature babies, and the mortality amongst premature babies (under 5½ lb.) varies directly with the birth-weight. As with stillbirths the cause of the premature onset of labour could not be determined in almost 40% of cases. In emergency cases trauma again accounted for 50% of the deaths in full-time babies and in premature babies there was a very large number in which the premature onset of labour seemed unavoidable in the present state of knowledge. The prevention of prematurity is an urgent problem and until this can be solved the best possible provision must be made for the nursing of premature babies. The better the care the higher the survival rate. Many are so feeble, however, that survival is impossible. Out of a series of 67 neonatal deaths in premature babies 45 died within three days of birth, due to weakness.

The incidence of premature labour in the "booked" hospital cases which represent the working-class community is about 9%. In a series of 885 cases in the upper and middle class the incidence of prematurity was 6%, and in a series of 330 "booked" specialist cases the premature birth-rate was 2%. The neonatal mortality of these three groups was respectively 3.3, 1.35, and 0.6. In the two latter groups the good figures were due to the absence of infection and to the fact that of the premature babies few were very small.

Where the neonatal mortality is low the stillbirth-rate is also low. In the specialist series already mentioned the stillbirth-rate was also 0.6 per cent. The fact that the stillbirth-rate in hospital, where obstetric care is good, is relatively high, 3.3%, suggests that social status is important, and the factor most likely to affect the rates is the diet of the mother. This is supported by recent Toronto feeding experiments. A supplementary ration reduced the prematurity rate from 8% to 2.2% and the stillbirth-rate from 3.4% to nothing.

Stillbirths and neonatal deaths as well as infant deaths in general have much higher rates in Scotland than in England. Sixty years ago the positions were reversed. Presumably, therefore, there is no inherent weakness in Scottish offspring. Housing is much worse in Scotland and there is much more poverty.

There is a vast amount of work dealing with the subject in animals and there is no doubt that the literature of animal experiments should be more widely known amongst obstetricians. The relatively prosperous parts of the country are solving the infant mortality by so reducing the size of their families that they are failing to reproduce themselves. In the depressed areas the birth-rate is much higher, but the stillbirth and neonatal mortality rates are high because of malnutrition, too rapid child-bearing and slum conditions generally. The net reproduction rate in these areas is about 0.9.

In a depressed area the following measures would lower the mortality: (1) better feeding of pregnant women and nursing mothers, together with more rest; (2) better health instruction and intensive mothercraft teaching during pregnancy; (3) the provision of more antenatal beds in hospital for treatment of complications; (4) better post-graduate training of doctors and nurses; (5) better training of health visitors.

In the more prosperous areas the chief problem is to check the fall in the birth-rate. The country must realize that its real wealth is in the quality of the young people whom it produces. Recent surveys have shown that over 50% of children are reared in conditions of primary poverty.

Professor Charles McNeil : I propose to make some practical suggestions for the study and reduction of infant deaths during birth and the first month of life.

Inclusion of stillbirths.—It is necessary to place alongside any figures of neonatal mortality the corresponding stillbirths. This is especially important in any international comparisons of infant mortality rates. Unless this is done, serious errors in the calculation of infant deaths will be made. Further, the dividing line between stillbirths and neonatal deaths, usually so sharply drawn, is misleading, because the same lethal processes that destroy infant life during birth, continue to operate with great power after birth, and indeed are responsible for the majority of neonatal deaths. To illustrate these points, statistics of 5,300 viable births in the Simpson Maternity Pavilion of the Edinburgh Royal Infirmary during 1939 and 1940 are presented. The figures of viable births and deaths are shown in graphic form in 3 charts; and these charts give broad but accurate impressions of three problems in a large maternity hospital:—the conglomerate mass of stillbirths and neonatal deaths which is the total problem of our discussion (fig. 1); the proportions of stillbirths and of neonatal deaths (fig. 2); and the division into maturity and prematurity, showing for each group a separation of stillbirths and neonatal deaths (fig. 3).

