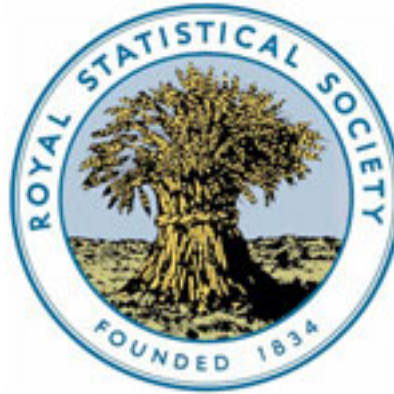


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The Perils and Protection of Infant Life

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**JOURNAL**  
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*The PERILS and PROTECTION of INFANT LIFE.*

(HOWARD MEDAL PRIZE ESSAY.)

By HUGH R. JONES, M.A., M.D., D.P.H., CANTAB., B.SC., LOND.,  
*Honorary Assistant Surgeon to the Infirmary for Children,*  
*Lecturer on Bacteriology, Royal Southern Hospital, Liverpool.*

[Read before the Royal Statistical Society, 19th December, 1893.  
The PRESIDENT, CHARLES BOOTH, ESQ., in the Chair.]

Dī quibus imperium est animarum, umbræque silentes  
Et Chaos et Phlegethon, loca nocte silentia latè,  
Sit mihi fas audita loqui; sit numine vestro  
Pandere res altā terrā et caligine mersas

\* \* \* \*

Vestibulum ante ipsum primisque in faucibus Orci,  
Luctus et ultrices posuere cubilia Curæ:  
Pallentesque habitant Morbi, tristisque Senectus  
Et Metus et malesuada Fames et turpis Egestas  
Terribiles visu formæ: Lethumque: Laborque:  
Tum consanguineus Lethi Sopor et mala mentis  
Gaudia:

\* \* \* \*

Continuū auditæ voces, vagitus et ingens  
Infantumque animæ flentes in limine primo:  
Quos dulcis vitæ exsortes et ab ubere raptos  
Abstulit atra dies, et funere mersit acerbo.

P. VIRGILII MARONIS *Æneidos*, Lib. vj.

Ye Gods who hold the sway of souls, ye silent Shades and Chaos and Phlegethon, darkling and wide and soundless realms, may it be mine without impiety to speak what I have heard and to expose what murk of gloom and the bulk of earth conceal.

Before the very portal and on the edge of the jaws of hell, have Grief and Revengeful Cares strown their couches. There dwell all Sallow Maladies and Sad Old Age and Fear and Famine that prompts to many a crime and Loathsome Need, shapes terrible to behold and Death and Toil and Death's Blood-brother Sleep and Evil Joys that haunt the soul.

Forthwith are heard voices, loud wailings and weeping ghosts of infants, in the first opening of the gate; whom bereaved of sweet life out of the course of nature and snatched from the breast a black day cut off and buried in an untimely grave.

VIRGIL: *Æneid*, Book vj.

## SUMMARY OF PAPER.

|                                       |  |
|---------------------------------------|--|
| Introduction and History.             | Special Social Conditions— <i>contd.</i> |
| Definitions.                          | National Prosperity.                     |
| Infant Mortality, all England.        | Poor Law Statistics.                     |
| Mortality in Urban Districts.         | Marriage Rates.                          |
| Registrar-General's Statistics.       | Birth Rates.                             |
| Zymotics: Small Pox, Measles, Scarlet | Intemperance.                            |
| Fever, Whooping Cough, Diph-          | Employment of Women.                     |
| theria, Croup, Enteric Fever,         | Ignorance and Neglect.                   |
| Diarrhœa.                             | Illegitimacy.                            |
| Dietetic Diseases.                    | Baby Farming.                            |
| Parasitic Diseases.                   | Heredity.                                |
| Constitutional Diseases, Rickets,     | Developmental Diseases.                  |
| Tubercle.                             | Administration of Opiates.               |
| Local Diseases: Diseases of Special   | Child Insurance.                         |
| Sense, of Circulatory System, of      | Summary.                                 |
| Respiratory System, of Digestive      | Causes of Growth of Towns.               |
| System, of Nervous System.            | Suburban Dwellings.                      |
| Ill-defined Causes of Death.          | Education, Elementary.                   |
| Violence.                             | „ Special.                               |
| Special Social Conditions—            | Intemperance.                            |
| Insanitation.                         | Legislation.                             |
| Influence of Dwelling House.          | Conclusion.                              |
|                                       | Appendix.                                |

*Note.*—Unless otherwise stated, the statistics are drawn from the Annual and Decennial Reports of the Registrar-General.

*Introductory.*

THE better protection of Infant Life is one of the most intricate and difficult of modern problems. It is closely bound up with many of the most widely discussed questions of the day. The labour problem bears upon it, because the rise and fall of wages has a direct influence on the rise and fall of the infant death-rate. The drifting of the rural population to towns is due, in part at least, to our system of land tenure; and it is well known that the perils of infant life are greatest in towns. The land question therefore needs consideration in any study of infant mortality. The ignorance which is responsible for so much of the waste of child life exists in spite of national education, so that means must be devised to combat the evil arising from defective training. The most popular form of thrift among the working classes (or industrial classes) is child insurance, and to this form of thrift child neglect and child murder have been almost wholly attributed by many persons.

Much has already been done to improve the social condition of the people and their sanitary surroundings. A wholesome water supply and efficient drainage are now obligatory, and compulsory universal vaccination modifies the susceptibility of the whole population to small pox, and thus its hygienic condition is improved. The compulsory demolition of insanitary areas, and

the provision of healthy dwellings, affect more especially a particular section of the community. Not content however with caring for the common weal, State interference has extended to more domestic and personal matters, even to the relation which exists between parents and children.

It is worthy of notice too that legislation has been directed against cause and against effect—(not only have bad hygienic conditions been remedied, but measures have been adopted to prevent their recurrence), so that the remedy has been immediate in its application, and a repetition of the evil has been rendered improbable.

In some respects legislation in so far as it affects the protection of infant life, has been in a sense inconsistent. It has imposed upon the State certain burdens to the relief of the parents, while it has on the other hand insisted upon the performance of other duties by the parents or guardians. In certain instances it has tended to diminish parental responsibility, *e.g.*, by the practical adoption of the principle of free education; in other instances the tendency has been to increase it, *e.g.*, by provision for the safe and careful custody of children.

The great problem to be solved is, how to protect children without usurping unnecessarily the authority of parents, and without diminishing unduly their responsibility. In the subsequent consideration of the better protection of infant life, the importance of this summary will become obvious: because the majority of the perils of infant life exist in the home. The larger proportion of the preventable deaths of young children are not due to causes directly under municipal or State control, but are due to the habitual and general neglect of duty and responsibility by parents and guardians. It may be even taken for granted that with a more fully developed sense of parental responsibility, it would be unnecessary to legislate for the protection of infant life. Wilful neglect, cruelty, and infanticide would gradually cease. We cannot however be content to leave things alone; we cannot accept the present sacrifice of infant life as a necessary though temporary evil—the inevitable concomitant of changing social conditions, among which the rapid growth of towns, and the more general employment of women in industrial occupations during recent years may be instanced. The evil is more deeply seated; we cannot hope to remove it by merely improving the sanitary conditions of urban life, by improving general education and the moral training of the children. True, these are important factors, but it is a vain expectation to see either an immediate or an appreciable improvement in the conditions of child life, by waiting patiently for a high moral sense to be developed by the general

community. The general consensus of opinion tends to the adoption of more drastic and immediate efforts to protect child life. Just as in the case of intemperance, where the wakening conscience of the masses has been nourished and fostered by penal laws against intemperance, so in the protection of child life active measures must be adopted corresponding to the growth of public opinion. Such measures would have a directly educating tendency.

Nevertheless the tendency in modern politics to legislate rashly in cases where persistent agitation is practised by a comparatively small number of persons must be carefully watched. The question of child insurance, which has been so much debated, has been accorded an importance far beyond its merits; in reality it only touches the fringe of the greater subject, the protection of child life, instead of being synonymous with it, as is so loudly urged. In a commendable endeavour to protect child life, care must be taken to avoid needless interference with existing conditions, by which the present confusion will only be intensified and aggravated.

It is impossible to discuss at length in this paper the remote factors which tend to excessive infant mortality. Upon these factors depends the prosperity of the country; for, in general, it may be said that with a heavy purse is associated a light mortality. Suffice it to say, that the preventable perils of child life may be referred to two fundamental causes, poverty, and the want of individual responsibility; and even these two causes may be traced to one common origin. With national and individual prosperity, combined with national and individual responsibility, it would be unnecessary to protect child life. Individual prosperity would provide the means, and individual responsibility would secure the employment of those means to the best advantage for the care and education of children. At the same time, much may be done by treating the more immediate causes of excessive infant mortality. Just as in medicine it is possible to palliate symptoms and to reduce distress without eradicating disease—indeed, a cure is sometimes effected by such treatment—so in the protection of child life by counteracting influences which are injurious to it, and by remedying social conditions (the result of remoter causes) benefit will accrue. The effect of rightly treating symptoms, once their significance is thoroughly appreciated, is always advantageous, and it is the highest art so to treat symptoms as to cure disease.

It will be of advantage to consider in this place, as illustrating what has already been said, as briefly as possible, the history of English legislation for the better protection of children.

*Historical.*<sup>1</sup>

In 1601 the first English poor law was passed, which provided for the support of children by their parents or grandparents, and in their default it established a system of child apprenticeship. In 1747 the cruel treatment to which these helpless children were subjected was partly remedied by an Act which empowered justices to discharge parish apprentices for ill usage. This Act was however evaded by some employers, and used as a means to rid themselves of their apprentices, and in 1792 an Act was passed by which the duty of prosecuting masters guilty of ill treatment was laid upon the parish officers. In the meantime (in 1788) it had been enacted that no boy should be employed as a chimney sweep under the age of 8 years: the hours of work were restricted, and the number of apprentices was limited. With the present century began the series of Factory Acts. The first, in 1802, provided for the cleanliness of factories, for the clothing and education of apprentices; it prohibited night work, and limited the hours of labour to twelve. The second, in 1819, regulated the employment of children in cotton mills and factories. The lowest age at which children could be employed was fixed at 9 years, and the hours of labour for children between the ages of 9 and 16 years were limited to twelve. More recently, child employment has been prohibited under the age of 11 years. In 1826 further restrictions were imposed upon the employment of children, and better provision for meal times was made. A short day of nine hours on Saturdays was introduced. In 1833 the distinction was first drawn between "children" of the ages 9 to 13 years, and "young persons" of the ages of 13 to 18 years. Children were not to work more than nine hours a day, and were compelled to spend two hours in school. Inspectors of factories were also appointed.

In 1834 the age of apprenticeship to chimney sweeping was raised from 8 to 10 years. The age was further raised to 16 in 1840.

Regulation of other industries and occupations was also adopted; for example, in 1842 children were prohibited from working underground, and more lately (in 1877) canal boat children were protected. In 1844 the hours of work for children were reduced to six and a half; and three hours' daily attendance at school required.

The better protection of apprentices and servants was secured in 1851 by an Act which enabled the guardians to prosecute in certain

<sup>1</sup> Liverpool Society for the Prevention of Cruelty to Children. Second Report, 1885. "Historical Résumé of English Legislation." By W. J. Stewart, B.A., Stipendiary Magistrate.

cases. Necessary food, clothing and lodging were to be provided. These provisions were extended to the cases of parent and child in 1868; and neglect to provide medical aid was made punishable in 1875.

Reformatory and industrial schools were established in 1866, and provision was made to receive therein not only destitute and orphan children, but also children having a surviving parent in prison, and children found in the company of thieves. In 1870 the Education Act was passed.

In 1872 the Infant Life Protection Act became law, to prevent the evils attendant on baby farming. In 1875 child insurance, which had been prohibited by an Act of George III, unless an insurable interest in the life existed, was permitted with certain restrictions, and the numerous burial clubs were thus suppressed. In 1889, the Prevention of Cruelty to Children Act was passed.

This brief and incomplete review of the legislation for the better protection of children is instructive, as it is indicative of the growing tendency of the State to stand *in loco parentis*.

### *Definitions, &c.*

The word infant is technically restricted by some writers to children under 1 year of age. By others it is used to include all children in the preparatory department of elementary schools, and therefore it is applied to children under the age of 7. Legally it includes all minors. It will be used in its most restricted sense—children under the age of 1 year—throughout this paper, but as the perils of child life under the age of 5 years are almost always identical with those of infant life, I have thought it well to include statistics having reference to the higher age limit. In general it may be said that the only reliable measure of the perils of infant life are the mortality statistics of the Registrar-General. These statistics will serve as a framework around which we can group and consider in orderly fashion not only the fatal, but the non-fatal perils of infant life. These statistics, for purposes of comparison, are expressed as rates per 1,000 living (Death-Rates), and in the case of infants also as rates per 1,000 births (Rates of Infant Mortality). I shall show that the preventable perils of child life are greatest in early infancy, when the child possesses least power of resistance, when it is unable easily to adapt itself to its environment, when it is exposed to more numerous dangers owing to its helplessness. Mortality statistics, though most valuable, need to be supplemented by statistics of case mortality before they can be used as an exact measure of the perils of infant life. As a general rule, however, it may be said that case mortality is highest at the extremes of life, and a large death-rate



from any disease may therefore be interpreted to mean not only that many children die from that disease, but also that the number of deaths is greater than would have been the case if the disease had occurred at later age periods. We have no means of estimating the frequency of non-fatal perils with any degree of accuracy.

### *Infant Mortality.*

The rate of infant mortality for all England, *i.e.*, the number of deaths under 1 year of age per 1,000 births, is shown in the following table :—

TABLE I.—*Rates of Infant Mortality. All England.*

| Years.        |     | Years.        |     |
|---------------|-----|---------------|-----|
| 1838-40 ..... | 155 | 1861-70 ..... | 154 |
| '41-50 .....  | 153 | '71-80 .....  | 149 |
| '51-60 .....  | 154 | '81-90 .....  | 142 |

During the decade 1881-90 the rate of infant mortality varied from 130 in 1881 to 151 in 1890. The death-rates at each year of life (0—5 years) during the year 1889 were as under :—

TABLE II.—*Death-Rates at each Year 0—5 Years.*

| Age.            | Death-Rates. |          |          |
|-----------------|--------------|----------|----------|
|                 | 1889.        | 1861-70. | 1871-80. |
| 0—1 year .....  | 177·0        |          |          |
| 1—2 years ..... | 65·9         |          |          |
| 2—3 „ .....     | 27·7         |          |          |
| 3—4 „ .....     | 18·0         |          |          |
| 4—5 „ .....     | 12·5         |          |          |
| 0—5 „ .....     | 51·3         | 68·2     | 63·12    |
| All ages....    | 17·9         | 22·5     | 21·27    |

The death-rate at all ages, 1861-70, was 22·5, and 1871-80, 21·27. The death-rate (0—5 years) was, during the same decades 1861-70, 68·2, and 1871-80, 63·12. The general death-rate therefore fell 5·4 per cent., and the death-rate (0—5 years) fell 7·4 per cent. The mortality (0—5 years) during the decade 1871-80 varied from 30 in the West Ward district, Westmoreland, to 119 in Liverpool district, and the rate of infant mortality during the same period varied from 80 in Westhampnett, to 217 in Liverpool. The excess of the prevailing rate of mortality in any district over the minimum rate recorded may be used as a measure of the preventable fatal perils of infant life, even though the minimum rate is higher than the ideal rate would be in a perfect state of society.

