A LONGITUDINAL STUDY OF THE GROWTH AND DEVELOPMENT OF PREMATURELY AND MATURELY BORN CHILDREN

PART VIII: MORBIDITY IN THE AGE PERIOD 2-5 YEARS

BY

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(RECEIVED FOR PUBLICATION FEBRUARY 16, 1961)

This paper, which is the eighth in a series presenting findings in a long-term study of growth and development in a sample of children of different birth weight, describes the health history of the group from 2 to 5 years. A description of the sample and methods of investigation is given elsewhere (Drillien, 1958).

All children were visited within one month of their third, fourth and fifth birthdays.

An illness is here defined as a disease incident normally necessitating medical attention or hospital admission. In the analysis of morbidity in the first two years of life (Drillien, 1959a), it was noted that some mothers, particularly middle-class women with first babies, called the doctor for trivial ailments and these were excluded from the analysis. After the age of 2 years, very few mothers requested medical attention without reasonable cause, although, as in the first two years, many poor working-class mothers ignored illness which would have received attention in better homes. In particular, sore throats, enlarged adenoids with persistent nasal discharge, and recurrent otitis media with discharge, went untreated in these homes. In addition, it was obvious that the accuracy of recall decreased with declining social standards. Because of this, social class differences in incidence of illness found in the subsequent analysis are likely to be smaller than the real differences which exist.

Of the 595 children enrolled in the survey, a full health history up to the age of 5 years was recorded for 514 (86%). The social class distribution of those lost from the survey does not differ significantly from that of those remaining at 5 years.

Patterns of Morbidity in the First Five Years

Fig. 1 illustrates the relative amount of medical illness suffered by premature and maturely born

children in the first five years of life divided into five sections: respiratory disease, infections of ear, nose and throat; gastro-intestinal infections, specific fevers; and all other causes.

The incidence of respiratory infection which accounted for one-half of all medical illness in the first two years, showed a marked decline in the third year, and a lesser decline in the next two years. Conversely, the incidence of infections of ear, nose and throat increased steadily with age and in the fifth year of life accounted for about one-third of all recorded illness.

The incidence of specific fevers reached a maxi-

FIG. 1.—Relative morbidity in first five years of life by diagnostic category for premature and maturely born children.

mum between 3 and 4 years. The overall incidence of illness at all ages up to 5 was higher in the prematurely born, but after the age of 2 years differences in morbidity were due mainly to the lower average social class of the prematurely born. Below this age there appeared to be a real excess of respiratory illness in prematurely born children, especially boys.

Respiratory Disease

In the third, fourth and fifth years of life respiratory illness accounted for 34, 30 and 21% of total medical illnesses. As in the first two years a social gradient was found in the number and severity of respiratory infections. Using the scoring method described in a previous paper (Drillien, 1959b), the amount of respiratory disease suffered by children in homes where maternal efficiency was graded 3 and 4 (fair and poor) was between three and four times as high as that found in children where maternal efficiency was graded 1 and 2 (very good and good) in the first two years. In the third, fourth and fifth years of life this ratio was roughly one and a half to one.

Effect of Repeated Respiratory Illness in First Two Years. In the first two years, 39 children were reported as having repeated 'chesty colds', bronchitis and pneumonia. Of these, 33 were followed up to 5 years and two more to 4 years. Twenty-four of the 39 children came from homes where maternal efficiency was graded fair or poor. After the age of 2, only four of the 35 children followed to 4 years had a marked excess of lower respiratory infections as compared with children from similar homes, but without this early history. The incidence of bronchitis and pneumonia complicating measles or whooping cough contracted after the age of 2 was no higher in these children than would be expected when maternal efficiency was taken into account.