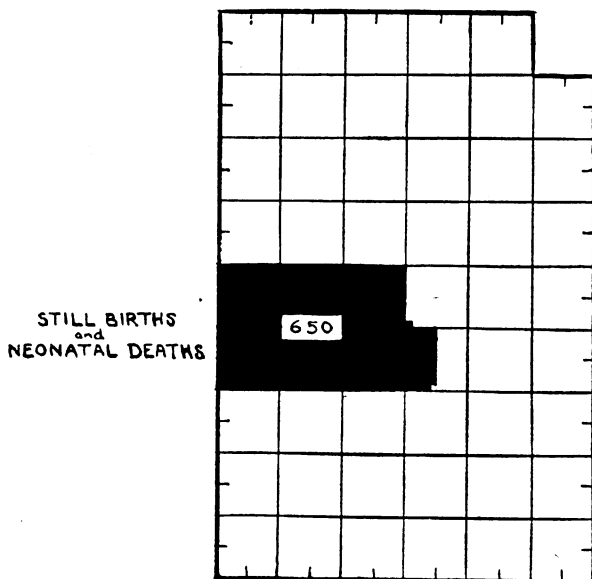


FIG. 1.—Maternity Pavilion, Royal Infirmary, Edinburgh. Deaths (stillbirths and neonatal deaths) in 5,300 viable births, 1939-40.

Fig. 2 shows the splitting of the single block of infant deaths into stillbirths and neonatal deaths, and the great preponderance of stillbirths. When we remember that many of the deaths in the neonatal block are due to the same causes that produce stillbirth, it is clear that the problem of stillbirths is the greatest part of the whole problem of natal and neonatal death.

Prematurity.—The standard of prematurity (or immaturity) for this series is the Geneva weight standard of $5\frac{1}{2}$ lb. In fig. 3, the *prematures* are placed at the bottom of the chart, and include stillbirths, neonatal deaths, and survivors, with a total death-rate (including stillbirths) of 53%; above them are placed the great mass of *mature viable births* with a total death-rate of 6.5%. The incidence of prematurity in this hospital series is 12%. This chart shows that any serious effort to reduce infant deaths in the first month must include a special and separate study of prematurity, the discovery and control of its causes, and a more successful management of the premature baby after birth. This series of 653 prematures includes 68 under $2\frac{1}{2}$ lb., all of whom died.

The introduction of a weight standard for prematurity has been of great value in allowing accurate comparison between published series of cases; but it is essential that premature stillbirths should be included in all studies of prematurity. It would be also of great value to have a lower weight standard in prematurity, all under $2\frac{1}{2}$ lb. being placed in a separate pre-viable group.

Pathological causes of death during birth and in the first month.—Post-mortem examination was carried out in 541 cases of the 650 deaths in this series. They were done by Dr. Agnes Macgregor. This large number of autopsies by an experienced pathologist allows the accurate grouping of the pathological conditions that were the immediate causes of death. These causes fall into six groups, gross congenital defects, asphyxia, intracranial hæmorrhage, infections, miscellaneous, and unknown (in stillbirths, this was

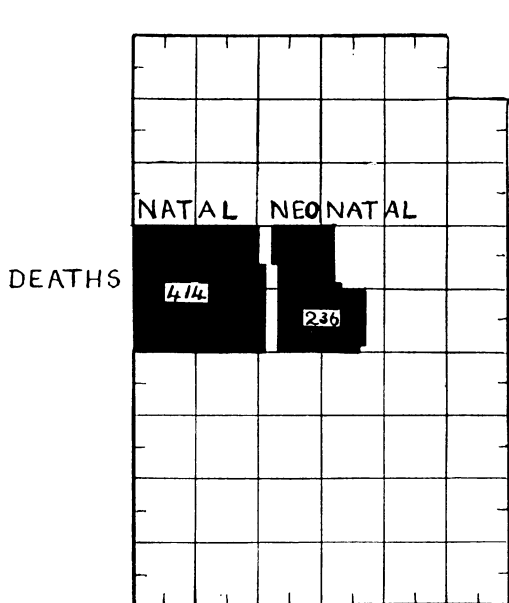


FIG. 2.—Stillbirths and neonatal deaths in 5,300 viable births.