If we analyse the causes of death, we find that the share taken by the eight chief groups into which the deaths from all causes



are classified by the Registrar-General in the sum of the total mortality, varies very widely, and the statistics for the year 1889 have been analysed to show how the rate of infant mortality is made up, and what are the chief causes of death operating under the age of 5 years. The comparative influence of diseases on the general rate of mortality may be measured in two ways: (1) By calculating the mortality from each disease or group of diseases per 1,000 living, or in the case of infants per 1,000 births. By this method the actual share which each disease has in the total mortality from all causes is ascertained. (2) By calculating the ratio of deaths at different age periods to the total deaths at all ages from different diseases. This method shows the incidence of fatality from each disease at the different age periods, and we can therefore classify diseases as diseases of infancy, of childhood, of adolescence, of maturity, or of old age.

TABLE III.—*Analysis of Causes of Death, 1889.*

| Causes of Death.                   | Rate of Infant Mortality. |          | Ratio of Deaths to Deaths at All Ages. |          |            |          |
|------------------------------------|---------------------------|----------|--|----------|------------|----------|
|                                    | Males.                    | Females. | 0—1 Year.                              |          | 0—5 Years. |          |
|                                    |                           |          | Males.                                 | Females. | Males.     | Females. |
| All causes .....                   | 159·0                     | 129·0    | 26·7                                   | 22·2     | 41·3       | 36·7     |
| 1. Specific febrile diseases ..... | 28·1                      | 25·0     | 36·8                                   | 34·0     | 76·8       | 71·7     |
| 2. Parasitic diseases .....        | 0·6                       | 0·56     | 80·2                                   | 71·9     | 89·7       | 86·9     |
| 3. Dietetic „ .....                | 0·3                       | 0·27     | 84·2                                   | 83·3     | 85·9       | 89·5     |
| 4. Developmental diseases .....    | 21·4                      | 17·4     | 99·0                                   | 98·7     | 99·6       | 99·6     |
| 5. Constitutional „ .....          | 10·4                      | 8·4      | 10·4                                   | 7·9      | 20·6       | 16·6     |
| 6. Local diseases .....            | 69·2                      | 54·2     | 22·7                                   | 18·1     | 35·5       | 30·5     |
| 7. Violence .....                  | 2·4                       | 2·5      | 8·7                                    | 22·0     | 17·8       | 37·8     |
| 8. Other causes .....              | 24·7                      | 20·4     | 80·8                                   | 75·9     | 88·1       | 85·0     |

Before proceeding to consider the deaths from each of these groups of diseases separately, it will simplify the subsequent discussion if we refer in this place to certain differences in the rates of infant mortality. It has already been pointed out that the rate of infant mortality varies very widely. It is lowest in purely agricultural districts and counties; it is highest in mining counties, and those with textile industries: *e.g.*, it is 83 in Dorset, and 176 in Lancashire. In his investigation as to the causes of death in infancy, the Registrar-General (Report, 1891) prepared tables which give the alleged causes of death and precise age of those who die. He also constructed life tables for infants born in three rural counties and three selected towns. From these it appears that the mortality is highest on the first day of life, remaining very high, however, for the first week. The

mortality is at its maximum in the first week, and in the first month, and in the first year of life. It falls abruptly in the second month, and declines gradually to the end of the seventh month; after which no very noticeable change takes place in the rate of mortality of infants. The aggregate infant mortality was twice as high in the towns as in the counties, and the town rate is higher for each fraction of the year than the rural rate. The town rates are most in excess of the rural rates in the later months of infancy, and it is of interest to note that four-fifths of the deaths during the first month of life are returned as due to premature birth, to congenital malformation, and to the somewhat indefinite causes of atelectasis, atrophy, and convulsions. Icterus and erysipelas neonatorum are also most destructive at this period. The consequence of the great incidence of these diseases in very early infancy is to tend to equalise the rates of mortality for town and country. The perils of infant life have scarcely begun to operate. These perils predominate in towns. Diarrhœal diseases are most destructive from the third to the sixth month. Congenital syphilis is most fatal during the first four months. Deaths from dentition are most numerous during the last three months. Whooping cough is the first zymotic to appear, closely followed by measles, and finally by scarlet fever. The excess in mortality in towns is due to diarrhœa and enteritis, to measles and scarlet fever (these diseases are favoured by a close aggregation of population), to syphilis, to premature birth (associated as it would seem with the employment of young married women in industrial occupations). The mortality from congenital malformations is much the same in the counties as in the towns.

The male and female mortality at different age periods is given in the following table. The male mortality is always slightly higher than the female mortality. The mortality is highest in the first year of life, is very considerable in the second year, after which it drops, until the minimum is reached at the 10—15 year age period.

TABLE IV.—*Mortality at Ages 0—75 per 1,000 Living, 1871-80.*

| Age.        | Males. | Females. | Age.         | Males. | Females. |
|-------------|--------|----------|--------------|--------|----------|
| 0—1 .....   | 197·4  | 157·3    | 20—25 .....  | 7·3    | 6·8      |
| 1—2 .....   | 68·3   | 63·6     | 25—35 .....  | 9·3    | 8·6      |
| 2—3 .....   | 27·9   | 27·5     | 35—45 .....  | 13·7   | 11·6     |
| 3—4 .....   | 18·1   | 17·9     | 45—55 .....  | 20·1   | 15·6     |
| 4—5 .....   | 13·3   | 12·9     | 55—65 .....  | 34·8   | 28·5     |
| 5—10 .....  | 6·7    | 6·2      | 65—75 .....  | 69·6   | 60·1     |
| 10—15 ..... | 3·7    | 3·7      | Over 65..... | 169·1  | 158·8    |
| 15—20 ..... | 5·2    | 5·4      |              |        |          |

The mortality during the first year of life is further analysed in the following table:—

TABLE V.—*Mortality during Infancy.*

[Registrar-General's Report, 1890.]

| Age.             | Males. | Females. | Ratio of Male to Female Mortality. |
|------------------|--------|----------|------------------------------------|
| 0— 3 months..... | 333    | 261      | 1'276                              |
| 3— 6     ".....  | 147    | 122      | 1'205                              |
| 6—12     ".....  | 120    | 100      | 1'200                              |
| 0—12     ".....  | 204    | 164      | 1'244                              |

The table expresses rates per 1,000 living at each age, and is calculated for the year 1890. The mortality for each month is during the first year of life as under:—

TABLE VI.—*Annual Death-Rate per 1,000 at each Month of Age.*

[Registrar-General's Report, 1875.]

| Age in Months. | Healthy Districts. | English Life Table. | Liverpool District. |
|----------------|--------------------|---------------------|---------------------|
| 0.....         | 447'51             | 571'32              | 672'19              |
| 1.....         | 145'49             | 218'37              | 316'72              |
| 2.....         | 102'05             | 157'10              | 226'78              |
| 3.....         | 87'16              | 131'87              | 209'37              |
| 4.....         | 81'09              | 126'04              | 205'25              |
| 5.....         | 75'54              | 120'50              | 203'65              |
| 6.....         | 70'54              | 115'09              | 204'89              |
| 7.....         | 65'97              | 109'92              | 209'17              |
| 8.....         | 61'85              | 105'01              | 216'42              |
| 9.....         | 58'32              | 100'33              | 227'30              |
| 10.....        | 55'28              | 95'84               | 241'80              |
| 11.....        | 52'86              | 91'61               | 260'23              |

It is to be noted that while in country districts the death-rate diminishes month by month, in large towns like Liverpool a very material rise takes place in the later months of infancy. During earlier infancy, when the great majority of infants are breast-fed, and receive most constant attention, their chance of life is more nearly equal in town and country than during the later months of infant life, when the preventable causes of infant mortality are more numerous and powerful.

Proceeding now to the consideration of the deaths in early childhood from the different groups of disease, I shall defer for later discussion certain of the social factors which predispose to certain forms of death. I shall afterwards consider certain special perils of infant life, *e.g.*, those due to baby-farming, to child insurance, and to the administration of opiates.

Considering, in the first place the mortality from ZYMOTIC

DISEASES, it is seen that it is responsible for nearly 20 per cent. of the infant mortality, and that about 35 per cent. of all deaths from zymotic diseases occur under the age of 1 year, and no fewer than 76 per cent. under the age of 5 years. Zymotic diseases are therefore peculiarly a danger of infant life. The death-rate from zymotic diseases at each year of life 0—5 years is shown by the following table, compiled from the Registrar-General's Decennial Report, 1871-80:—

TABLE VII.—*Deaths per 1,000 Living from Zymotic Diseases, 1889.*

| Age.     | Total Deaths. | Persons.  | Rate per 1,000. |
|----------|---------------|-----------|-----------------|
| 0—1..... | 236,674       | 720,002   | 32·87           |
| 1—2..... | 144,645       | 639,202   | 22·62           |
| 2—3..... | 79,299        | 659,285   | 12·03           |
| 3—4..... | 57,847        | 644,006   | 8·98            |
| 4—5..... | 42,715        | 633,575   | 6·74            |
| 0—5..... | 561,180       | 3,296,270 | 17·03           |

It will be noticed that the fatality of zymotic diseases diminishes year by year. For this diminution two reasons are assignable: (1) The diminished case mortality at later age periods. This is shown by the statistics of hospitals, where the mortality is found to be greatest at the extremes of life. I quote the hospital statistics for scarlet fever (Registrar-General's Report, 1886):—

TABLE VIII.—*Case Mortality per 1,000 from Scarlet Fever, 1874-85.*

| Age.      | Male. | Female. |
|-----------|-------|---------|
| 0—1 ..... | 395   | 442     |
| 1—2 ..... | 384   | 346     |
| 2—3 ..... | 255   | 226     |
| 3—4 ..... | 184   | 174     |
| 4—5 ..... | 130   | 112     |
| 0—5 ..... | 241   | 217     |

The importance therefore of protecting infants from birth to as large an extent as possible from the risk of zymotic diseases is obvious. Into the ultimate result of postponing the date of attack of zymotic diseases upon the health of the general population it is not necessary to enter further than to point out that the tendency would be to stamp out disease, and thus a direct and general benefit would accrue from the protection of infant life. The mortality from small pox is a case in point. Though the

mortality at higher age periods has slightly increased, there can be no doubt but that the resultant effect on the general community has been beneficial.

(2) The immunity conferred by one attack from subsequent attacks renders the population at the later age periods less liable to attack from zymotic diseases. There can be no doubt but that the mortality from zymotic diseases is greater than the recorded mortality, as many organic diseases of the heart, of lungs, and of kidneys, date from an attack of zymotic disease, and from these diseases death ultimately results. Therefore although there would be greater risk to the adult population if an epidemic occurred in a virgin community, a direct saving of life would be accomplished. Isolation and preventive measures could be more efficiently carried out. The disease would be more easily localised.

Certain zymotics moreover are peculiar to earlier childhood, *e.g.*, fatal diarrhoea, measles, and whooping cough. These diseases would tend to disappear.

The different zymotic diseases require individual consideration.

1. SMALL POX.—The death-rate 0—5 years 1871-80 was 0·53. The death-rate at the different age periods 1854-87 :—

TABLE IX.—*Mortality from Small Pox at Age Periods.*

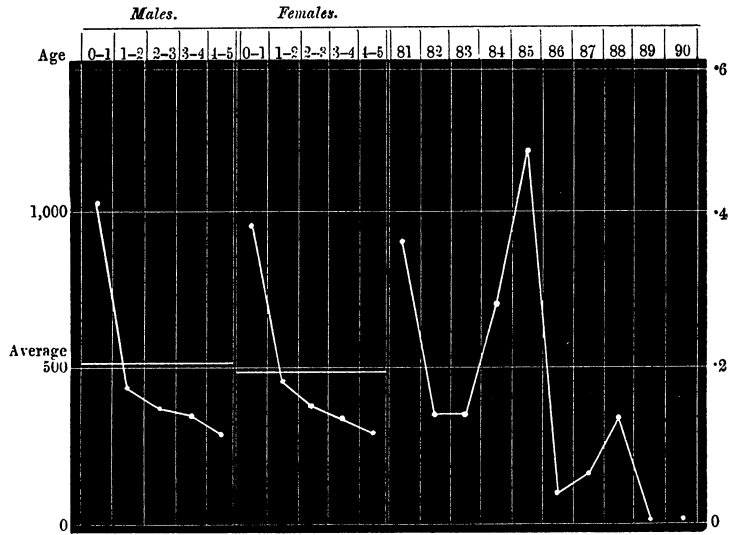
| Age.              |             |             | Age.           | Male. | Female. |
|-------------------|-------------|-------------|----------------|-------|---------|
| 0— 3 months ..... | 1·57        |             | 1—2 years..... | 0·432 | 0·448   |
| 3— 6 „ .....      | 0·89        |             | 2—3 „ .....    | 0·367 | 0·381   |
| 6—12 „ .....      | 0·79        |             | 3—4 „ .....    | 0·341 | 0·333   |
|                   |             |             | 4—5 „ .....    | 0·305 | 0·296   |
| 0— 1 year .....   | M.<br>1·035 | F.<br>0·946 | 0—5 years..... | 0·511 | 0·493   |

The deaths between 1881-90 (0—1 year) numbered 1,389, of which 40 occurred in vaccinated children, 583 in unvaccinated children, and in 766 the condition as to vaccination was not stated. The death-rate per 1,000 births varied from 0·00225 in 1889 to 0·481 in 1885 :—

TABLE X.—*Rate of Infant Mortality from Small Pox, 1881-90.*

| Year.      |       | Year.      |         |
|------------|-------|------------|---------|
| 1881 ..... | 0·361 | 1886 ..... | 0·0335  |
| '82 .....  | 0·145 | '87 .....  | 0·0688  |
| '83 .....  | 0·142 | '88 .....  | 0·138   |
| '84 .....  | 0·280 | '89 .....  | 0·00225 |
| '85 .....  | 0·481 | '90 .....  | 0·00344 |

Annual deaths from small pox at age periods (0—5 years), 1854-87, per 1,000,000 living, and at age 0—1 year, for the decade 1881-90, per 1,000 births.



It is unnecessary to discuss the prophylactic value of vaccination—it is only needful to mention that since 1851 there has been a continuous decline in infant mortality from small pox, that the decline has been simultaneous with the more efficient performance of obligatory vaccination; and that the decline in mortality does not correspond to the decline in the general death-rate, which has been attributed to better sanitation.

Small pox is most fatal in infants; the mortality abruptly falls during the second year of life, and continues to fall every year during the age period 0—5 years. The value of shielding infants from small pox is therefore patent. The case mortality of small pox 0—2 years, compared with the case mortality of all ages, is as follows :—

TABLE XI.

| Vaccination Marks.    | 0—2 Years. | All Ages. |
|-----------------------|------------|-----------|
| Good marks .....      | —          | 3         |
| Imperfect marks ..... | 9          | 9         |
| No marks .....        | 41         | 27        |
| Unvaccinated .....    | 66         | 43        |

The figures are also confirmatory evidence of the prophylactic value of vaccination. As a non-fatal peril of infant life may be mentioned the blindness which is due to small pox.