Asthma. In the age period 2 to 5 years, 13 children suffered from recurrent attacks of wheezy breathing, dyspnoea and cough which were diagnosed as asthma, of which only one case presented the typical picture of an allergic asthma. Five of the 13 children had had recurrent lower respiratory infections from infancy, with an asthmatic type of breathing developing after the age of 2 years. These later attacks were always associated with an upper respiratory infection. Four children developed asthmatic bronchitis after the age of 2 years. One child developed recurrent asthmatic attacks after being in hospital, but the condition cleared without treatment in three months. She had previously reacted to maternal separation by unexplained vomiting. Four of the 13 children had quite severe

FIG. 2.—Proportion of children, by maternal grade, suffering from at least one attack of tonsillitis.

infantile eczema before or during the same period as the asthmatic attacks. Of seven other children with a history of severe or prolonged infantile eczema, five also suffered from recurrent lower respiratory infections in the first two years of life, but without any obvious features of asthma.

In eight further cases of milder infantile eczema, consisting of dry scaly patches over scalp, forehead, cheeks, upper chest or back, lasting for 12 months, there was no history of excessive susceptibility to lower respiratory infection at any age.

Infections of Ear, Nose and Throat

In the first two years of life, infections of ear, nose and throat accounted for 14% of all medical illnesses compared with 20, 27 and 34% in the next three years.

Tonsillitis. Of the total group, 27% had one or more attacks of acute tonsillitis during the three-year period. Mild sore throats with little constitutional disturbance were not included. Fig. 2 shows the percentage of children, by maternal efficiency, who suffered from at least one attack of tonsillitis in each year from 2 to 5, and the percentage of children having three or more attacks in any one year. With declining maternal standards, the incidence of infection rises, and also the number of cases of recurrent tonsillitis.

Of the 514 children followed through to 5 years, 53 (10.3%) had tonsils and adenoids removed before the fifth birthday, and in four more adenoidectomy only was performed. Children from the

TABLE 1
REMOVAL OF TONSILS AND/OR ADENOIDS: INCIDENCE
BY MATERNAL EFFICIENCY GRADE

Maternal Efficiency	% Children Having had Adenoidectomy With or Without Tonsillectomy		
	3 Years	4 Years	5 Years
1	1.0	5.6	10.1
2	0.9	5.2	11.4
3 and 4	1.8	3.5	13.3
Number of cases	6	26	57

poorest homes were most likely to have had this operation performed (Table 1).

Table 2 gives the main indication for which the operation was carried out, with an assessment of the degree of improvement, if any, noticed after operation. This was necessarily rough as it was based mainly on the mother's own report. In 10 cases insufficient time has elapsed since the operation to make any assessment. In three cases there was no obvious reason why the operation was performed. In all, 53% showed definite improvement after operation, 17% some improvement and 30% no obvious improvement.

TABLE 2
INDICATIONS FOR ADENOIDECTOMY AND/OR
TONSILLECTOMY

Main Indication for Operation	No. of Cases	Improvement			
		Defi- nite	Some	None	I.T.*
Recurrent tonsillitis	31	19	5	2	5
Adenoidal, frequent head colds	13	4	2	4	3
Otitis media	8	2	1	3	2
Deafness	2	—	—	2	—
?	3	—	—	—	—
Total	57	25	8	11	10

* Insufficient lapse of time since operation to make any assessment.

Otitis Media. During the first five years of life, 63 children had one or more episodes of purulent otorrhoea with or without earache. In a further 15 a diagnosis of otitis media had been made by the family doctor in the absence of discharge. Thus, a total of 78 children (15%) were reported as having had a middle-ear infection. Other cases of non-recurrent earache which, from the history, might have been due to tonsillitis or carious teeth, were not included, nor were a few others where the diagnosis had been made without aural examination. Most of the cases of otitis media without discharge which had been definitely diagnosed were reported from the better type of home, and it seems likely that there was under-reporting from the poorer homes. Here it was not unusual to find that earache had been

FIG. 3.—Proportion of children analysed by maternal efficiency grade suffering from one or more attacks of purulent otorrhoea during the first five years of life.

treated with aspirin and warm oil drops, often prescribed by the local chemist, the doctor only being called in cases of persistent discharge or marked constitutional disturbance. The recorded incidence of 15% of total children affected is probably an underestimate. In the Newcastle survey (Miller, Court, Walton and Knox, 1960), 19% of children were affected before the age of 5 years.