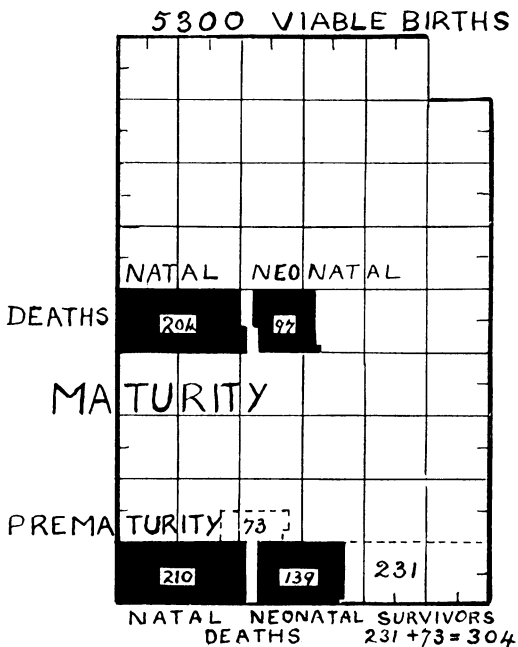


FIG. 3.—Maturity and prematurity.

nearly always maceration). The results are given in the following table as death-percentages for the four clinical groups; mature stillbirths and neonatal deaths; and premature stillbirths and neonatal deaths.

Pathological condition	Mature	
	(Autopsies 163) Stillbirths	(Autopsies 95) Neonatal deaths
Congenital defect	11%	21%
Asphyxia	49%	19%
Intracranial hæmorrhage	26%	13%
Infections	0%	31%
Miscellaneous	0%	11%
Unknown	13%	2%

Pathological condition	Premature	
	(Autopsies 153) Stillbirths	(Autopsies 130) Neonatal deaths
Congenital defect	25%	4%
Asphyxia	42%	37%
Intracranial hæmorrhage	10%	15%
Infections	0.7%	23%
Miscellaneous	4%	5%
Unknown	17%	16%

Comment may be made upon the more important facts disclosed by this table.

Congenital defects account for a considerable number of deaths both in matures and prematures; but the incidence of fatal congenital defects is about nine times greater in the premature than in the mature group.

Asphyxia is the predominant cause of death both in matures and prematures; and especially so, in prematures.

Infections only caused one death in all the stillbirths; but they took a high place both

in the mature and premature neonatal deaths. The principal fatal infection was gastro-enteritis; respiratory infections and thrush also played a considerable part. Fatal infection of the umbilical wound, and destructive infection of the eye, formerly common in maternity hospitals, are now rare, although minor surface infections are still prevalent. But the high incidence of fatal alimentary and respiratory infections shown in this series is probably occurring in other maternity hospitals and nursing homes where the newborn are congregated; and with the steady increase of institutional midwifery, the problem of fatal neonatal infection remains serious and demands further study and stricter measures of notification and control.

Allocation of the infant clinical problems of the first month.—As regards study and control, these problems fall either to obstetrics or to pædiatrics.

The allocation to *obstetrics* includes, congenital defects; asphyxia and intracranial hæmorrhage, with their causes; and the great predisposing condition of prematurity which entails a study of the general health of pregnant women. These clinical conditions form the largest and the most intractable part of the total problem of stillbirths and neonatal deaths. But obstetrics, which is perhaps the best organized of the primary subjects of medical practice, is well equipped to grapple with its share of this hard problem; and already hopes have been raised that improvement of the diet in pregnancy can substantially reduce the incidence of prematurity. If these hopes are realized, a reduction of prematurity will bring down appreciably the natal and neonatal death-rate.

The *pædiatric clinical problems* are: The care of the premature baby after birth; the countering of neonatal hospital infection; and the inauguration and management of feeding. Our present management of these three problems leaves much room for improvement; and yet all these problems are amenable to measures of control as has been shown by the reduction of premature neonatal deaths in Chicago, and the improved nursing hygiene in the newborn nurseries of New York. British pædiatrics is poorly equipped to deal with these big problems. The first urgent requirement is the strengthening of pædiatric staffs in maternity hospitals.