2. MEASLES.—The death-rates per 1,000 living (1848-87) is given in the following table:—

TABLE XII.—*Death-Rates for Measles at Age Periods.*

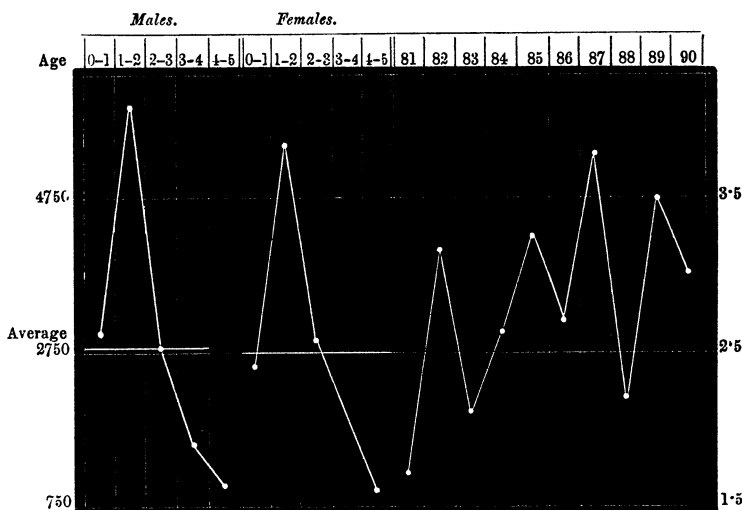
| Age.              |                   | Age.           | Male. | Female. |
|-------------------|-------------------|----------------|-------|---------|
| 0— 3 months ..... | 0·38              | 1—2 years..... | 5·812 | 5·462   |
| 3— 6 „ .....      | 0·84              | 2—3 „ .....    | 2·883 | 2·935   |
| 6—12 „ .....      | 4·88              | 3—4 „ .....    | 1·599 | 1·680   |
|                   |                   | 4—5 „ .....    | 0·926 | 0·956   |
| 0— 1 year .....   | M. 3·011 F. 2·515 | 0—5 years..... | 2·888 | 2·733   |

The rate of infant mortality from measles during the decade was as under:—

TABLE XIII.—*Rate of Infant Mortality, Measles, 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 1·719 | 1886 ..... | 2·763 |
| '82 .....  | 3·208 | '87 .....  | 3·820 |
| '83 .....  | 2·182 | '88 .....  | 2·232 |
| '84 .....  | 2·697 | '89 .....  | 3·531 |
| '85 .....  | 3·344 | '90 .....  | 3·030 |

Annual deaths from measles at age periods (0—5 years), 1848-87, per 1,000,000 living, and at age 0—1 year, for the decade 1881-90, per 1,000 births.



It is to be noticed that measles is most fatal during the second year of life. It is also becoming more prevalent. The infant mortality, 1851-60, was 2·095, 1861-70, 2·291, 1871-80, 2·319, 1881-90,



2·85. More importance and attention must be given to measles. Measles and whooping cough are regarded as so truly and entirely infantile disorders, that there is a tendency to neglect them. They are both infectious before they can be diagnosed with certainty, so that compulsory notification is only a partial means of suppression. It is however urgently needed, owing to the great influence of schools in spreading the disease. The danger of measles has been very greatly underrated. There is no doubt but that the tuberculous diseases of childhood, whether local, as lupus and enlarged glands, or whether general and fatal, as pulmonary phthisis, are often rightly traced and attributed to an attack of measles. Prolonged debility and ill health are frequent sequelæ. Moreover many deaths, really due to measles, are ascribed to disease of the respiratory organs, which is so general a complication. The *insouciance* with which measles is regarded is wholly unjustifiable.

3. SCARLET FEVER.—The death-rates at age periods per 1,000 living, 1859-85, are given in the following table:—

TABLE XIV.—*Death-Rates from Scarlet Fever at Age Periods.*

| Age.              |             |             | Age.           | Male. | Female. |
|-------------------|-------------|-------------|----------------|-------|---------|
| 0— 3 months ..... | 0·30        |             | 1—2 years..... | 4·170 | 3·874   |
| 3— 6 „ .....      | 0·69        |             | 2—3 „ .....    | 4·676 | 4·491   |
| 6—12 „ .....      | 2·35        |             | 3—4 „ .....    | 4·484 | 4·332   |
|                   |             |             | 4—5 „ .....    | 3·642 | 3·556   |
| 0— 1 year .....   | M.<br>1·664 | F.<br>1·384 | 0—5 years..... | 3·681 | 3·482   |

The rate of infant mortality from scarlet fever during the decade was as under:—

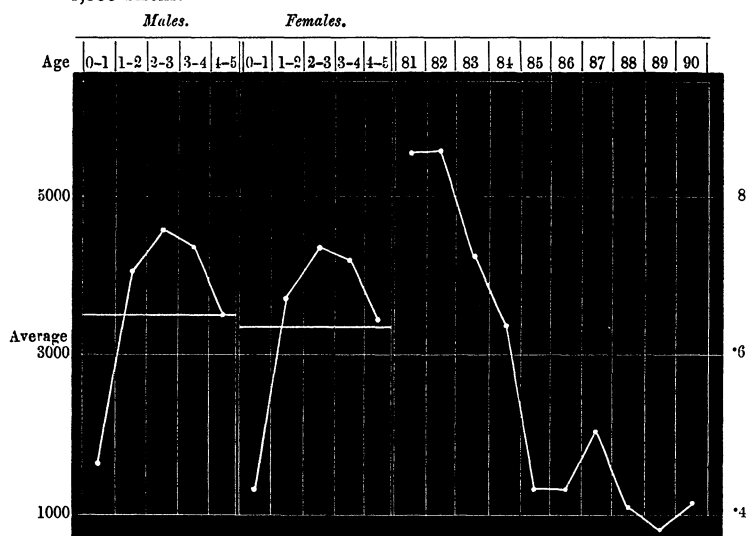
TABLE XV.—*Rate of Infant Mortality from Scarlet Fever, 1881-90.*

|            |        |            |        |
|------------|--------|------------|--------|
| 1881 ..... | 0·8606 | 1886 ..... | 0·4336 |
| '82 .....  | 0·8706 | '87 .....  | 0·5007 |
| '83 .....  | 0·7331 | '88 .....  | 0·4114 |
| '84 .....  | 0·6460 | '89 .....  | 0·3860 |
| '85 .....  | 0·4372 | '90 .....  | 0·4103 |

There has been a continuous decline during recent years in the infant mortality from scarlet fever. During 1851-60 the mortality was 1·685; from 1861-70, 1·698; from 1871-80, 1·185; and from 1881-90, 0·5692. It is most fatal during the third year of life. Numerous sequelæ are observed after scarlet fever, so that this disease also is more fatal than the statistics show. The prompt isolation of cases, and the more general hospital treatment of

patients, is being followed by excellent results, and is ample justification for the notification of infectious diseases.

Annual deaths from scarlet fever at age periods (0—5 years), 1859-85, per 1,000,000 living, and at age 0—1 year, for the decade 1881-90, per 1,000 births.



4. WHOOPING COUGH.—The mortality at age periods is shown in the following table:—

TABLE XVI.—*Death-Rates from Whooping Cough at Age Periods, 1848-87.*

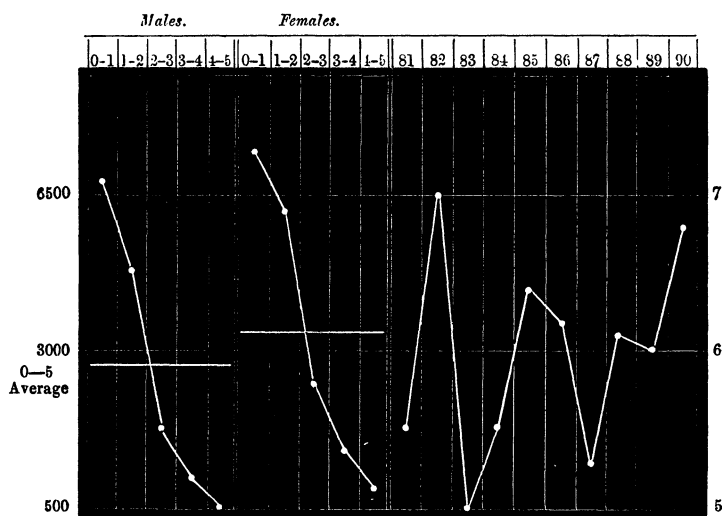
| Age.              |          |          | Age.           | Male. | Female |
|-------------------|----------|----------|----------------|-------|--------|
| 0— 3 months ..... | 4·56     |          | 1—2 years..... | 4·930 | 6·213  |
| 3— 6 „ .....      | 6·14     |          | 2—3 „ .....    | 2·071 | 2·954  |
| 6—12 „ .....      | 8·12     |          | 3—4 „ .....    | 1·086 | 1·629  |
|                   |          |          | 4—5 „ .....    | 0·584 | 0·859  |
| 0— 1 year .....   | M. 6·769 | F. 7·306 | 0—5 years..... | 3·217 | 3·916  |

The rate of infant mortality during the decade was as under:—

TABLE XVII.—*Rates of Infant Mortality, Whooping Cough, 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 5·521 | 1886 ..... | 6·289 |
| '82 .....  | 7·096 | '87 .....  | 5·357 |
| '83 .....  | 5·071 | '88 .....  | 6·147 |
| '84 .....  | 5·523 | '89 .....  | 6·012 |
| '85 .....  | 6·445 | '90 .....  | 6·874 |

Annual deaths from whooping cough at ages 0—5 years, 1848-87, per 1,000,000 living, and at age 0—1 year, for the decade 1881-90, per 1,000 births.



It is seen that whooping cough is most fatal during the first year of life; a curious circumstance is that it is uniformly more fatal in girls than in boys at each year of age. It is the most fatal of all zymotic diseases except diarrhoea. It is one of the most difficult diseases to treat and isolate; its duration is long, and it is infectious before it can be recognised. Between 1851-60 the rate of infant mortality from whooping cough was 5.744; from 1861-70, 6.083; from 1871-80, 6.198; and from 1881-90, 6.007, so that its frequency is remaining fairly constant. Little has as yet been done to grapple seriously with the disease.

5. DIPHTHERIA.—The mortality at age periods per 1,000 living, 1859-87, and the rates of infant mortality from diphtheria during each year of the decade 1881-90, are given in the following tables:—

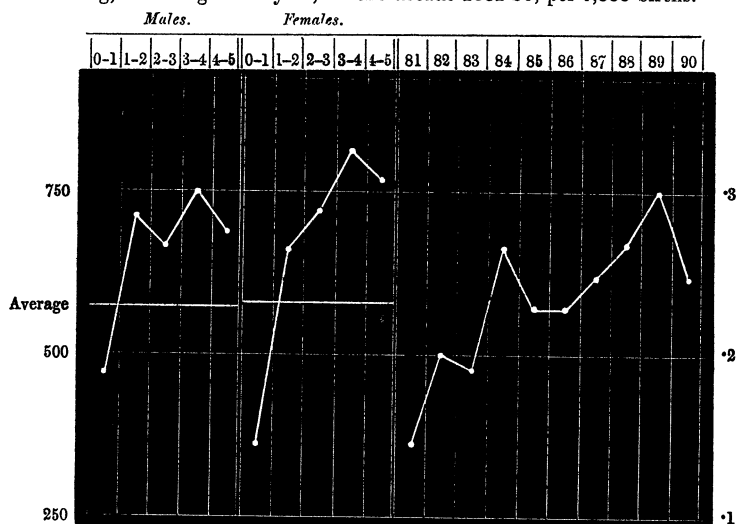
TABLE XVIII.—*Death-Rates from Diphtheria at Age Periods.*

| Age.              |       |       | Age.           | Males. | Females. |
|-------------------|-------|-------|----------------|--------|----------|
| 0— 3 months ..... | 0.32  |       | 1—2 years..... | 0.720  | 0.665    |
| 3— 6 „ .....      | 0.30  |       | 2—3 „ .....    | 0.675  | 0.731    |
| 6—12 „ .....      | 0.63  |       | 3—4 „ .....    | 0.757  | 0.835    |
|                   | M.    | F.    | 4—5 „ .....    | 0.690  | 0.782    |
| 0— 1 year .....   | 0.464 | 0.356 | 0—5 years..... | 0.655  | 0.664    |

TABLE XIX.—*Rates of Infant Mortality, Diphtheria, 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 0·144 | 1886 ..... | 0·230 |
| '82 .....  | 0·209 | '87 .....  | 0·253 |
| '83 .....  | 0·195 | '88 .....  | 0·278 |
| '84 .....  | 0·275 | '89 .....  | 0·309 |
| '85 .....  | 0·233 | '90 .....  | 0·257 |

Annual deaths from diphtheria at ages 0—5 years, 1859-87, per 1,000,000 living, and at age 0—1 year, for the decade 1881-90, per 1,000 births.

TABLE XX.—*Death-Rates from Croup at Age Periods, 1869-87.*

| Age.           | Males. | Females. | Age.           | Males. | Females. |
|----------------|--------|----------|----------------|--------|----------|
| 0—1 year ..... | 1·043  | 0·752    | 3—4 years..... | 1·422  | 1·294    |
| 1—2 years..... | 1·871  | 1·574    | 4—5 „ .....    | 1·013  | 0·912    |
| 2—3 „ .....    | 1·633  | 1·519    | 0—5 years..... | —      | —        |

Many cases of death returned as due to “croup” ought to be included with the diphtheria statistics. It is noticeable that the frequency of croup, as shown by its mortality at the different age periods, is greatest in the second year, while diphtheria is most fatal in the fourth year. The difference is naturally to be expected, for the younger the child the greater the possibility that diphtheria will not be recognised.

Diphtheria seems to be gradually increasing in frequency in infants during the last decade. The influence of school attendance in the propagation of infectious diseases, though recognised, is not fully appreciated. In diphtheria the influence is very great, and summary measures ought to be taken with regard to diphtheria and measles earlier than is usually the case. The closure of elementary schools during an outbreak of infectious disease has

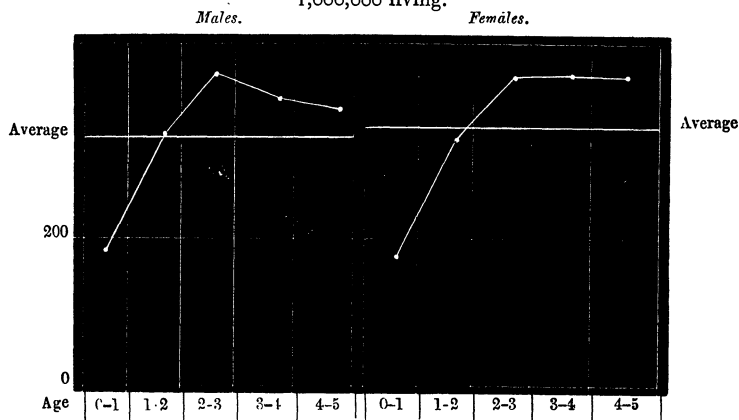
been provided for in the educational code, but the practice has been to delay acting until the epidemic is well established, and the tendency is to re-open the school prematurely. The delay in closing is defended on the ground that closure interferes with the school curriculum and endangers the grant; but the occurrence of even a few cases of diphtheria or measles ought to determine immediate action. Sunday schools are more difficult to manage. During a severe epidemic<sup>2</sup> of diphtheria at Lake Vyrnwy, Montgomeryshire, in 1888 (when plenary powers were entrusted to me for dealing with the epidemic) I failed utterly to convince the Sunday schools authorities of the urgent necessity for closing the schools, and the outbreak was only suppressed by the compulsory removal of all cases to an infectious hospital. Additional powers are needed to deal with public meetings in such cases.