Fig. 3 shows the percentage of children by maternal efficiency grade having one or more attacks of purulent otorrhoea in the first five years of life, and the percentage having (1) one single attack (2) two or three separate attacks or exacerbations of one attack and (3) four or more distinct attacks or exacerbations.

The incidence of affected children rises with declining maternal standards, but a more marked difference is found in the proportion of affected children having four or more attacks. In the best homes over 70% of affected children had one attack only. In the worst homes 50% had four or more attacks or exacerbations.

Table 3 shows the number of cases in which there

TABLE 3
CO-EXISTING INFECTIONS AT TIME OF FIRST ATTACK
OF PURULENT OTORRHOEA

Infections	No.	%
Measles	8	13
Tonsillitis	7	11
Upper respiratory infection	3	5
Lower respiratory infection	3	5
Fractured skull	1	1
None, but child subject to repeated infections	12	19
None, child healthy	29	46
Total	63	100

TABLE 4
AGE OF FIRST ATTACK OF PURULENT OTORRHOEA BY
MATERNAL EFFICIENCY GRADE

Maternal Efficiency	Age (Years)			Total	No. of Cases
	<1 (%)	1-2 (%)	3-5 (%)		
1	13.8	24.1	62.1	100.0	29
2	25.0	31.2	43.8	100.0	16
3 and 4	33.3	22.2	44.5	100.0	18

was coexisting infection at the time of the first attack of purulent otorrhoea. In 41 of 63 cases (65%) there was no other infection reported, although 12 of these children, all from poor homes, were subject to repeated infective illness of one sort or another before and after the initial attack of otitis media. Table 4 gives the age of the first attack of purulent otorrhoea by maternal efficiency. One-third of affected children from the poorest homes had their first attack before the first birthday.

Later, it is hoped to obtain results of audiometric testing in school for all children in the survey attending Edinburgh Corporation schools. So far, 10 of the 63 children have been tested and of these eight have some impairment of hearing.

Specific Fevers

Table 5 gives the number of cases of specific fevers for each year of life up to 5 years, occurring in the 514 children who have been followed up to this age; 265 were first-born children and 249 had older siblings. As children with older siblings are likely to contract these infections at a younger age, the cases are divided into those occurring in first- and later-born children and totals are given for all children.

Measles. Measles was by far the most common of the immunizing diseases recorded. More than one-half of all children in the survey had contracted

FIG. 4.—Incidence of measles per 100 susceptible children by year of life and maternal efficiency, and proportion of cases considered severe.

measles by their fifth birthday. The incidence of measles, the severity of the disease and the age at which it was contracted, all varied with social class and place in the family.

For all types of home the incidence was lower for first-born children as compared with later-born below the age of 3 years. In the poorest homes the incidence in first-born children after the age of 3 was as high or higher than in later-born children. The proportion of first-born children varied with maternal efficiency grade, being 60% in those cases graded 1, 46% in cases graded 2 and 35% where efficiency was graded 3 or 4.

Fig. 4 shows the case incidence of measles for each year of life per 100 susceptible children (i.e.

TABLE 5
NUMBER OF CASES OF SPECIFIC FEVERS IN 514 CHILDREN BY YEAR OF LIFE AND PLACE IN FAMILY

	Years of Life										Total		All Cases	% Total Children Contracting Infection up to 5 Years		All Cases
	1st		2nd		3rd		4th		5th					First-born	Later-born	
	First-born	Later-born	First-born	Later-born	First-born	Later-born	First-born	Later-born	First-born	Later-born						
Measles	6	8	23	44	35	31	38	45	31	26	133	154	287	50.2	61.8	55.8
Chicken-pox ..	1	12	2	12	8	14	12	12	11	21	34	71	105	12.8	42.2	20.4
Whooping cough ..	5	8	8	14	6	15	3	15	2	7	24	59	83	9.1	23.7	16.1
Mumps	—	2	4	4	4	5	11	13	17	11	36	35	71	13.6	14.1	13.8
Rubella	1	1	4	1	10	17	8	17	4	5	27	41	68	10.2	16.5	13.2
Scarlet fever ..	—	—	—	—	3	—	3	2	5	—	11	2	13	4.2	0.8	2.5
Total	13	31	41	75	66	82	75	104	70	70	265	362	627			