SUMMARY

In the neonatal period, stillbirths and neonatal deaths present a conjoint clinical problem.

One part, which is obstetrical, involves the study of conditions that occur during birth and also go back to the period of pregnancy; while the pædiatric problem, covering the first weeks after birth, continues and extends into the succeeding weeks and months.

This double problem, obstetrical and pædiatric, is therefore not confined in time to the first month, nor can it be studied completely in maternity hospitals. It requires study of the food and other home conditions of the expectant mother as well as the highest standards of obstetric care during pregnancy and labour. It also requires the successful inauguration of baby feeding in the maternity hospital; the protection of the baby from the great danger of hospital infection; and more than that, the continued mastery of infant dietetics at home during the first year, and the maintenance of conditions in the home that will raise a barrier against the dangers of infection there.

In the obstetrical problem, created by infant deaths during birth and in the succeeding weeks, there are two main keys to its solution—the nutrition and diet of the mother during pregnancy, and skilful management of labour. In the pædiatric problem the main keys are again two—the nutrition and diet of the baby, and the prevention of infection.

The first month of life is therefore of the highest importance as regards the health of the mother and child. The health of the mother *before and after birth*, is bound up with the health of the child. This conjoint problem of maternal and child health constitutes the main foundation of national health.

RECOMMENDATIONS

- (1) Increase of pædiatric staffs in maternity hospitals.
- (2) Planned studies in maternity hospitals of the infant problems which occur in the first month.
- (3) A uniform and more complete reporting of statistics of stillbirths and live births in maternity hospitals which would be of great value in promoting these studies.
- (4) Agreed standards of prematurity should be adopted by maternity hospitals—the inclusion of stillbirths, and an upper and lower weight standard.
- (5) In selected hospitals radical investigations of the problem of prematurity should be carried out by medical teams consisting of obstetricians, pædiatricians and patholo-

gists; these investigations centred in the hospitals, but extending into homes and home conditions during pregnancy, and after discharge of mothers and babies from hospital.

(6) The question of notification of neonatal hospital infections, and especially gastro-enteritis, should be considered.

(7) Infant follow-up clinics should be attached to all maternity hospitals.

(8) In order to close the disastrous gap in medical and nursing supervision of the baby that occurs in the second week in hospital and home midwifery, when the mothers resume their household duties and the attendance of obstetrician and midwife ends, there should be *continuous and much closer supervision of babies, born in hospital or at home, throughout the first month* by doctors and nurses well instructed in the baby problems of the first month, and especially as regards dietetics and hygiene.

I wish to make grateful acknowledgment to Dr. Agnes Macgregor for her valuable post-mortem records, and to Dr. J. L. Henderson for his laborious and accurate compiling and analysis of the figures.

Sir Francis Fremantle, M.P., said that the infant mortality rate and the maternal death-rate which caused so much anxiety in England, and still more in Scotland, but so little perturbation in Holland and other countries, must be related to a common set of causes. Attention was markedly directed to these matters by the passing of the Midwives Act, 1902; by the Report on Maternal Mortality presented to Parliament in 1937; by the Joint Council of Midwifery, which started in 1935, dealing particularly with the work of midwives, and by the reports on maternity nurses and on abortion. Maternity nurses were often in the same position as midwives as they were left largely responsible for the condition of their patients for the greater part of the time.

The conditions of war had brought these matters sharply home to the authorities and to the public. One of the difficulties was to find an adequate number of women to undertake the work, and to make it sufficiently attractive for them to remain and to keep them up to the mark. It might be hoped that in due course midwives, on the report of the Rushcliffe Committee, soon to be expected, would enjoy a position comparable with teachers, whose position had been so greatly improved by the Burnham scale.

The Ministry of Health had lately produced its annual report. After dropping to the low figure of 2.6 per 1,000 births in 1940, the maternal mortality rate had risen slightly, but the rate of infection during childbirth and the puerperium and the figures for puerperal sepsis had fallen during the last two years. Infant mortality had risen by 3 points over that for 1940 and 9 points over the record low figure for 1939; but the neonatal mortality rate had fallen a little and the stillbirth rate which in 1938 was 38 per 1,000 births, declined to 35 last year, again a low record; so that despite the war there had been improvement in that respect.