6. ENTERIC FEVER.—Cases of enteric fever rarely occur, and are still more rarely diagnosed in early life. Depending upon contamination of the food supply and upon the risk of exposure to the specific virus which is increased by change of residence and travelling, the danger of enteric fever is less in the case of infants than in persons of older years. The death-rates per 1,000 living at age periods (1869-87) are given in the following table:—

TABLE XXI.—*Death-Rates from Enteric Fever at Age Periods.*

| Age.           | Males. | Females. | Age.           | Males. | Females. |
|----------------|--------|----------|----------------|--------|----------|
| 0—1 year ..... | 0·181  | 0·171    | 3—4 years..... | 0·343  | 0·374    |
| 1—2 years..... | 0·306  | 0·299    | 4—5 „ .....    | 0·336  | 0·373    |
| 2—3 „ .....    | 0·364  | 0·365    | 0—5 years..... | 0·303  | 0·312    |

Annual deaths from enteric fever at age periods (0—5 years), 1869-87, per 1,000,000 living.



<sup>2</sup> Lake Vyrnwy: the History of a Valley and Submerged Village. Liverpool, 1892. D. Marples & Co.

7. DIARRHŒA.—Deaths from diarrhœa are allied in many respects to deaths from enteric fever. Diarrhœa and enteric fever belong to a class of specific fevers other than those previously considered. Diarrhœa has long been studied by specialists in public health, and the general opinion now held is that fatal infantile diarrhœa is a specific disease, due to a specific virus which is introduced into the system through the food supply. The frequency and consequently the fatality of diarrhœa is affected by a very large number of factors. It has a direct relation to meteorological conditions; the number of cases varying with the temperature registered by the four-foot earth thermometer. Rain-fall, wind and season all have influence. Locality and the geological nature of the soil are also factors. Lastly, density of buildings, elevation of site, want of ventilation and want of cleanliness, foul air and foul water, social position—that is to say social conditions—are all important. In short, for the prevalence of diarrhœa, the locality must be a favourable nidus for the specific organism; the meteorological conditions must be favourable for its activity; the social conditions must be favourable for its distribution. The majority (but not all) of the fatal cases of diarrhœa are directly traceable to the contamination of the food supply. Diarrhœa is however sometimes symptomatic. We are now concerning ourselves with fatal infantile diarrhœa. More than 78 per cent. of all deaths from diarrhœa are deaths of infants. The mortality at age periods 1848-87 is shown in the following table:—

TABLE XXII.—*Death-Rates from Diarrhœa at Age Periods.*

| Age.               |             |            | Age.              | Males. | Females. |
|--------------------|-------------|------------|-------------------|--------|----------|
| 0— 3 months .....  | 21'00       |            | 1—2 years .....   | 5'024  | 4'956    |
| 3— 6    "    ..... | 20'14       |            | 2—3    "    ..... | 1'042  | 1'057    |
| 6—12   "    .....  | 11'86       |            | 3—4    "    ..... | 0'393  | 0'381    |
|                    |             |            | 4—5    "    ..... | 0'231  | 0'221    |
| 0— 1 year .....    | M.<br>18'97 | F.<br>15'9 | 0—5 years.....    | 5'526  | 4'805    |

It is seen that diarrhœa is exceedingly fatal during the first year of life—more especially during the earlier months. This fatality in great measure is due to the improper feeding of infants. Owing to the neglect and ignorance of their mothers, the infants are fed on contaminated milk or other food. An attack of acute diarrhœa is developed, and the child very generally dies—if the attack is fatal—in less than seven days. Dr. Hope, the Assistant Medical Officer of Health for Liverpool, investigated 1,000 fatal

cases of diarrhoea<sup>3</sup> occurring in children under 5 years of age in Liverpool, and I summarise his results. He found that the prevalence of fatal diarrhoea was associated with the existence of insanitary surroundings, squalor and filth; that the disease attacks all classes of society; that the mortality from the disease undergoes great yearly fluctuations and enormous seasonal fluctuations. The majority of the cases were acute, the illness lasting less than a week. It frequently happened that some other persons in the house, most commonly the children, were also affected to a greater or less degree with vomiting and diarrhoea. A certain number of cases were less acute, and temporary improvement would take place before the fatal issue. In all these cases death was frequently preceded by convulsions. In the more chronic cases the diarrhoea was, most frequently, merely a symptom of some other disease. Dr. Hope investigated the mode in which these children were fed. By "food" is meant a variety of things commonly considered appropriate for infants.

TABLE XXIII.—*Analysis of 1,000 Fatal Cases of Diarrhoea.*

| Age at Death.                | Under<br>3 Months. | Over<br>3 Months,<br>Under<br>6 Months. | Over<br>6 Months,<br>Under<br>12 Months. | Year,<br>1—2. | Years,<br>2—5. | Total. |
|------------------------------|--------------------|---|--|---------------|----------------|--------|
| Breast alone .....           | 16                 | 7                                       | 7  | —             | —              | 30     |
| „ and food .....             | 70                 | 50                                      | 55                                       | 34            | —              | 209    |
| „ bottle, and food .....     | 40                 | 35                                      | 30                                       | 4             | —              | 109    |
| Bottle alone .....           | 33                 | 19                                      | 13                                       | —             | —              | 65     |
| „ and "food" .....           | 69                 | 115                                     | 115                                      | 16            | —              | 315    |
| Cow's milk and "food" .....  | 5                  | 3                                       | 5  | —             | —              | 13     |
| Breast and any kind of food. | —                  | 1                                       | 16                                       | 20            | —              | 37     |
| Any kind of food.....        | —                  | —                                       | 14                                       | 156           | 52             | 222    |
| Total.....                   | 233                | 230                                     | 255                                      | 230           | 52             | 1,000  |

It is seen that of 718 cases of infants, 30 only were fed on the breast alone, 391 got no breast milk at all, and 297 were getting artificial diet as well as breast milk. Dr. Hope further found that 50 per cent. of infants are fed upon breast milk alone up to 3 months of age. From 3 to 6 months about 20 per cent. are so fed, and from 6 to 12 months artificial food is nearly always given in addition to the breast milk. He was able to state his conclusions in the following way: Under 3 months of age for every infant fed entirely on the breast dying of diarrhoea, 15 die who receive other food in addition to or instead of breast milk. And if it be assumed that 15 per cent. of infants under 3 months of age are reared exclusively by artificial food (this

<sup>3</sup> Liverpool Medicochirurgical Journal.



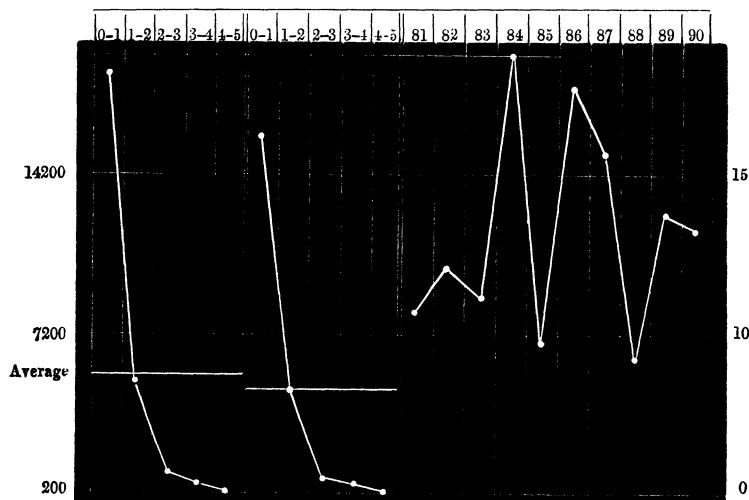
estimate is too low), the deaths amongst infants so fed are twenty-two times as numerous as they are amongst equal numbers of partly, or entirely, breast fed infants. From the age of 3 months to 6 months, if 80 per cent. of infants are supposed to get some breast milk, for every infant so fed dying of diarrhœa, six die amongst an equal number getting no breast milk at all. I have quoted Dr. Hope's paper so fully, in order to show the importance of infant feeding in the ætiology of infantile diarrhœa.

The rate of infant mortality from diarrhœa during the decade was as under:—

TABLE XXIV.—*Rates of Infant Mortality, Diarrhœa, 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 10·65 | 1886 ..... | 18·27 |
| '82 .....  | 12·01 | '87 .....  | 15·90 |
| '83 .....  | 11·18 | '88 .....  | 9·33  |
| '84 .....  | 19·57 | '89 .....  | 13·85 |
| '85 .....  | 9·86  | '90 .....  | 13·42 |

Annual deaths from diarrhœa at ages 0—5 years, 1848-87, per 1,000,000 living, and at age 0—1 year, for the decade 1881-90, per 1,000 births.



But these rates of mortality do not fully represent all the deaths attributable to diarrhœa. Many cases result in chronic wasting and atrophy, and the children are returned as dying from debility, atrophy, or inanition. In America it has been noticed that deaths from these causes are more numerous after an epidemic of diarrhœa, and that they are more numerous during the later months of the year, following the seasonal prevalence of diarrhœa.

It is of interest to notice the great difference in the rate of infant mortality from diarrhoea in England and in Scotland.

Between 1873 and 1875 (Farr's "Vital Statistics," p. 191) the death-rate in England from diarrhoea was 17·1; from convulsions, 25·1; from atrophy, 26·7; from premature birth, 12·8 (the two last causes together having a rate of 39·5). In Scotland, during the same period, the death-rate from diarrhoea was 7·1; from convulsions, 5·5; from atrophy and premature birth, 30·7. I have already noticed that convulsions often terminate an attack of diarrhoea; and I shall hereafter show the relation between deaths from the other causes noted and the mismanagement of children. The deaths from diarrhoea depend upon social conditions which influence the feeding of children. In Scotland these conditions do not operate to nearly the same extent as they do in England. The sanitary conditions of Scotland are not so perfect as to account for the difference—the explanation depends upon better care for the children at home which exists in Scotland.

I have insisted on the importance of improper food, especially artificial food, in the ætiology of diarrhoea to the exclusion of other factors (which are fully considered in Dr. Ballard's report), because, as we shall hereafter see, the danger of artificial feeding to the child depends upon the two most potent factors tending to excessive infant mortality, viz., ignorance and neglect. In fact, the death-rate of infants from diarrhoea may be used as a measure of the ignorance of a community, together with the prevalence therein of child neglect.

The remaining other zymotic diseases do not require consideration, as the deaths are comparatively few. It is of interest, however, to notice that the death-rate from erysipelas (0—3 months) is 1·91; (0—6 months) 0·77; and (6—12 months) 0·27.

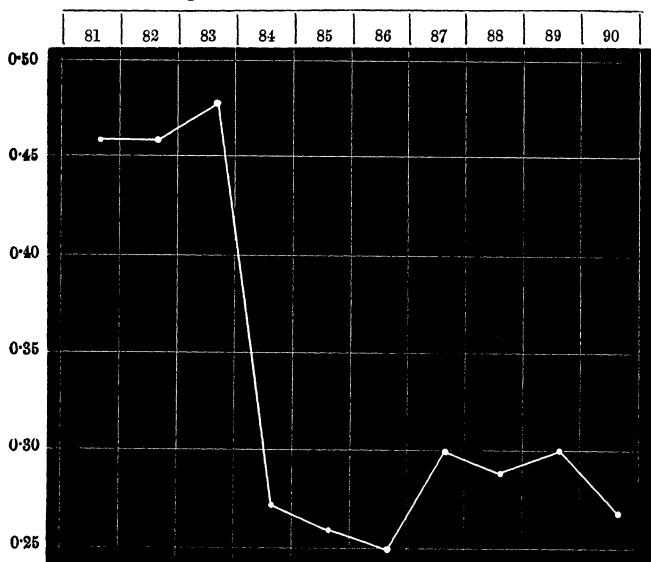
## II.—DIETETIC DISEASES.

Excluding alcoholism, 84·2 per cent. of all the deaths of males (and 85·9 per cent. in the case of females) registered from dietetic diseases in 1889, are deaths of infants, of which 53 per cent. were deaths of infants under 3 months of age. Of the 2,983 deaths in infancy registered, 1881-90, from this cause, 2,968 were due to starvation and want of breast milk. Considering these alone, the rate of infant mortality during the decade was as under:—

TABLE XXV.—*Rates of Infant Mortality, Starvation, &c., 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 0·460 | 1886 ..... | 0·250 |
| '82 .....  | 0·458 | '87 .....  | 0·301 |
| '83 .....  | 0·478 | '88 .....  | 0·296 |
| '84 .....  | 0·274 | '89 .....  | 0·303 |
| '85 .....  | 0·255 | '90 .....  | 0·267 |

## England : Deaths from dietetic diseases.



It is seen that the deaths from dietetic diseases show a tendency to diminish in numbers. Here again the question of infant feeding is raised, and it can be asserted with confidence that deaths from this cause are either more properly referable to other causes, or are preventable.

## III.—PARASITIC DISEASES.

The deaths of infants from parasitic diseases, 1881-90, numbered 6,889, and in 1889 the deaths of male infants were 80.2 per cent., and of female infants 71.9 per cent. of the total deaths from these diseases. The vast majority occur during the first three months of life—78 per cent. in the case of males. Most of the deaths are registered from thrush, but the growth of *oïdium albicans* is only symptomatic of some other disorder—generally gastric in origin again : suggesting the same initial cause of illness, namely, bad feeding. Deaths from this cause ought to disappear in time from the mortality statistics, and will be assigned to the proximate causes of death. The rate of infant mortality from these diseases was as under :—

TABLE XXVI.—*Rate of Infant Mortality, Parasitic Diseases, 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 0.894 | 1886 ..... | 0.870 |
| '82 .....  | 0.779 | '87 .....  | 0.712 |
| '83 .....  | 0.940 | '88 .....  | 0.593 |
| '84 .....  | 0.912 | '89 .....  | 0.611 |
| '85 .....  | 0.751 | '90 .....  | 0.734 |

Many of the deaths registered from these diseases may also be fairly regarded as preventable.

#### IV.—DEVELOPMENTAL DISEASES.

I shall defer the consideration of deaths from developmental diseases until I enter upon the discussion of certain social conditions tending to the undue destruction of infant life.

#### V.—CONSTITUTIONAL DISEASES.

About 10 per cent. of the deaths from constitutional diseases occur in infancy, and 20 per cent. in childhood under the age of 5 years.

Constitutional diseases in the Registrar-General's reports include rheumatism (which is comparatively rare, and rarely fatal in early life), rickets, and the group of tubercular diseases. The other diseases may be left out of our consideration.

*Rickets.*—Rickets is a very interesting disease considered historically. It was known as *morbus puerilis anglorum*, and in Dr. Whistler's inaugural thesis, which is dated 1645, he inquires, "whether it be best for the health of children to be "suckled by their own mothers?" So even then it was recognised that a connection existed between the occurrence of rickets and errors in diet. It is now most generally accepted that rickets is a disease almost entirely due to bad feeding. Whether syphilis or other hereditary taint is also a factor we need not now pause to consider. Rickets may be taken as a typical peril of infant life; 1,200 deaths were registered from it in 1891, but these are no measure either of its prevalence or of its danger. Indirectly it is the cause of numerous deaths from hydrocephalus, convulsions, and respiratory disease, but there are no means of determining the number. Of the prevalence of rickets there can be no doubt, *e.g.*, at the Liverpool Infirmary for Children over 500 cases of rickets pass under observation annually, and are treated. Most of the deformities of children so obvious in our crowded towns are due to this disease. The children suffering from rickets are weak and debilitated; prone to be attacked with any prevailing illness, which is also more likely to prove fatal. If they escape any intercurrent illness, they are as likely as not to be left with deformed chests, with thickened and enlarged skulls, and with crooked legs. It is not necessary for me to discuss the disease medically, suffice it to say that it may be regarded as a wholly preventable form of infant peril; that it is always due to faulty nutrition, that it is most frequently associated with artificial feeding; that it always has an evil influence on the development of the child, both

physically and mentally. The connection between the prevalence of rickets and a very soft water supply has been urged, and the case of the city of Glasgow instanced; but we may, for the purposes of the present paper at least, content ourselves by regarding it as due to faulty nutrition, and leave out of our consideration the relative share which water and food take in its production.