TABLE 6
INCIDENCE OF WHOOPING COUGH IN PROTECTED AND UNPROTECTED CHILDREN
BY MATERNAL EFFICIENCY GRADE

Maternal Efficiency	Immunized Children			Non-immunized Children		
	+	?	—	+	?	—
<i>1 and 2:</i> Incidence per 100 children	11·3	5·2	83·4	24·0	—	76·0
Per cent. total cases considered severe	9·3			11·1		
<i>3 and 4:</i> Incidence per 100 children	9·8	—	90·2	33·3	13·9	65·3
Per cent. total cases considered severe	50·0			41·7		

those who had not already contracted the disease) by maternal efficiency grade. The incidence has been standardized for place in family (i.e. the incidence has been calculated which would be expected if the proportion of first- and later-born children were identical for all maternal efficiency groups). In each year of life, more especially in the first three, susceptible children from the poorest homes are more likely to contract measles. The incidence is maximal for these children between 2 and 3 years, compared with a maximum between 3 and 4 years for children from better homes. Fig. 4 also shows the proportion of cases considered severe (i.e. those having considerable constitutional disturbance and prolonged convalescence with or without a complicating otitis media, bronchitis or pneumonia).

In each year of life the proportion of severe cases is much higher for children from the poorest homes. In all types of home the highest proportion of severe cases occurred not in infancy, but at the age of maximum susceptibility. The number of severe cases dropped considerably after the age of 4 years.

Whooping Cough. A comparison of the effect of environmental factors on the incidence of whooping cough is complicated by the fact that in maternal efficiency grade 1, 88% of children received protective immunization against whooping cough before their second birthdays, 64% in grade 2 and only 38% in grades 3 and 4.

Of the total sample, 14% had contracted whooping cough by their fifth birthday. Eighteen other children had had an episode of spasmodic cough, worse at night, lasting for four to eight weeks, but without whoop, vomiting or constitutional disturbance. In no case was there any obvious cause for the cough, such as post-nasal drip. Seventeen cases occurred in immunized children from good homes and one in an unimmunized child from a poorer home. If these cases are included as whooping cough, the percentage of total children affected rises to 19%. In the Newcastle survey 44% of children

had contracted whooping cough by the age of 5 years. Only 56 of a total of 847 Newcastle children (7%) had been given protective immunization. Of these, 11 contracted the disease (20%). In the Edinburgh sample incidence was highest in later-born children from the poorest homes and maximum in the second year. In better homes (i.e. maternal efficiency grades 1 and 2), the maximum incidence was between 3 and 4 years and then only reached one-half that for children from grade 3 and 4 homes one year earlier.

Table 6 gives the case incidence up to 5 years by maternal efficiency for children who had and had not received protective immunization and also the percentage of affected children in whom the disease was considered severe.

Amongst unprotected children the incidence was higher in those from poor homes; this was not seen in protected children.

When an attack had occurred the chance of its being severe did not appear to differ significantly for protected or unprotected children, though in both groups the incidence of severe and complicated cases was very much higher for children from poorer homes.

In the two-year analysis no statistically significant difference could be found in rate of attack or incidence of severity between protected and unprotected children when maternal efficiency was taken into account. This is due to the fact that the majority of children from good homes where protection is common tend to contract the disease after this age, and the majority from poor homes where immunization is uncommon contract the disease before 2 years. The difference in incidence rates between protected and unprotected children could not be separated from the effect of maternal efficiency. When all cases occurring up to 5 years are considered a significantly lower incidence is seen in protected children ($\chi^2 = 11.993$; $p = <0.001$), although the proportion of severe attacks is not affected even if the queried cases are included as true cases of whooping cough.