There are now 1,860 antenatal clinics showing 452,000 attendances last year. The first visits paid by health visitors—a new profession of great promise—numbered over half a million. But a good deal remained to be done in improvement of these antenatal clinics and in the training and selection of health visitors. Feeding arrangements for expectant and nursing mothers had also been improved, and these might be expected to have a considerable effect in reducing the stillbirths and neonatal mortality rates. But housing, economic welfare, and institution accommodation, all influenced the position; the war would bring about a large forward movement in these directions; and he hoped any extension of the institutional care of mothers, would not take away from them their sense of individual responsibility and their duty of self-help.

Poverty and housing had come largely into the picture. In these investigations it was found as a rule that alarming conditions reflected in the infant mortality rates were associated with poverty. The economic conditions which created poverty were to a certain extent the result in present or previous generations of ignorance and weakness in the individual and the fact that the weakest had inevitably gone to the wall. It was not merely the conditions under which they lived but also their natural weakness in breed, character, or intelligence, which produced the deplorable statistics.

The desired advance would not result merely by improving housing conditions. They all knew of people who lived in slums in conditions of penury and insanitation and yet, because the housewife was scrupulously clean and a good manager, a healthy family was brought up.

It was most important to teach the people themselves how they could develop their own powers and help their own prospects. That would be a better method of reform than all the proposals which came before them in Parliament.

Dr. Doyne Bell : In a discussion of maternity services held by this Section earlier in this year one speaker was reported as saying that "it was logical to take the maternal mortality rate as a yardstick by which to measure the quality of the service" (Holland, 1942). But the baby is no mere by-product of the service and the stillbirth rate and the neonatal death-rate are two very useful yardsticks for measuring its success.

A recent editorial in the *Lancet* (1942) said that the first month was the beginning of pædiatrics; yet in the new Maternity Services Act there was no specific provision for the expert pædiatric control of the baby in these first dangerous weeks after birth; there was in fact no pædiatrician on the Central Midwives Board.

This editorial was prompted by an article by Miller (1942) based on a report by Spence and Miller on the causes of infantile death, and stressed the inaccuracies of certification of such deaths. One point among the many which emerged from this report was that up till 1940 "Prematurity was preferred to almost any other cause of death in infancy". *Prematurity* should be used to imply birth before full expected term, and *Immaturity* birth while the infant is relatively ill-equipped for extra-uterine life. Prematurity has been defined as birth before the 40th week of gestation, and immaturity can be usefully gauged by the weight of the infant and has been arbitrarily defined as an attribute of infants weighing less than 5½ lb. at birth.

The work carried out in Toronto (Ebbs *et al.*, 1941, 1942) has already been referred to and, as it has been hailed as showing that, with proper feeding of poor women, infant mortality can be almost abolished, it seems worth while to examine such a startling claim. The general scheme of this work was to study the performances in child-bearing of two groups of mothers, one on a "Poor Diet", and the other on a "Good Diet". It was soon appreciated that these two groups were not comparable, so the "Poor Diet" group was divided into two, one of which had their diet supplemented to the standard of the original "Good Diet" group. The past obstetrical history of the multiparæ in these groups is given in Table I (Ebbs *et al.*, 1941). The multiparæ constituted 65%

TABLE I. (From *The Journal of Nutrition*, 1941, 22, 522.)

Past obstetrical history of multiparous patients (% of cases)	Poor diet (1)	Supplemented good diet (2)	Good diet (3)
Abortions	13.1	4.7	9.0
Miscarriages	38.1	39.0	24.4
Prematures	10.7	20.3	13.3
Stillbirths	9.5	4.7	2.2

and 71% of the first two groups respectively. It will be seen at once that these two series differ so widely that neither constitutes a control series for the other.

Unfortunately there is no record either in this paper or in its second version of the distribution of the babies in the three groups, Table II (Ebbs *et al.*, 1942). If the

TABLE II. (From *The Canadian Med. Assn. Journal*, 1942, 46, 8.)