*Tubercular Diseases.*—The group of tubercular diseases includes hydrocephalus (tubercular meningitis), tabes mesenterica, phthisis, and other forms of tuberculosis, including scrofula.

TABLE XXVII.—*Mortality per 1,000 Living, 0—5 Years.*  
*Tubercular Diseases.*

| Years.         | Phthisis. | Hydrocephalus. | Other Tuberculoses. |
|----------------|-----------|----------------|---------------------|
| 1851-60 ... .. | 13'05     | 25'39          | 19'20               |
| '61-70 ... ..  | 9'68      | 22'13          | 22'67               |
| '71-80 ... ..  | 7'67      | 19'00          | 25'50               |

TABLE XXVIII.—*Mortality at Age Periods, 1871-80, per 1,000 Living.*

| Years.    | Scrofula. | Tabes. | Phthisis. | Hydrocephalus. |
|-----------|-----------|--------|-----------|----------------|
| 0-1 ..... | 11'89     | 53'2   | 14'0      | 36'8           |
| 1-2 ..... | 7'49      | 29'6   | 11'7      | 30'1           |
| 2-3 ..... | 2'89      | 8'85   | 5'38      | 12'4           |
| 3-4 ..... | 1'71      | 3'59   | 3'38      | 7'57           |
| 4-5 ..... | 0'13      | 2'14   | 3'00      | 5'88           |
| 0-5 ..... | 5'21      | 20'2   | 7'66      | 19'00          |

Tubercular meningitis, tabes mesenterica, and scrofula, are all really diseases of early childhood. The death-rate from these causes diminishes year by year. On the other hand the death-rate from phthisis, though it also diminishes year by year during the first few years of life, afterwards rises to a point far beyond the mortality during the first year of life. The liability to tubercular disease is known to be strongly hereditary, and to a certain extent therefore these diseases cannot be considered as wholly preventable perils of infant life. At the same time tuberculosis is a frequent sequela of specific fevers (particularly measles), and is also induced by insanitary surroundings, damp, privation, want, and neglect; so that the tuberculoses are after all to a certain extent preventable diseases. I need not here discuss the communicability of phthisis, but I would call attention to the excessive mortality from this disease among those who live in overcrowded

apartments. Tubercular disease is also induced more readily in the offspring of those who are related by blood, who are weakened by dissipation or want. How far tuberculosis is due to the ingestion of unsound meat and food is difficult to say. The immunity of Jews from this disease is said to be due to the care with which they select animals to be slaughtered for food. Moreover, *tabes mesenterica* is most frequent in infancy, during a period when milk forms the major part of the diet. It has been estimated that stall-fed cattle are tubercular from 2 to 50 per cent. Tubercle bacilli have been found in the milk of tuberculous cows.

## VI.—LOCAL DISEASES.

Local diseases include diseases of special organs of the nervous system, of the organs of special sense, of the circulatory system, of the respiratory system, of the digestive, lymphatic, urinary systems, of the organs of generation, of locomotion, of the integumentary system. We need only concern ourselves at any length with diseases of the nervous, respiratory, and digestive systems. About 20 per cent. of deaths from local diseases occur in infancy, and about 35 per cent. under the age of 5 years. It is seen that early childhood is much more liable to local disease than to constitutional disease.

### A.—DISEASES OF THE ORGANS OF SPECIAL SENSE.

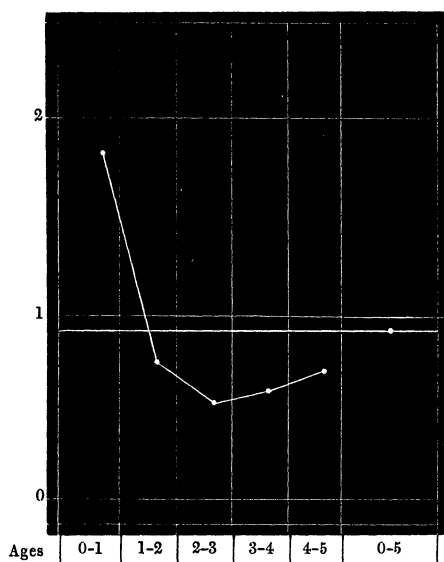
Diseases of these organs are rarely fatal. The ear diseases of childhood are generally sequelæ of specific fevers. The ophthalmia of early infancy however constitutes a grave peril of infant life. It is wholly preventable by care and cleanliness. It has been estimated that it is responsible for fully 30 per cent. of the blindness of the United Kingdom.

### B.—DISEASES OF THE CIRCULATORY SYSTEM.

TABLE XXIX.—*Mortality at Age Periods, 1871-80.*

| Age.      |       |
|-----------|-------|
| 0—1 ..... | 1·810 |
| 1—2 ..... | 0·760 |
| 2—3 ..... | 0·538 |
| 3—4 ..... | 0·580 |
| 4—5 ..... | 0·705 |
| 0—5 ..... | 0·900 |

Circulatory diseases at ages 0—5 years per 1,000 living.



The excessive mortality during the first year is probably due to congenital disease, and ought therefore to be included among deaths from developmental diseases. The increasing frequency of heart diseases as a cause of death in subsequent years must be ascribed to previous attacks of specific fevers.

### C.—DISEASES OF THE RESPIRATORY SYSTEM.

The consideration of diseases of the respiratory system introduces a new factor, previously not considered by us, into the ætiology of infant mortality. In 1847 Mr. Bateman, in a paper read before the Liverpool Literary and Philosophical Society, sought to explain excessive infant mortality by the great susceptibility of infants to the influence of cold. There is no doubt a certain truth in this belief. The infant is less able to adapt itself to sudden changes in environment. The clothing of infants, which is dictated by the arbitrary rule of fashion, is utterly unsuited for the maintenance of sound health. The short sleeves and socks imposed from time immemorial on sturdy and delicate infants alike, whether during genial summer or during severe winter, are quite insufficient to protect infants from changes of temperature, or even to maintain sufficient warmth. Among the poorer classes the clothing is insufficient for other reasons, though a tendency to follow fashion is also observable. The clothing of children of



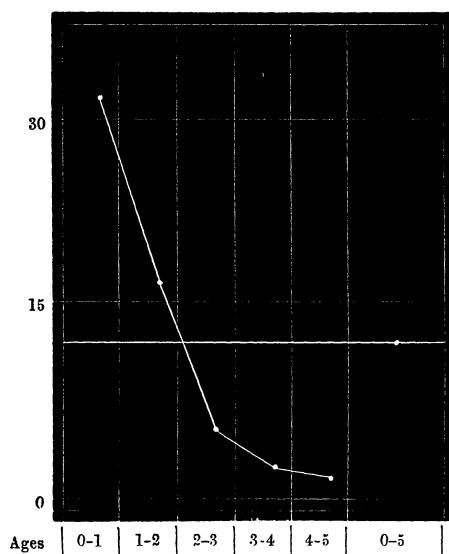
tender years requires careful attention, and to the neglect of this very obvious precaution many of the diseases of the organs of respiration must be traced.

Diseases of the respiratory system are most frequent in early life: 44 per cent. of all deaths from these diseases occur under the age of 5 years:—

TABLE XXX.—*Diseases of Respiratory System. Mortality, 1871-80.*

| Age.            |      |
|-----------------|------|
| 0—1 year .....  | 31·8 |
| 1—2 years ..... | 16·9 |
| 2—3 „ .....     | 5·58 |
| 3—4 „ .....     | 2·73 |
| 4—5 „ .....     | 1·64 |
| <hr/>           |      |
| 0—5 years ..... | 12·0 |
| <hr/>           |      |

Respiratory diseases at ages 0—5 years per 1,000 living.



The majority are due to bronchitis and to pneumonia—we have already considered the deaths from croup. In 1881 42 per cent. of the deaths from bronchitis, and 45 per cent. of the deaths from pneumonia occurred under the age of 1 year. It is seen that as age advances, deaths from pneumonia become relatively more frequent than deaths from bronchitis:—

TABLE XXXI.—1881. *Deaths from Bronchitis and Pneumonia.*

| Age.          | Population. | Deaths from |            | Death-Rates per 1,000 Living. |            |
|---------------|-------------|-------------|------------|-------------------------------|------------|
|               |             | Bronchitis. | Pneumonia. | Bronchitis.                   | Pneumonia. |
| 0—1 year .... | 753,113     | 14,104      | 5,119      | 18·7                          | 6·8        |
| 1—2 years.... | 684,412     | 6,230       | 3,286      | 9·1                           | 4·8        |
| 2—3 „ ....    | 704,409     | 1,900       | 1,255      | 2·7                           | 1·8        |
| 3—4 „ ....    | 691,695     | 837         | 745        | 1·2                           | 1·07       |
| 4—5 „ ....    | 687,235     | 449         | 451        | 0·65                          | 0·65       |
| 0—5 years.... | 3,520,864   | 23,520      | 10,856     | 6·6                           | 3·08       |

The accumulating evidence in favour of the specific nature of certain cases of pneumonia when it occurs as a primary disease, partly explains the increasing frequency of it in later years. Pre-disposing causes as to the occurrence of respiratory disease are found in the debility from bad or insufficient food, from privation, and from exposure to cold, and from foul air, due to overcrowding and defective drainage.

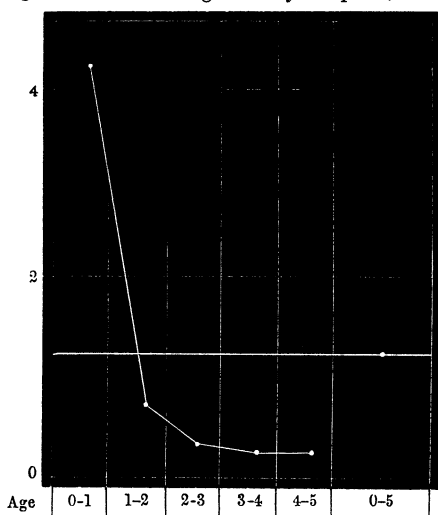
#### D.—DISEASES OF THE DIGESTIVE SYSTEM.

Deaths of infants and children under 5 years only accounted for 18 per cent. of the total deaths from digestive disorders. This small percentage is explained, as I have already pointed out, by the large number of deaths primarily due to digestive disorders being otherwise classified.

TABLE XXXII.—*Diseases of Digestive System. Mortality, 1871-80.*

| Age.            |       |
|-----------------|-------|
| 0—1 year .....  | 4·34  |
| 1—2 years ..... | 0·788 |
| 2—3 „ .....     | 0·366 |
| 3—4 „ .....     | 0·270 |
| 4—5 „ .....     | 0·239 |
| 0—5 years ..... | 1·27  |

Digestive diseases at ages 0—5 years per 1,000 living.



The two most frequent causes of death from digestive disorders in infants are dentition and enteritis. The latter accounted for (1881-90) 14,692 deaths, and these deaths ought really to be added to the deaths ascribed to diarrhoea; from dentition 25,254 deaths were registered. I cannot avoid insisting upon the fact that dentition is not in itself an efficient cause of death. Dentition is a purely physiological process, and its danger arises from the fact, for the most part, that at this period breast milk alone is found insufficient for the growing infant, and needs to be supplemented by some form of artificial food. The child is irritable from the process of dentition. The feeding and the dentition together succeed in setting up a gastric irritation, which leads to death in some cases. A child never dies from dentition alone. Whatever the concomitant disorder may be, it is to that disorder death ought to be assigned, and dentition may be recorded as a secondary cause. In this connection it is necessary to refer to the similar form of the curves representing the annual numbers of deaths from certain diseases. Messrs. Buchan and Mitchell's diagrams, modified by Dr. Longstaff, and included by him in his work on "Studies in Statistics," show that if we take the curve for diarrhoea as our standard the curves for the following causes of death—

Simple or English cholera,  
Dysentery,  
Want of breast milk,  
Tabes mesenterica,

Thrush,  
Jaundice,  
Enteritis,  
Atrophy and debility,

resemble it, all to a greater or less extent. In the case of the last seven they exhibit less ample fluctuations (Longstaff, p. 280, *loc. cit.*). These various diseases are all primarily referable to digestive disorders, and hence the importance of food and feeding in the ætiology of infant mortality is emphasised.

In further investigation of the influence of diet in the production of digestive disorders, I analysed my records of 500 consecutive cases of infants and children under 1 year 6 months of age brought to the out-patient department of the Infirmary for Children, Liverpool. The analysis took into account methods of feeding (whether the children were entirely breast fed, or partially breast fed, receiving some food in addition to breast milk, or entirely fed with food, receiving no breast milk), and also the complaints from which the children suffered. By food, a variety of kinds of nourishment is to be understood (milk, prepared foods, &c.). The conclusions are summarised, the data upon which they are based being included in the Appendix.

(1.) The greater proportion of the illness from which infants suffer is referable to disorders of the alimentary canal.

(2.) Infants brought up entirely on breast milk are least liable to such digestive disorders; infants fed partially on the breast and partially on food, suffer less frequently than infants fed entirely on artificial food.

(3.) Breast fed children are more liable to such disorders during early and during late infancy, whereas artificially fed children are most liable during the earlier months, and partially breast fed children during the later months. These results were to be expected.

(4.) From 0—3 months of age 50 per cent. of infants are breast fed, nearly 70 per cent. partially or wholly breast fed; from 3—6 months 40 per cent. are breast fed, and 60 per cent. partially or wholly breast fed; from 6—12 months 35 per cent. are breast fed, and 60 per cent. partially or wholly breast fed.

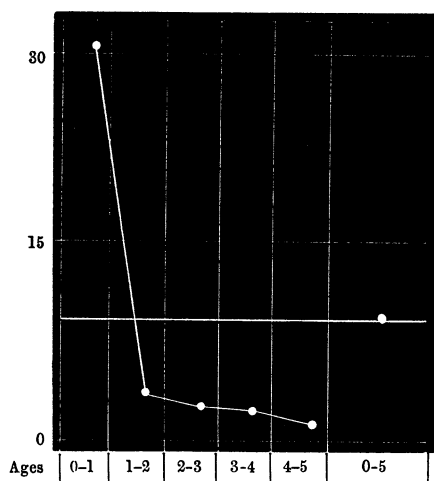
(5.) Of 87 consecutive cases, 23 per cent. were weaned under 3 months, 15 per cent. were weaned 3—9 months of age, and 50 per cent. from 9—15 months. These conclusions are in accord with Dr. Hope's report in regard to fatal infantile diarrhœa previously referred to.