TABLE 7
OTHER EYE DEFECT ASSOCIATED WITH SQUINT

Birth Weight	Hypermetropia With or Without Astigmatism	Myopia With or Without Astigmatism	Myopia With or Without Other Abnormality	Other Defect	No Refractive Error	No Knowledge
4·8 and under	5	5	3	1	2	3
4·9 and over	10	1	—	2	5	1

Other Specific Fevers. No obvious social gradient was found in the incidence of chicken-pox, mumps or rubella.

In chicken-pox maximum incidence was recorded in the fifth year. At every age, incidence was much higher for later-born children. The incidence of rubella was also rather higher for later-born children with most cases occurring between 2 and 4 years. Mumps was recorded most frequently in the fifth year. Here no difference was found between incidence in first- and later-born children.

Convulsions

Twenty-five surviving children have a history of one or more episodes of convulsions in the period between discharge from maternity hospital and 5 years.

This incidence of 4·9% is lower than that recorded in the Newcastle survey (Miller *et al.*, 1960), where 5·8% of children surviving to 5 years gave a history of convulsions. The recording of morbidity data was more accurate in the Newcastle survey and it is probable that the Edinburgh figure is an underestimate. Seven of the 25 children are mentally handicapped; of these, three have recurrent convulsions. Eighteen come within the normal range of intelligence and attend normal school; three of these have recurrent convulsions.

The birth weight distribution of the 15 children who have a history of not more than two convulsive episodes does not differ from that of the total sample, three being less than 4½ lb. at birth, seven between 4½ and 5½ lb. and five over 5½ lb. All the mentally retarded children with fits were premature, six of them being less than 4½ lb. at birth.

The birth history of the 15 mentally normal children with non-recurrent convulsions has been examined. In six cases there was a history of complicated delivery. Three of these were delivered by mid-cavity forceps, one on account of foetal distress and two owing to delay in the second stage. In one case manual rotation was performed. Three others were delivered by breech extraction, two on account of second stage delay and one due to deep transverse arrest. The incidence of 40% assisted delivery compares with 20% in the total sample.

In spite of the small numbers the difference is on the border of statistical significance ($\chi^2 = 3·647$). Three of the six children with complicated delivery showed abnormal post-natal signs as did two others who were delivered spontaneously by vertex and breech respectively. The incidence of abnormal post-natal signs in the total sample was 14·2% compared with 33·3% in the group who later had febrile convulsions. This difference can be considered statistically significant ($\chi^2 = 4·203$). Although on so few cases there is reluctance to draw any definite conclusions, the findings suggest that a predisposition to later febrile convulsions may result from minor brain damage at birth.

Squint

Thirty-eight cases of persisting squint (7·4%) were noted during the first five years of life. In seven further cases a definite squint was noticed over a period of three to six months or longer, but cleared spontaneously without treatment, and no error of vision has been reported so far in these children after school medical examination. Transient squints which are common in early infancy and may be prolonged in small premature infants have not been included.

Persisting squint was more commonly found in small prematurely-born children, being 16·3% of those 3½ lb. or less at birth, 11·0% of those between 3½ and 4½ lb. and 5·2% of those over this birth weight. The incidence was no higher for twins than singletons once allowance had been made for birth weight.

The incidence in larger premature and full-term children corresponds closely to that found in the Newcastle survey.

Associated errors of refraction and other eye defects are shown in Table 7 for those above and below 4½ lb. at birth.

Myopia was the commonest refractive error found in the small prematures and hypermetropia in those over 4½ lb. at birth.

Twelve of the 38 children with squints were mentally defective (I.Q. <70), or border-line defectives (I.Q. 70-79). All the eight children with myopia were mentally retarded, and two of those

with hypermetropia. Two of these retarded children had recurrent epileptic fits and one was a case of congenital cerebral palsy.

Six children had other congenital defects apart from mental retardation. In these cases it appears that the eye defect is part of a general picture of abnormal development.

Accidents

During the age period 2 to 5 years, 39 cases of accident or injury were treated in hospital. These are set out by cause and maternal efficiency grade in Table 8. The highest accident rate in the first five years was recorded for the second year of life (4.4%); in the third, fourth and fifth years it was 3.3, 2.3 and 1.9%.