	Poor diet (1)	Good diet	
		Supplemented (2)	Good diet (3)
Total patients observed	120	90	170
Miscarriages	7	0	2
Stillbirths	4	0	1
Deaths recorded in first 250 babies followed up to 6 months	3	0	0
	14	0	3
Congenital malformation	1	2	1

conclusion that three infant deaths out of an unstated number in the "Poor Diet" group against no death out of an unstated number in the "Supplemented Good Diet" group is of any significance, it is clearly justifiable to conclude that double the number of congenital malformations in the "Supplemented" group is significant, which is highly improbable.

A research also addressed to the problem of the effect of diet upon the infant was initiated before the war by the People's League of Health, and an interim report has been published in the *B.M.J.* and the *Lancet*. Unfortunately the concept of prematurity, defined as birth before the 40th week of gestation, has been used as a yardstick to measure the success of the changed diet. In order to try to assess the suitability of such a yardstick for this purpose, I have, with the permission of Mr. Eardley Holland, taken a

random series of 147 babies born in the London Hospital in 1938 and 135 babies born in 1942 and have made a histogram of their estimated gestation periods (fig. 1). It will be seen that in 1938 the estimated gestation periods are distributed normally about the 40th week with a standard deviation of approximately \pm ten days, that is between 3% and 4%.

This observation leads to the expectation that $\frac{1}{8}$ of all normal gestations will terminate before the 40th week. I venture to suggest that the differences of $3.8 \pm 1.10\%$ for primigravidae and $4.1\% \pm 1.33\%$ for the multiparæ achieved by the dietetic methods adopted in the work sponsored by the People's League of Health are probably of no significance. My conclusion is reinforced by their admitted failure to influence the birth-weight of the babies.

The 1942 histogram is interesting as showing a preponderance of allegedly premature infants. An explanation of this shift appears to be that London mothers are reluctant to go into the reception areas for their confinement and, to avoid doing so, deliberately misstate their expected date. By this means they contrive to be admitted to hospital in London at the onset of labour.

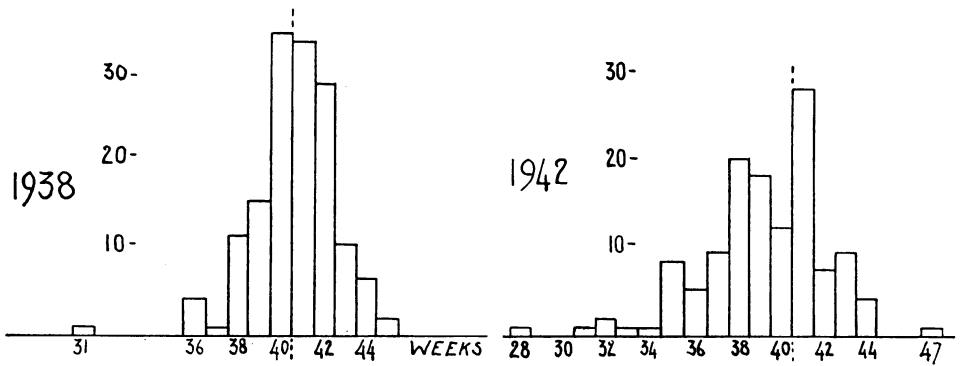


FIG. 1.