#### E.—DISEASES OF THE NERVOUS SYSTEM.

Deaths from diseases of the nervous system under the age of 5 years account for 44 per cent. of the total deaths from nervous diseases, and in 1889, 65 per cent. of the deaths from these diseases were registered from convulsions. It must be clearly

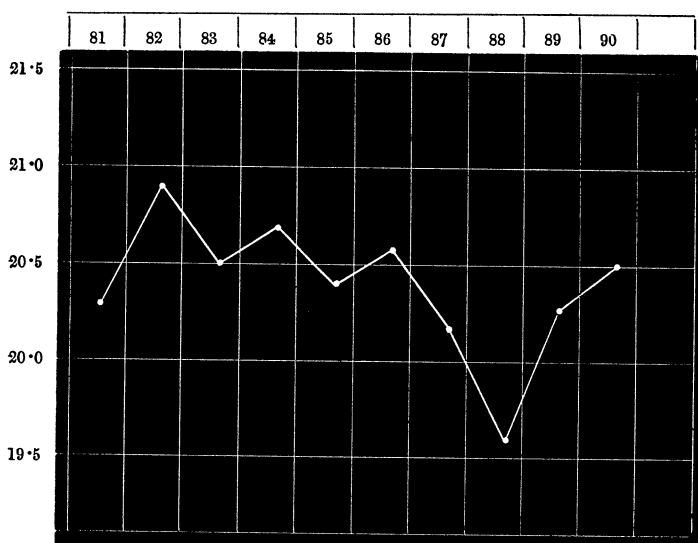
understood that death from convulsions pure and simple very rarely occurs. Convulsions are only symptomatic. They are the *exitus letalis* of many diseases, I have already referred to their connection with diarrhoea. They may usher in acute specific fevers. They are however generally due to some form of peripheral irritation, most usually from gastric disorders; sometimes from dentition, but rarely unless gastric disorder is also present. They are doubtless often the proximate cause of death, but death ought not to be registered as due to convulsions. It is to be expected that deaths registered from this cause will gradually diminish:—

Nervous diseases at ages 0—5 years per 1,000 living.

TABLE XXXIII.—*Diseases of Nervous System, 1871-80. Mortality.*

| Age.     |      |
|----------|------|
| 0—1..... | 30.8 |
| 1—2..... | 6.67 |
| 2—3..... | 2.62 |
| 3—4..... | 1.59 |
| 4—5..... | 1.07 |
| 0—5..... | 9.08 |

## England, Deaths from Convulsions.

TABLE XXXIV.—*Rates of Infant Mortality, Convulsions, 1881-90.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 20'35 | 1886 ..... | 20'68 |
| '82 .....  | 20'76 | '87 .....  | 20'15 |
| '83 .....  | 20'52 | '88 .....  | 19'60 |
| '84 .....  | 20'69 | '89 .....  | 20'31 |
| '85 .....  | 20'28 | '90 .....  | 20'62 |

The death-rate from convulsions is seen to be fairly constant.

## VII.

Deaths from VIOLENCE I shall consider again.

## VIII.—DEATHS FROM OTHER AND ILL-DEFINED CAUSES.

Lastly we have to consider a heterogeneous collection of deaths. Nearly 80 per cent. of the deaths of an indeterminate or ill specified nature occur in infancy, and of these no fewer than 73 per cent. are ascribed to debility, atrophy, and inanition—in fact, from the wasting disorders of infant life which are rarely, if ever, seen among the infants of persons of the better classes of society. Some few are doubtless cases of unrecognised tubercular disease. Others may also depend upon some organic disease, but the vast majority of them occur in neglected, badly fed, starved children. I have already (p. 13) referred to some of these cases as a sequela of infantile diarrhœa. I have referred (p. 16) to the simultaneous variation in the number of deaths from this cause

and from other diseases which are mainly assignable to disordered digestion.

England: debility, atrophy, and inanition.

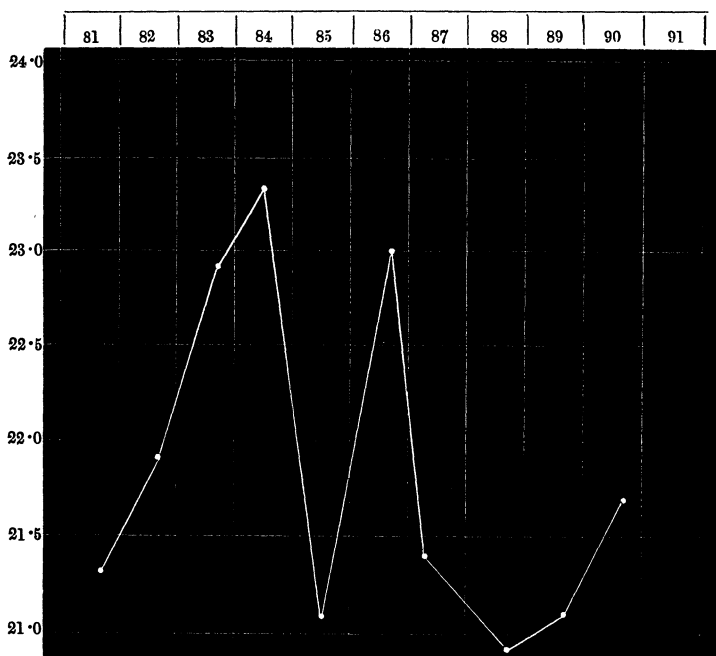


TABLE XXXV.—*Rates of Infant Mortality, 1881-90, Debility.*

|            |       |            |       |
|------------|-------|------------|-------|
| 1881 ..... | 21.32 | 1886 ..... | 23.03 |
| '82 .....  | 21.87 | '87 .....  | 21.38 |
| '83 .....  | 22.95 | '88 .....  | 20.93 |
| '84 .....  | 23.35 | '89 .....  | 21.01 |
| '85 .....  | 21.13 | '90 .....  | 21.71 |

It is the experience of every hospital surgeon that children who are progressively wasting, who are dying before admission as in-patients, rapidly improve, only to relapse and die after discharge. There is no organic disease; the children die, in reality, from starvation.

### *Summary.*

Let us sum up what we have learnt of the perils of infant life from a study of the mortality statistics of the Registrar-General. The perils may be classified as under:—

(1.) The danger of contracting zymotic disease, with risk of life or of permanent injury, *e.g.*, blindness from small pox, kidney disease from scarlet fever, tuberculosis from measles.

(2.) The injury to health and the frequent death of infants who are badly fed, *i.e.*, with improper food, or who are insufficiently fed. These dangers induce diarrhœa, digestive disorders, and the wasting diseases of infancy. Deaths from convulsions and dentition must be considered in this connection.

(3.) The risk of diseases of the respiratory system, depending upon overcrowding and exposure to cold, and upon the debility due to privation, bad feeding, or disease (*e.g.*, rickets, specific fevers, &c.).

(4.) Simple neglect, *e.g.*, blindness from the untreated ophthalmia of infants.

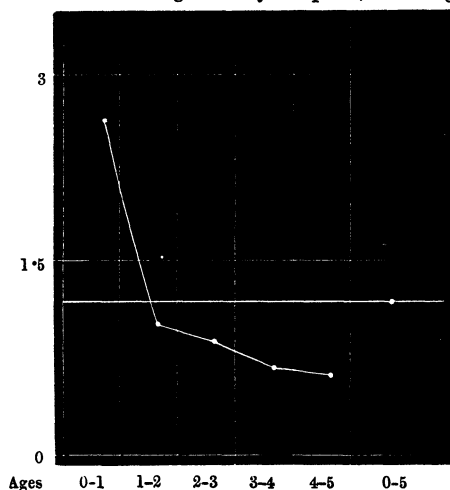
The danger to infant life from all these causes is excessive. Their relative importance has been indicated by the statistics which have been quoted. We have next to consider deaths from violence where cause and effect are obvious. We shall then pass to the discussion of certain conditions (social and municipal) which tend to excessive mortality from the diseases we have already considered, as well as from developmental diseases.

#### DEATHS FROM VIOLENCE.

TABLE XXXVI.—*Mortality from Violence per 1,000 Living, 1871-80.*

| Age.      |       |
|-----------|-------|
| 0—1 year  | 2'63  |
| 1—2 years | 1'02  |
| 2—3 „     | 0'927 |
| 3—4 „     | 0'714 |
| 4—5 „     | 0'607 |
| <hr/>     |       |
| 0—5 years | 1'21  |

Violence at ages 0—5 years per 1,000 living.





Deaths from violence are worthy of careful consideration; they afford in some degree a means of measuring two other perils of child life—deaths by accident, and deaths by design. The deaths by accident are in general due to carelessness and want of proper supervision. They may be dismissed with this brief reference. It must however be remembered that simple carelessness is often only passive neglect, and that it is difficult in many cases to determine when such passive neglect becomes actually criminal.

Deaths from violence may be classified as under:—

- |                               |   |                          |   |   |
|-------------------------------|---|--------------------------|---|---|
| 1. <i>Accidental</i> ....     | { | neglect and carelessness | { | simple neglect<br>cuts, stabs<br>poisoning and drowning<br>burns, scalds<br>navel hæmorrhage<br>accident<br>fracture<br>injury at birth |
|                               |   | ill defined              |   |   |
| 2. <i>Suffocation in bed.</i> |   |                          |   |   |
| 3. <i>Intention</i> ....      | { | murder<br>manslaughter   |   |   |

All deaths from these causes may be regarded as preventable in a perfect state of society. The number of deaths registered every year varies greatly, not only for the whole country, but the rate of infant mortality from violence in different districts varies enormously. The rate of infant mortality (1871-80) for a few towns is given in the following table:—

TABLE XXXVII.—*Rates of Infant Mortality from Violence, 1871-80.*

|                    |       |                  |       |
|--------------------|-------|------------------|-------|
| All England.....   | 2·37  | Manchester ..... | 2·41  |
|                    |       | Oldham .....     | 0·93  |
| Liverpool .....    | 14·00 | Bolton .....     | 0·93  |
| Birmingham .....   | 10·92 | Halifax.....     | 0·53  |
| Newcastle.....     | 4·25  | Blackburn .....  | 0·525 |
| Kidderminster..... | 2·87  | Cardiff.....     | 0·36  |

A high death-rate from violence is not necessarily associated with a high death-rate from all causes, but there is a general relation between the two rates.

TABLE XXXVIII.—*Rates of Infant Mortality from Violence and from all Causes.*

|  | Rate of Infant Mortality. | Violence Rate. |
|--|---------------------------|----------------|
|  | 217                       | 14'0           |
|  | 179                       | 10'92          |
|  | 176                       | 4'25           |
|  | 165                       | Over 2         |
|  | 159                       | Under 2        |

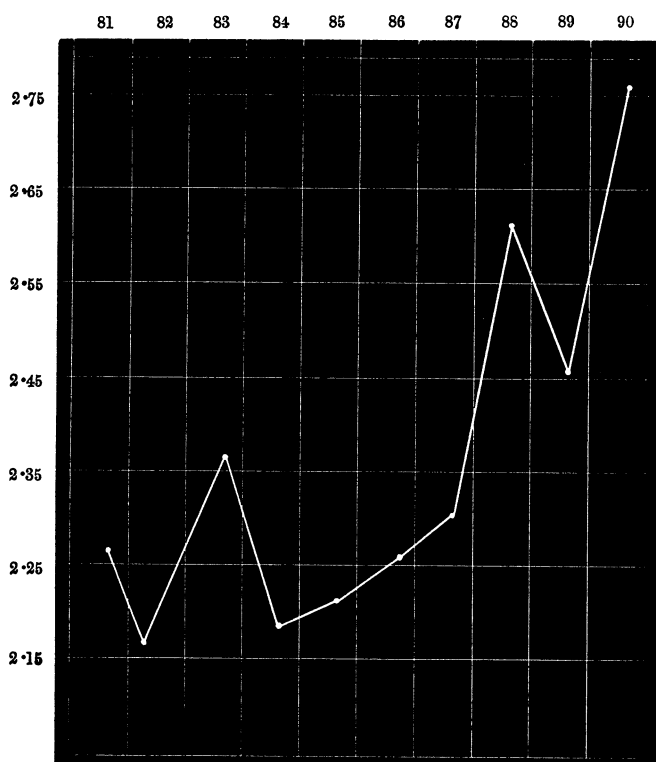
The above table has been compiled from the statistics of fifty-eight northern towns. (See Appendix. These towns were chosen as they had been selected for examination by Messrs. Poynting and Dendy in their report on intemperance.) If the rate of violence be further subdivided it is found, *e.g.*, when it is below 1, that the rate of infant mortality is 164. When a violence rate is above 1 and below 2 the rate of infant mortality is 154. It is therefore obvious that a high death-rate from violence is not necessarily associated with a high rate of infant mortality from all causes. The association indicated (limited as it is) is nevertheless worthy of notice, for it may be inferred that where a high death-rate from violence exists, the same causes which tend to violence would also tend to magnify the general rate. If one form of death is preventable, so also is the other, to a certain degree.

The analysis of the deaths for 1889 showed that the rate of mortality from violence in infancy was 2'4 in males and 2'5 in females, and that violent deaths at the age period (0—1 year) formed 8'7 per cent. of all deaths from violence in males, and 22 per cent. of all deaths from violence in females. The higher percentage at early age periods in females is due to the greater liability of adult males to accidents from the nature of their employment. It has no significance in reference to the present discussion. The detailed analysis of deaths from violence, 1881-90, gives the following table:—

TABLE XXXIX.—*Deaths from Violence, 1881-90.*

|                     |        |
|---------------------|--------|
| Fractures .....     | 121    |
| Gunshot .....       | 2      |
| Cuts, stabs .....   | 15     |
| Burns, scalds ..... | 1,102  |
| Poison .....        | 252    |
| Drowning .....      | 334    |
| Suffocation .....   | 14,956 |
| Others .....        | 2,685  |
| Murder .....        | 1,029  |

Deaths from violence, England, 1881-90.



Deaths from suffocation and murder require special consideration.

*Deaths from suffocation.*—The majority of these cases are due to suffocation in bed, either from overlying or by the bedclothes. This form of death is so nearly criminal, that I append the statistics in detail. It is interesting to note that it was in reference to overlying, that the judgment of Solomon was delivered, and that even this early case occurred with dissolute people.