In the analysis of data up to 2 years, no difference was found in accident rates in different types of home. Up to that age the majority of accidents occurred within the house. After the age of 2 years there is a significant difference between accident rates in homes where maternal efficiency was considered very good, and homes where efficiency rated as good, fair and poor ($\chi^2 = 8.666$; $p = < 0.01$). There is also a difference in the type and severity of accidents. Of 13 accidents occurring in grade 1 homes, 11 required stitches for cuts and two were more serious. Of the 26 accidents occurring in other homes, eight were relatively trivial and 18 more serious.

Eleven of the 13 accidents in grade 1 homes occurred in the house or garden. Fifteen of the 26 other accidents occurred in the street. In six of these cases the child was knocked down by a car. The difference by type of home appears to be due to the fact that pre-school children from the middle class and superior working-class homes where nearly all mothers were graded efficiency 1, are allowed considerably less freedom outside the home than

children from average or poor working-class homes. Permission to play in the street was not due to poor housing. In all but one case children injured in the streets lived in good houses nearly all of which had gardens. The child living in a suburban local authority housing scheme is more likely to be allowed out to play in the pre-school period than the child living in overcrowded or condemned property in the town. This was noticed in particular in the average working-class home where maternal efficiency was considered good. This type of mother did not allow her pre-school children out to play alone if she lived in slum property, but did not insist on the children remaining in the garden if she moved to a local authority estate.

Enuresis

The age at which children become reliably dry by day and night was found to depend on sex, birth weight and type of home. Full toilet history was obtained for 518 children.

A child is considered to be reliable by day when he is able to take responsibility for his own toilet requirements either by telling his mother or by going to the toilet himself. He can be allowed out to play without fear of accidents. A child is considered reliable at night when he is dry except for an occasional accident without being lifted. He may either go through the night without needing to micturate or else wake himself if he needs the toilet.

Table 9 gives the ages by which girls and boys were reported to be reliably dry by day and night for those over 4½ lb. at birth and those who were below this weight. Small prematurely-born children acquire sphincter control later than those over 4½ lb. at birth. This is due, in part, to an excess of mentally retarded children, but not entirely, as a difference was still seen by birth weight when children with an I.Q. of less than 100 were omitted. Part of the difference can be attributed to an excess of poor homes in the small premature group, but within each social group the small prematures were later to acquire control. No difference was found by birth weight over 4½ lb. Girls became reliable by day earlier than boys; 52% of girls were dry by 2 years compared with 40% of boys. In the 2-year analysis (Drillien, 1959), a higher percentage of both girls and boys were reported as being dry at 2 years. However, on further questioning at 3 years, it was found that a number who had been reported as reliable at 2 had later relapsed. In the 2-year analysis only singletons were considered. Twins, on average, acquire sphincter control later than singletons of like birth weight. This appears

TABLE 8

ACCIDENTS REQUIRING HOSPITAL TREATMENT IN 514 CHILDREN AGED 2 TO 5 YEARS, BY MATERNAL EFFICIENCY GRADE

Accident	Efficiency Grade			Total
	1	2	3 and 4	
Cuts requiring stitches ..	11	2	5	18
Head injuries	—	5	—	5
Burns and scalds	1	—	4	5
Fractures	—	3	2	5
Crush injuries and penetrating wounds	1	2	—	3
Swallowed foreign body ..	—	—	1	1
Poisoning	—	1	—	1
Drowning	—	1	—	1
Total	13	14	12	39
Per cent. children at risk ..	4.5	12.3	10.6	7.6