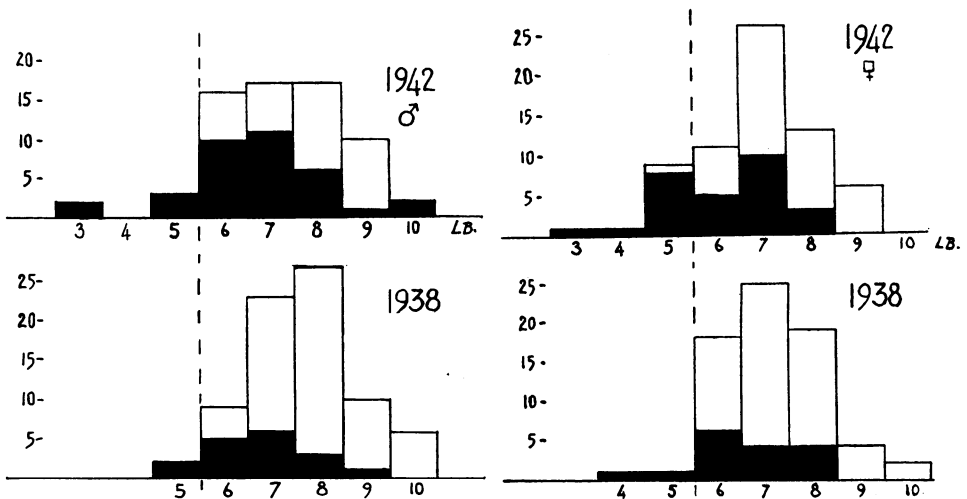


FIG. 2.

FIG. 3.

In figs. 2 and 3 the distribution of birth-weights is shown. The black areas refer to infants born allegedly before the 40th week. The suggestion of falsification of dates is borne out here, for it is clear that the proportion of infants of normal weight born allegedly before term is much greater in 1942 than in 1938.

Table III shows that in 1938 less than 10% of premature babies were immature, and in 1942 less than 24%. On the other hand, there is only one instance in each annual sample of an immature infant born after the beginning of the 40th week. One further point is demonstrated by this table, that the problem of immaturity may be one of immediate and topical interest. Four out of 147 infants proved to be immature in 1938, i.e. less than 3%, whereas 17 out of 135, or more than 12%, were immature in 1942. The difference is unlikely to be the result of chance.

TABLE III.

	Birth-weight	Calculated gestation period		Total
		Before 40th week	In and after 40th week	
1938				
	5½ lb. and over	29	114	143
	Under 5½ lb.	3	1	4
	Total	32	115	147
1942				
	5½ lb. and over	51	67	118
	Under 5½ lb.	16	1	17
	Total	67	68	135

SUMMARY

(1) In spite of very loose certification of neonatal deaths, both as regards cause and as regards exact age, it is probable that immaturity plays a very important part in the deaths of infants in the early weeks of life.

(2) Though there is no reason for supposing that the problem of preventing immaturity has been solved, the proper treatment of immature infants can help to reduce neonatal mortality.

(3) Such treatment and the instruction of pupil midwives and medical students in its methods is essentially the job of the pædiatrician, and the Ministry of Health should instruct local authorities to equip the evacuated midwifery services in their areas with a pædiatric service.

REFERENCES

- HOLLAND, EARDLEY (1942) *Proc. R. Soc. Med.*, 35, 647.
Lancet (1942) (ii), 283.
 MILLER, F. J. W. (1942) *Lancet* (ii), 269.
 EBBS, J. H., TISDALL, F. F., and SCOTT, W. A. (1941) *J. Nutrit.*, 22, 515.
 —, BROWN, A., TISDALL, F. F., MOYLE, W. J., and BELL, M. (1942) *Canad. med. Ass. J.*, 46, 8.

Professor James Young said that the investigations in Oslo, Toronto and London had drawn attention to the critical importance of maternal nutrition for the healthy development of the child both before and after birth. The Oslo and Toronto workers had shown that where the mother's diet was good there was a lowering of the abortion and prematurity rates. But the total figures on which these and other similar investigations were based were so small or the controls were so inadequate that it was doubtful if they were beyond statistical reproach. For this reason the recent Report of the People's League of Health was important. This was probably the most comprehensive and the best controlled investigation ever carried out on this subject. It was based upon observations on 5,000 antenatal women in 10 London hospitals. The women were divided into two equal groups by strictly alternate enrolment and they were, moreover, grouped by age and parity. 2,500 received additional supplements containing those materials (calcium, iron, iodine and vitamins A, B, C, D) in which the dietaries of a large proportion of the population were known at that time (1938-9) to be defective. The other group of 2,500 women acted as controls.

Two important results of statistical significance from the standpoint of the present discussion were revealed. In the first place the incidence of pregnancy toxæmia was about 30% less in the treated than in the control women. Toxæmia was known to be one of the chief factors in prematurity, stillbirth and neonatal death. In the second place the prematurity rate was about 17% less.