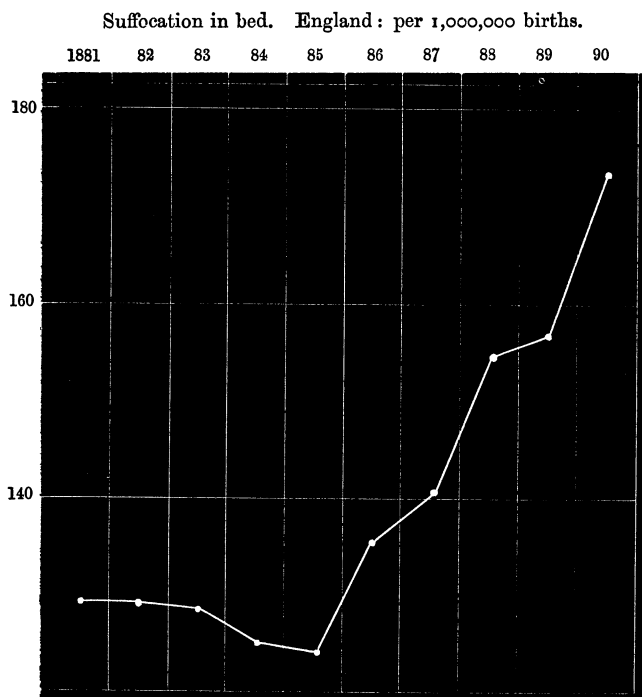


TABLE XL.—*Suffocation in Bed, 1881-90.*

| Year.        | Males. | Females. | Total. | Rate per Million Births. |
|--------------|--------|----------|--------|--------------------------|
| 1881 .....   | 578    | 571      | 1,149  | 130                      |
| '82 .....    | 600    | 560      | 1,160  | 130                      |
| '83 .....    | 577    | 571      | 1,148  | 129                      |
| '84 .....    | 589    | 541      | 1,130  | 125                      |
| '85 .....    | 549    | 561      | 1,110  | 124                      |
| '86 .....    | 659    | 573      | 1,232  | 136                      |
| '87 .....    | 628    | 624      | 1,252  | 141                      |
| '88 .....    | 655    | 712      | 1,367  | 155                      |
| '89 .....    | 689    | 697      | 1,386  | 157                      |
| '90 .....    | 767    | 750      | 1,517  | 174                      |
| 1881-90..... | 6,391  | 6,160    | 12,451 | 140                      |

It is seen that within recent years there has been an alarming increase in deaths from this cause. Of 2,020 inquests held on infants, 767 deaths were found to be due to suffocation in bed, and 1,253 to other causes. Analysing the deaths from suffocation in bed, according to the day of the week upon which death occurred, the following distribution was found by the Registrar-General. It

is seen that while deaths from violence other than suffocation are fairly evenly distributed over the days of the week, deaths from suffocation in bed are chiefly referred to Sunday, that is to Saturday night :—

TABLE XLI.—*Inquests on Infants.*

| Day.           | Suffocation. | Other Cases. |
|----------------|--------------|--------------|
| Sunday .....   | 283          | 180          |
| Monday .....   | 124          | 132          |
| Tuesday .....  | 137          | 145          |
| Wednesday..... | 116          | 139          |
| Thursday ..... | 115          | 136          |
| Friday .....   | 107          | 128          |
| Saturday ..... | 118          | 140          |
|                | 1,000        | 1,000        |

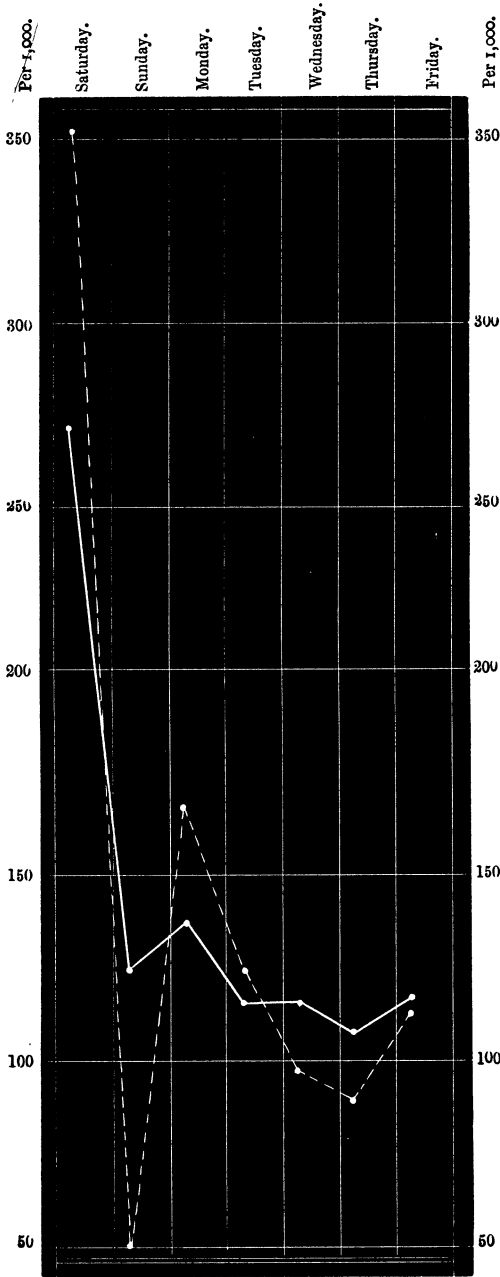
Sixty per cent. of deaths from suffocation in bed take place in the winter months, and 40 per cent. during the summer months. The curious distribution of deaths according to season and days of the week has been explained by the supposition that these deaths are due to the drunkenness of the parents. I proceeded to investigate this association. Taking the apprehensions for drunkenness during 1891 in Liverpool, it is found that the 8,402 arrests were distributed as follows over the days of the week. There is no reason to doubt but that Liverpool may be taken as a typical town, and that the same tendency to drunkenness would be found elsewhere on the corresponding days :—

TABLE XLII.—1891. *Liverpool Apprehensions for Drunkenness.*

| Day.           | Arresta. | Percentage. |
|----------------|----------|-------------|
| Sunday .....   | 423      | 5'0         |
| Monday .....   | 1,439    | 17'1        |
| Tuesday .....  | 1,047    | 12'4        |
| Wednesday..... | 815      | 9'7         |
| Thursday ..... | 772      | 9'1         |
| Friday.....    | 944      | 11'2        |
| Saturday ..... | 2,962    | 35'2        |

The parallelism between the figures relating to drunkenness and suffocation in bed is extraordinary. If the figures be represented graphically, the identical forms of the two curves are very striking. It cannot be regarded as accidental; it can only be explained by the mutual dependence of the two curves upon one another.

Apprehensions for drunkenness (dotted line).  
Deaths from suffocation in bed (continuous line).



If the death-rate from violence of infants is considered in the northern towns (excluding five towns with an excessively high rate of violence, Birmingham, Nottingham, Leeds, Berwick, Kidderminster, and where the rate of intemperance, as measured by the apprehensions for drunkenness per 1,000 inhabitants, is low), it is seen that it varies with the rate of intemperance. Local opinion and custom affect the apprehensions for drunkenness to such an extent that though a large number of apprehensions is evidence of much drinking, the contrary inference is not true :—

TABLE XLIII.

| Number of Towns. | Death-Rate from Violence. | Rate of Intemperance. |
|------------------|---------------------------|-----------------------|
| 1                | 14·0                      | 42·0                  |
| 1                | 4·25                      | 37·2                  |
| 9                | 1·56                      | 35—25                 |
| 6                | 1·24                      | 25—20                 |
| 7                | 1·18                      | 20—15                 |
| 15               | 1·13                      | 15—10                 |
| 13               | 1·07                      | Below 10              |

The towns were arranged in order of intemperance, and then the rates of violence were taken and averages found. This relation confirms the inference to be drawn from the incidence of suffocation in bed on the different days of the week.

2. *Deaths from Murder.*—Of 1,517 inquests held in Liverpool during 1890, 460 or 30 per cent. were held on infants. If the deaths from homicide for a quarter of a century, 1863-87 (Registrar-General's report), be considered, the incidence of homicide on infants is shown most remarkably :—

TABLE XLIV.—*Deaths from Homicide, 1863-87.*

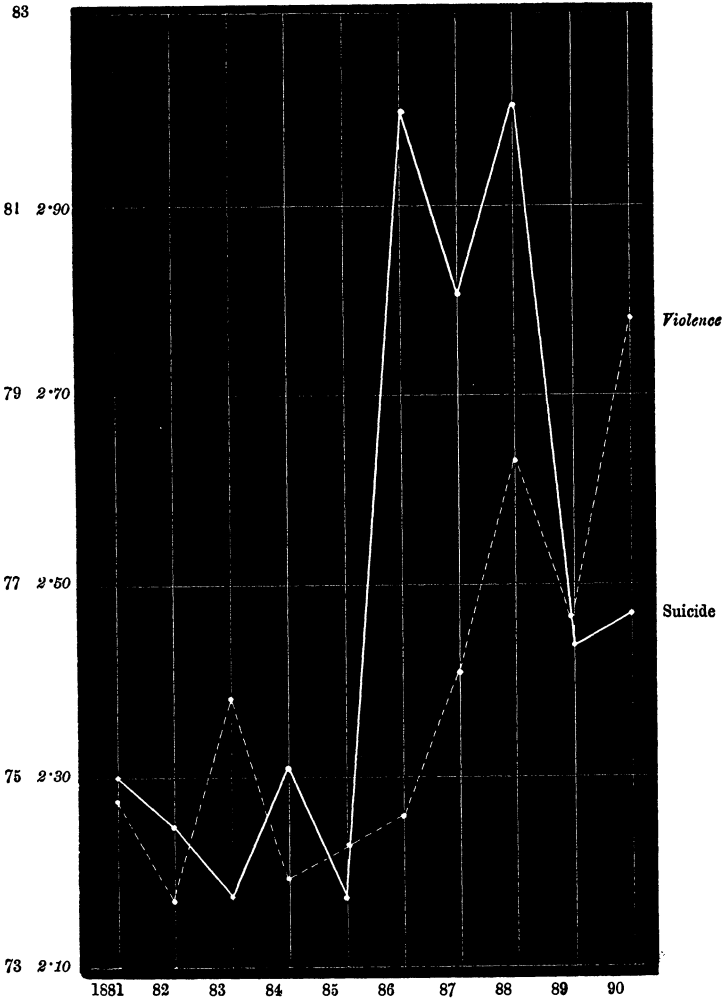
| Age.          | Male. | Female. | Percentage. |
|---------------|-------|---------|-------------|
|               |       |         | Per cent.   |
| 0 .....       | 1,626 | 1,629   | 61          |
| 1 .....       | 51    | 55      | —           |
| 2 .....       | 32    | 38      | —           |
| 3 .....       | 24    | 30      | —           |
| 4 .....       | 15    | 25      | —           |
| Under 5 ..... | 1,748 | 1,777   | 66          |
| Over 5 .....  | 908   | 881     | 34          |
| Total .....   | 2,656 | 2,658   | —           |

It is thus seen that 3,525 of the 5,314 cases of homicide (or 66 per cent.) take place under 5 years of age, and 3,355 (or 61 per cent.) under the age of 1 year. The light estimation in which infant life is held cannot be more forcibly expressed than by the mere quotation of these figures.

It occurred to me that a relation might exist between deaths from violence and suicide, but the following figures show that there is no obvious association.

TABLE XLIVA.—*Deaths from Suicide per Million, and Infant Deaths per 1,000 Births from Violence.*

|            | Suicide. | Under 1 Year:<br>Violence. |            | Suicide. | Under 1 Year:<br>Violence. |
|------------|----------|----------------------------|------------|----------|----------------------------|
| 1881 ..... | 75·0     | 2·27                       | 1886 ..... | 81·9     | 2·26                       |
| '82 .....  | 74·5     | 2·17                       | '87 .....  | 79·9     | 2·40                       |
| '83 .....  | 73·1     | 2·37                       | '88 .....  | 82·0     | 2·62                       |
| '84 .....  | 75·1     | 2·19                       | '89 .....  | 76·3     | 2·46                       |
| '85 .....  | 73·7     | 2·22                       | '90 .....  | 76·6     | 2·76                       |





I have shown that deaths from violence are associated in a certain measure with high infant mortality (p. 37), that the majority are due to suffocation—chiefly suffocation in bed—and that there is a direct connection between suffocation in bed and intemperance; I have further shown the terrible incidence of homicide in infancy and in early childhood. It is therefore obvious that more efficient protection is urgently needed. We pass now to the consideration of certain conditions which affect infant life more indirectly.

1. URBAN AND RURAL DISTRICTS.—Reference has already been made to the greater mortality in urban districts than in rural districts, and the following table is of interest as districts with varying rates of mortality are compared :—

TABLE XLV.—*Mortality per 1,000 Living at each Age, 1889.*

[Registrar-General's Report, 1889.]

| Area.                        | 0—3 Months. | 3—6 Months. | 6—12 Months. |
|------------------------------|-------------|-------------|--------------|
| England and Wales .....      | 286         | 128         | 103          |
| Leicestershire.....          | 338         | 180         | 118          |
| Lancashire .....             | 321         | 162         | 140          |
| South Eastern Division ..... | 227         | 89          | 68           |
| „ Western „ .....            | 233         | 90          | 76           |

The same variation in mortality in the case of children under 5 years of age in the different districts.

Considering now the factors which cause these differences in mortality, the first great difference between urban and rural districts is density of population.

Dr. Farr believed that the rate of mortality of population was a function of its density—as measured either by the population per square mile, or by the acreage to each person. The rate of mortality was found to vary as the twelfth root of the density of population.

TABLE XLVI.—*Mortality 0—5 Years in its Relation to Density.*[FARR, *loc. cit.*, pp. 175 and 176.]

| District.               | I.  | II. | III. | IV.   | V.    | VI.    | VII.   |
|-------------------------|-----|-----|------|-------|-------|--------|--------|
| Density of population.. | 166 | 186 | 379  | 1,718 | 4,499 | 12,357 | 65,823 |
| Male mortality .....    | 41  | 51  | 68   | 88    | 101   | 118    | 145    |
| Female „ .....          | 34  | 44  | 58   | 76    | 89    | 106    | 134    |
| Mean „ .....            | 38  | 48  | 63   | 82    | 95    | 112    | 140    |

The influence of mere density of population is greatest in childhood and after maturity. It is least felt in early adult life. The

rate of infant mortality varies also just as the rate of mortality under 5 years varies. The following rough summary of the county statistics of the Registrar-General for 1891, shows that the rate of infant mortality tends to vary with the density of population :—

TABLE XLVII.

| Acres to a Person.             | Rate of Infant Mortality. |
|--------------------------------|---------------------------|
| Less than 1 acre .....         | 151                       |
| More than 1, less than 3 ..... | 131                       |
| „ 3 .....                      | 120                       |

It is scarcely fair to take large areas, but these were the only statistics within my reach. They serve to illustrate the general truth, that mortality varies with density of population.

The increase in mortality (0—5 years) due to density of population is found to be due to pulmonary disease, to phthisis, and to zymotic diseases, including diarrhœa. Of these the only one which can be really attributed to *mere* density of population is the increased risk of infectious disease. “The direct consequences,” writes Dr. Ogle, “of close aggregation, *i.e.*, the risks of fouling “air, water, and soil, are comparatively insignificant with the “indirect consequences. These depend upon privation, filth, “crime, intemperance, and unhealthy industries.” The direct consequences mentioned by Dr. Ogle can be neutralised by perfect sanitation. The increased risk of zymotic disease remains. Density of population is therefore an over-rated factor in the production of excessive mortality.

2. INSANITATION.—The crude or general death-rate is a fair measure of the sanitary condition of any district, but it ought to be corrected for age and sex distribution. We find that the rate of infant mortality varies with the general death-rate.

TABLE XLVIII.\*—*Death-Rates at all Ages, and Rates of Infant Mortality.*

| Death-Rate. | Rate of Infant Mortality. |
|-------------|---------------------------|
| Over 25     | 195                       |
| „ 20        | 173                       |
| Under 20    | 164                       |

\* See Appendix, p. 86.

Closely associated with the two factors just considered is—

3. THE INFLUENCE OF THE DWELLING HOUSE.—The class of dwelling house occupied affects the health of the residents. By overcrowding, or by what practically amounts to overcrowding—viz., bad ventilation—the total death-rate, as well as the death-rate from infectious diseases, from phthisis, from diseases of the respiratory system, and from diarrhoea, are all excessive. The effect of overcrowding was investigated by Carnelley in Dundee (*vide* “Royal Society: Phil. Trans.”). The influence of back to back houses has been investigated by Dr. Tatham of Manchester. Statistics are included in the Appendix. The main fault in the construction of such houses is the want of through ventilation. It is unnecessary for me to discuss the influence of overcrowding. Well known examples of its evil influence are numerous, *e.g.*, the history of the Black Hole of Calcutta, the excessive mortality in the army and navy, attributed by the Sanitary Commissioners to the vitiated atmosphere of the barrack room.