TABLE 9
AGE BY WHICH 514 CHILDREN WERE REPORTED AS RELIABLY DRY, BY BIRTH WEIGHT AND SEX

Sex	Birth Weight lb. oz.	% Reliable by Day (Years)				Not Reliable At 5 Yrs (%)	% Reliable by Night (Years)				Not Reliable At 5 Yrs (%)
		2	3	4	5		2	3	4	5	
Female	4 8 and under 4 9 and over	35	89	99	100	—	20	71	86	96	4
		59	90	98	99	1	30	75	87	92	8
	Total	52	90	98	99	1	27	74	87	93	7
Male	4 8 and under 4 9 and over	27	74	92	96	4	8	38	70	78	22
		46	95	98	99	1	21	61	81	88	12
	Total	40	89	97	98	2	17	54	78	85	15

to be due to the fact that toilet training tends to start later for twins. By 3 years, there was no difference in the proportion of girls and boys reliable by day. A more marked sex differential was seen in the age at which children became reliable by night. At 5 years, 7% of the girls (19 cases) were still wet at night and 15% of the boys (37 cases). The overall incidence of 11% corresponds quite closely with the minimal estimate of 9% enuretic at 5 years in the Newcastle survey.

Table 10 gives the ages at which all children were reported as reliable by day and night by maternal efficiency grade. Children under 4½ lb. at birth have been excluded as these acquire control later, and this group contains an excess of children in grade 3 or 4 homes. At 5 years 7% of children from the best homes were still unreliable at night compared with 16% in the worst homes.

At 2 years only 30% of children from the worst homes were reliable by day compared with 60% in the best, but this is not surprising as the age of starting toilet training was much later in the former; over one-quarter of these children had never been attempted on the pot at 2 years.

Of the 37 boys who were still bed wetting at 5 years, 19 were wet on average at least six nights out of seven and had never gone longer than two or three days without being wet. Fourteen were wet less often, some could be kept dry by lifting, and some had had dry periods of several weeks. Four

others who had been dry for three to six months later reverted to bed wetting. Among the 19 girls, eight were wet nearly every night, eight less often and three had reverted. In the seven children who became enuretic after apparent establishment of control, this appeared to be connected with an emotional disturbance; the arrival of a new baby in two cases, severe marital discord in three and school entrance in two.

Of the 22 children who had never been dry, five were mentally defective and six more came from very poor homes, where wet beds were considered an unavoidable evil; 15 of these children did not acquire day control before the age of 4 years.

Only three of the 22 children who were wet less often came from very poor homes and none were mentally defective. In the majority control during the day had been established before the age of 3 years.

Infective Illness in Day Nurseries and Nursery Schools

In the first two years of life, 17 children attended day or residential nurseries for periods of six months or longer. After the age of 2 the number of children attending day nursery, play centre or nursery school increased each year. Between 4 and 5 years 83 children were in regular attendance at one of these centres. The amount of infective illness suffered

TABLE 10
AGE BY WHICH CHILDREN OVER 4½ LB. AT BIRTH WERE REPORTED AS RELIABLY DRY, BY MATERNAL EFFICIENCY GRADE

Maternal Efficiency	% Reliable by Day (Years)				Not Reliable At 5 Yrs (%)	% Reliable by Night (Years)				Not Reliable At 5 Yrs (%)
	2	3	4	5		2	3	4	5	
1	60	96	100	—	—	29	76	89	93	7
2	52	95	99	—	1	28	62	80	88	12
3 and 4	30	78	94	97	3	14	53	75	84	16

health of poor housing was difficult because poor housing and a low standard of maternal care commonly went together. In addition, of the 64 children considered here 48 were rehoused between the age of 18 months and 2 years and it has been noted that the incidence of recurrent infection, so common in poor homes, falls markedly after this age in all types of housing.

Fifty-five other children were still living in very poor accommodation at 4 years. Twenty-three families (with one exception all graded 3 and 4 for maternal efficiency) have not applied for rehousing, either because they appear satisfied with present accommodation or because they are unable to afford higher rents.

The incidence of infective illness between 2 and 5 years (excluding specific fevers) was found to be almost identical in those children who had been rehoused and those awaiting rehousing, where maternal care was considered good or very good. Where maternal care was fair or poor, the incidence of infection was one and a half times as high in those who had been rehoused. However, this excess of infection in the rehoused children is not enough to be statistically significant. It may be due in part to the larger family size of those poor families who have been rehoused, but even so the figures do not suggest that rehousing by itself leads to improvement in health as measured by incidence of infection. Rehousing involves the family in increased expenditure on rent and maintenance and often in the first two or three years in quite heavy hire-purchase repayments for new furnishings and floor covers. Where the father earns a low wage, is working short time or is unemployed, there is less money available for food, clothing and coal, which may well offset the initial advantages of a new house.