Whilst our aim must always be to ensure an adequate and balanced diet of fresh food to expectant mothers there was a risk, especially at a time when the need for food restriction was great and likely to increase, of the administrative arrangements concerned with the growth, import and disposal of our food materials being haphazard unless they were based upon a scientific knowledge of differential values. This was a matter of no small urgency at the present time. When the time arrived for the transport of large

quantities of food-stuffs to the Continent for the succour of the millions suffering privation and starvation, it would become a matter of supreme moment. It was obvious that expectant mothers would then become a very special responsibility. It would be necessary to ship immense quantities of food including vitamin concentrates to Europe after the war and to continue this until the first harvests became available. Meanwhile only by a concerted effort now to establish comparative values could we hope to ease the immense administrative problems which would then arise.

The influence of maternal nutrition on the health and life of the child had, in addition, an important bearing on the population problem facing this country and the Empire. This problem already recognized by competent authorities as serious before the war would become much more grave during and after the war by the withdrawal and loss of a large proportion of the male population. Therefore the feeding of mothers should receive special attention and by further research the newly acquired knowledge on the importance of maternal nutrition in the prevention of prematurity and stillbirth should be directed along effective lines.

Professor Young gave figures relating to changes in the infant birth-weights, the prematurity rate and the toxæmia rates since and during the war. This study had been carried out by Dr. Hargreaves at the British Postgraduate Medical School on "booked" cases during the years 1937 (1,597 cases), 1938 (1,765 cases), 1940 (954 cases), 1941 (846 cases) and 1942 (662 cases). The average birth-weights of full-time children had shown a decline since the pre-war years in primigravidæ from 7.3 to 7.1 lb. and in multigravidæ from 7.6 to 7.4 lb. The percentage prematurity rates had declined, though not so consistently, from 19.7 to 14.2 in primigravidæ and from 16.7 to 13.6 in multigravidæ. The percentage toxæmia rates had shown no consistent change. It was true that evacuation schemes had tended to a differential disturbance of the populations during the war years. Making allowance for these factors the figures seemed to indicate that in this group there had been an appreciable fall in the average birth-weight of the children and that the prematurity rate had declined. Similar studies in other areas would be valuable.

Professor Baird, in replying on the discussion, said that he would like to challenge Sir Francis Fremantle's observations on intelligence and environment. He preferred to wait to see the environment standardized before he passed any opinion on the other factors concerned.

He thought that Dr. Bell's criticism of the Toronto figures was quite justified. The figures were on a very small scale. Just before the war Sir John Orr had made arrangements for a similar investigation to be carried out in Aberdeen to synchronize with the investigation in Toronto, but the onset of war made the Aberdeen investigation impossible. He fully agreed that from groups of 90 or 110 cases it was impossible to draw conclusions, but the work should be repeated on a large scale as soon as possible.

Dr. Bell had spoken about the need for the appointment of a pædiatrician to some of these emergency hospitals. That might be necessary, but it would be only a war-time measure. What he would like to see was more appointments of the type recently made at Newcastle, where Dr. Spence had been appointed Professor of Child Life, which was a very progressive step. The difficulty was to use the obstetricians and pædiatricians to help the Medical Officers of Health and their staffs to organize the health services. Too often the senior members of the health services became administrators divorced from clinical work.

He had been interested in Professor Young's figures, which were very suggestive. He had found the incidence of pre-eclamptic toxæmia in primigravidæ in Aberdeen in "booked" hospital cases to be about 8%. This was fairly near the London figures, which surprised him, because he had always understood that there was relatively little toxæmia in London. The incidence of toxæmia in the small series of private cases was only 3%. These facts were in keeping with Professor Young's view that diet influenced the incidence of toxæmia.

The incidence of prematurity, as defined by Professor Young, in hospital cases in Aberdeen amongst primigravidæ was 24%, as compared with Professor Young's 23%. But in private practice on the same standard the prematurity rate was only 8%. The evidence is sufficiently strong to recommend the giving of vitamin and other preparations in tablet form to make up for deficiencies in the diet.