In general, the mothers took into the new homes the standards of care and household management observed in the old, but in nine of the 64 cases maternal standards quite obviously rose after rehousing. These mothers and several others remarked on an improvement in their own health and well-being after rehousing.

Summary

The health history has been studied of over 500 premature and maturely born children in Edinburgh, between the ages of 2 and 5 years.

Respiratory illness. The incidence of lower respiratory infection showed a marked decline in the third year. The striking association between lower respiratory infection and inadequate maternal

care noted in the first two years of life was not so obvious after this age.

Only four out of 35 children with a history of repeated lower respiratory infections in the first two years, showed an excess in expected infection rate after this age.

Infections of ear, nose and throat. The incidence of such infections increased steadily after the age of 2 years, and between 4 and 5 years accounted for one-third of all medical illness.

Of the total group 27% had one or more attacks of acute tonsillitis between 2 and 5 years. The incidence increased with declining maternal standards as did the number of affected children having recurrent attacks.

Over 10% of the group had tonsils and/or adenoids removed before the fifth birthday. In one half of cases the operation appeared to be beneficial. In 30% no obvious benefit resulted. A middle-ear infection was recorded in 15% of the group before the fifth birthday. Incidence was higher where maternal care was judged unsatisfactory. Recurrent purulent otorrhoea was much more common in poor homes.

Specific fevers. One half of the group had contracted measles by 5 years of age. Incidence was higher in later-born children from unsatisfactory homes and the proportion of severe cases was much higher in such homes.

A statistically significant excess of cases of whooping cough was found in children who had not received protective immunization. Once contracted, previous immunization did not appear to alter the chance of the attack being a severe one.

No social gradient was found in the incidence of other specific fevers.

Convulsions. Of surviving children, 5% had one or more convulsive episodes before the fifth birthday. A consideration of the birth history of those with normal intelligence and non-recurrent febrile convulsions suggests that minor brain damage at birth may result in a predisposition to febrile convulsions.

Squint. Persisting squint was three times as common in children $3\frac{1}{2}$ lb. or less at birth and twice as common in those between $3\frac{1}{2}$ and $4\frac{1}{2}$ lb. as in those over this birth weight. Myopia was the commonest refractive error found in the small prematures and hypermetropia in those over $4\frac{1}{2}$ lb. at birth.

Eight of the nine cases of myopia were mentally retarded. Six other children of a total of 38 had

other congenital abnormalities apart from mental defect.

It is suggested that in the prematurely born the eye defect is commonly a part of a general picture of abnormal development.

Accidents. After the age of 2 years a significantly lower accident rate was found in middle-class and superior working-class homes. The excess in other types of home resulted from accidents occurring in the streets.

Enuresis. Sex, birth weight and type of home all affected the age at which children acquired sphincter control by day and by night. At 5 years, 7% of girls and 15% of boys were not reliably dry at night.

Infective illness in day nurseries and nursery schools. Children from good homes contract considerably more infective illness between 2 and 3 years of age when attending a nursery; after this age the excess in infective illness is much less. Children from poor homes have no more infective illness at any age when attending nurseries than do those remaining in their own homes.

Hospital admissions. Hospital admissions for medical illness fell steadily from 12·5% in the first year of life to 1·6% in the fifth. One half of total admissions were on account of lower respiratory and gastro-intestinal infections.

The effect of rehousing on infective illness. No difference in the incidence of infective illness could be found between children who had been rehoused or were awaiting rehousing. It is suggested that the added financial burden of a new house may offset the advantages of good accommodation.

It is a pleasure to thank Professor R. W. B. Ellis for his assistance and encouragement throughout.

This investigation was carried out during the tenure of a Senior Research Fellowship of the Mental Health Research Trust Fund with an Expenses Grant from the Scottish Hospital Endowments Research Trust.

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