By the demolition of existing insanitary property, and by rebuilding on the cleared site huge blocks of “model” dwellings, a new class of house has been introduced, and a short epitome of the investigation made by Dr. Newsholme into the vital statistics of the model dwellings in London is best included here. There was a population of 18,453 persons, occupying 10,144 rooms (Appendix). The density of population was as high as 751 per acre in the case of the Peabody buildings. The birth-rate was in excess of the general birth-rate for all London by about 10 per 1,000; the death-rate was less than the London rate (1·2 per cent.). The rate of infant mortality was considerably less (13·7 per cent.). We are now considering the Peabody dwelling statistics for 1884.

If the statistics are however analysed in detail for all the block dwellings, it is seen that the death-rates from scarlet fever, diphtheria, measles, whooping cough, phthisis, respiratory diseases, violence, and ill-defined causes were all in excess. Deaths from typhoid fever and diarrhoea were below the average for London. In other words, even with good sanitary conditions and improved construction, the mortality from zymotics was excessive. The lowness of the typhoid death-rate is evidence of the improved sanitation. The greater mortality from the causes referred to must be attributed to the density of population. The age distribution which obtains in the buildings is favourable to a low death-rate, and a certain selection of population is inevitable. I cannot therefore believe that the construction of block dwellings has been attended with sufficiently good results to justify a continuance of the plan. The statistics do not warrant the enormous

outlay by any proof of an adequate return in benefit to public health. Yet, compared with the mortality that prevailed before the demolition of the insanitary property previously existing on the site, the prevailing mortality is evidence of the great influence which the dwelling house exerts on health. In the Nash Grove model dwellings erected by the Corporation of Liverpool, the death-rate is less than half what it was previously over the same area; the death-rate has fallen from 44 to a little over 20. Other plans of providing houses for the ejected inhabitants must be adopted. The demolition of insanitary areas is an urgent necessity, but the erection of block dwellings is a practical error, and must tend in time to the aggravation of the evil which it is desired to eradicate.

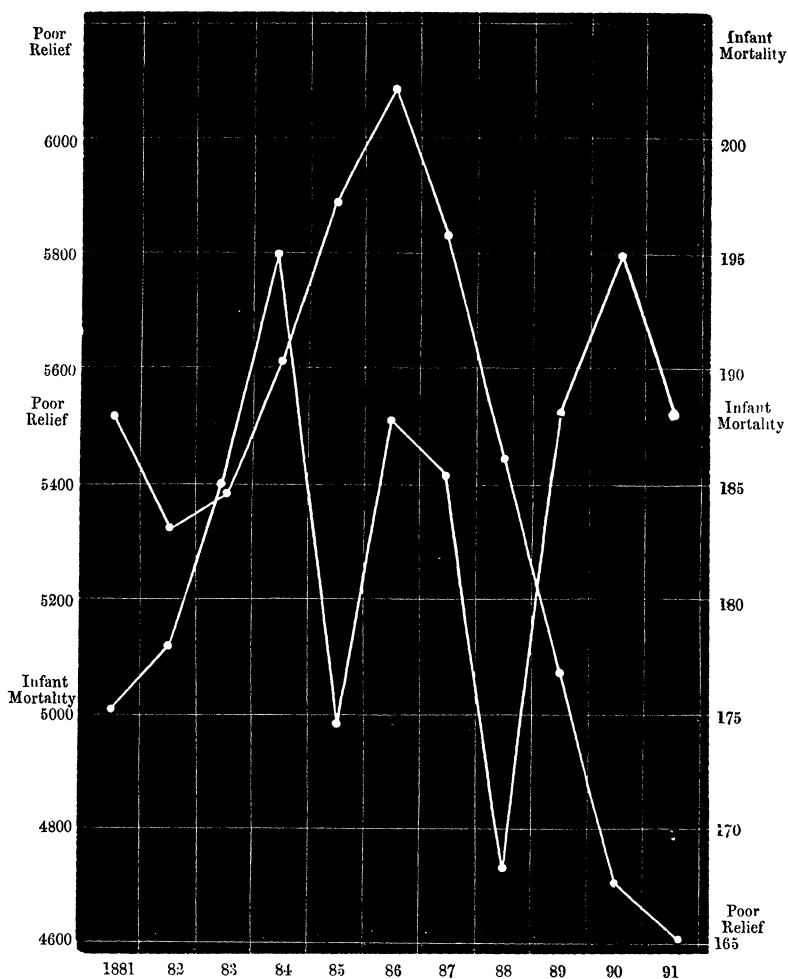
4. NATIONAL PROSPERITY.—In my introduction I referred to the association between the rates of mortality and the rates of wages. This factor is also more powerfully operative in urban districts.

A. If we examine the *poor law statistics*, using them as a measure of the amount of destitution prevalent, no very definite relation is shown between the number per 1,000 in receipt of poor law relief and the rate of infant mortality.

TABLE XLIX.—*Poor Law Statistics and Rates of Infant Mortality, England and Wales.*

| Year.         | In Receipt<br>of Relief per 1,000. | Rate of<br>Infant Mortality. |
|---------------|------------------------------------|------------------------------|
| 1851-55 ..... | 49'0                               | 156                          |
| '56-60 .....  | 43'8                               | 152                          |
| '61-65 .....  | 44'4                               | 151                          |
| '66-70 .....  | 42'7                               | 157                          |
| '71-75 .....  | 34'7                               | 153                          |
| '76-80 .....  | 27'8                               | 145                          |
| '81-85 .....  | 26'7                               | 139                          |
| '86-90 .....  | 25'5                               | 145                          |

In and Out-Door Relief, Liverpool (Numbers), and Infant Mortality, per 1,000 Births.



It is seen that there has been an almost continuous decline in the percentage in receipt of poor law relief. Even the annual variations in the rates of infant mortality and of poor law relief are quite independent of each other. Nor was I able to trace a local connection even after careful analysis of the figures for Liverpool. It is worthy of remark that in times of great distress, *e.g.*, during the Lancashire cotton famine and during the siege of

Paris, there was a great fall in the rate of infant mortality. These facts show that prosperity and privation do not react directly upon the rate of mortality, but are remoter causes affecting infant mortality. In times of prosperity other factors neutralise the beneficial influence of "plenty," *e.g.*, high wages are associated with much drinking, and brisk trade with more general employment of women. So that neglect and want must be considered as inevitable concomitants of prosperity.

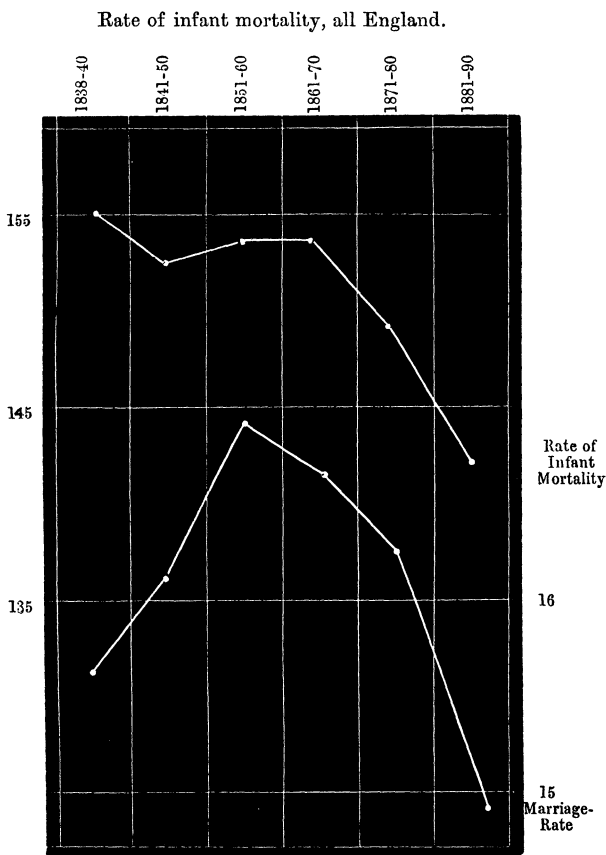
Poor law statistics are drawn from too small sections of the community—and that not a representative section—to give trustworthy results in this investigation.

### B.—THE MARRIAGE-RATE.

The marriage-rate is a useful index of national prosperity. A high marriage-rate is associated with good trade, and it was therefore expected that with a high marriage-rate conditions would be favourable to a low rate of infant mortality. It will be seen that when the marriage-rates at decennial intervals, 1838-90, are compared with the rates of infant mortality, that both have declined simultaneously since 1851. If the rates at quinquennial periods are compared, no very definite relation is noticed between the variations. A fall in the marriage-rate was associated three times with a fall in the rate of infant mortality, and twice with a rise. A rise in the marriage-rate was associated four times with a fall, and once with a rise in the rate of infant mortality:—

TABLE L.—*Relation between the Marriage-Rate and the Rate of Infant Mortality.*

| Years.     | Marriage-Rate. | Rate of Infant Mortality. | Years.     | Marriage-Rate. | Rate of Infant Mortality. |
|------------|----------------|---------------------------|------------|----------------|---------------------------|
| 1838-40... | 15·6           | 155                       | 1866-70..  | 16·4           | 157                       |
| '41-45...  | 15·7           | 147                       | '71-75.... | 17·1           | 153                       |
| '46-50...  | 16·5           | 157                       | '76-80...  | 15·3           | 145                       |
| '51-55...  | 17·2           | 156                       | '81-85.... | 15·1           | 139                       |
| '56-60...  | 16·7           | 152                       | '86-90.... | 14·7           | 145                       |
| '61-65...  | 16·8           | 151                       |            |                |                           |



On investigating local marriage-rates and rates of infant mortality a more definite relation was discoverable. In the northern towns, the rate of infant mortality was found to vary with the marriage-rate. The marriage-rate is acknowledged to vary with the state of trade, and a high marriage-rate is indicative of prosperity. It is always high in growing towns, and these are the districts where overcrowding occurs, where sanitary conditions are bad, where intemperance is greatest, where poverty, privation, and crime abound. These social conditions are at present inevitably associated with prosperity, and we are therefore not surprised to find that with a local high marriage-rate, a high rate of infant mortality prevails. Too absolute reliance cannot however be placed upon results merely depending upon averages.

TABLE LI.—*Marriage-Rates and Rates of Infant Mortality, 1871-80, Northern Towns.*

| Marriage-Rates. | Rates of Infant Mortality. |
|-----------------|----------------------------|
| 30—25           | 191                        |
| 25—20           | 175                        |
| 20—15           | 161                        |
| Under 15        | 128                        |

The higher mortality, it must be remembered, does not depend upon a higher birth-rate. A high birth-rate is the natural consequence of a high marriage-rate, and in the same towns it was found that this association existed. The rate of infant mortality ought not to be affected thereby, for we are not considering the general death-rate.

TABLE LII.—*Marriage-Rates and Birth-Rates, Northern Towns, 1871-80.*

| Towns with Birth-Rate | Marriage-Rate. |
|-----------------------|----------------|
| Under 35              | 16·27          |
| Over 35               | 19·01          |

If we consider the marriages of minors the rate of infant mortality is found to vary with the percentage of these marriages to the total marriages.

TABLE LIII.—*Marriage of Minors and Rates of Infant Mortality.*

| Mean Rate of Infant Mortality in Twelve Towns. |                  | Percentage of Marriages of Minors. |          |
|--|------------------|------------------------------------|----------|
| High Death-Rates.                              | Low Death-Rates. | Males.                             | Females. |
| 190  | —                | 12·5                               | 28·3     |
| —  | 110              | 4·9                                | 18·3     |

The importance of this relation will become obvious later.

### C.—BIRTH-RATES.

We naturally pass to the consideration of the relation between the birth-rate and the rate of infant mortality. The birth-rate for all England and Wales increased continuously from the beginning of registration until a few years ago. Then it declined and again rose. No relation therefore exists between the general birth-rate and the rate of infant mortality for all England. But as I have already indicated, a local relation was discoverable in the northern towns. In each of these towns, it may be well to observe, there was a population exceeding 10,000.



A high birth-rate was found to be associated with a high rate of infant mortality.

TABLE LIV.—*Northern Towns, 1871-80. Birth-Rates and Rates of Infant Mortality.*

|  | Birth-Rate. | Rate of Infant Mortality. |  |
|--|-------------|---------------------------|--|
|  | Over 35     | 168                       |  |
|  | Under 35    | 144                       |  |

It will be unnecessary for me to consider the question of over population as affecting infant mortality at any length, and thus seek to explain the above table. Over population is without a doubt a cause of excessive infant mortality in crowded cities; but with a wise distribution of population it would not have that influence. Large families need not be a cause of high mortality, for in South Africa, where there is an abnormally high birth-rate, the rate of infant mortality is low. Density of population is an economic mistake. It involves a struggle for existence which must inevitably result in the sacrifice of the weakest. A high rate of infant mortality, therefore, associated with a high birth-rate, is evidence that something is wrong in our condition of life, and that the close aggregation of a population in cities under the present conditions of existence is attended with a waste of child life. How much of this waste must be attributed to mere density of population, how much to the struggle for existence, must at present remain indeterminate. There are other factors, however, which tend to explain the simultaneous variation in birth-rates, marriage-rates, and rates of infant mortality.

The first of these is *INTEMPERANCE*.

It has been shown by Dendy and Poynting (Manchester Literary and Philosophical Society) that the rate of intemperance, as measured by the number of apprehensions for drunkenness per 1,000 inhabitants, varies with the density of population and with the rate of increase of the population—in other words, with the birth-rate. The quantity of alcoholic beverages consumed is known to vary with the Board of Trade returns, and is used as an index of national prosperity. The rate of increase of population is an index of local prosperity. Taking the mortality statistics for the decade 1871-80, and the drunkenness statistics for the mid-year 1876, the following relations were found to hold in the northern towns previously referred to :—

TABLE LV.—*Intemperance and Infant Mortality.*

| Number of Towns. | Rate of Intemperance. | Rate of Infant Mortality. |
|------------------|-----------------------|---------------------------|
| 3                | 26·5                  | 217—200                   |
| 16               | 16·5                  | 199—170                   |
| 28               | 15·9                  | 169—140                   |
| 9                | 12·6                  | Below 140                 |

(A.) The rate of infant mortality varied with the rate of intemperance.

(B.) The rate of violence varied with the rate of intemperance.

Here therefore is one social condition which leads directly to the sacrifice of child life.

2. EMPLOYMENT OF WOMEN IN INDUSTRIAL OCCUPATIONS. — In Belgium the general death-rate, 1869-72, was 24·3. For the triennium 1885-88 it had fallen to 20·25, but the rate of infant mortality during the same period had risen from 148 to 159. It has been said that this increase is due to the more general employment of women in industrial occupations.

In endeavouring to estimate the effect of the employment of women upon the rate of infant mortality, two methods may be adopted: (a) The rates of mortality in districts where the sanitary conditions of the population are strictly comparable, but where different numbers of women are employed, must be investigated, and (b) the causes of the excess of infant mortality must be examined in detail in towns where the employment of women is most general. Then the results must be compared.

Dr. George Reid, County Medical Officer of Health for Staffordshire ("Prov. Medical Journal," October, 1892), published the following tables:—

TABLE LVI.—*Staffordshire. Groups of Towns, 1881-90.*

| Groups of Towns.                         | Mean Population. | Rate of Infant Mortality. | General Death-Rate. |               | Zymotic Death-Rate. | Diarrhoea Death-Rate. |
|--|------------------|---------------------------|---------------------|---------------|---------------------|-----------------------|
|  |                  |                           | Actual.             | Hypothetical. |                     |                       |
| 1. Many women employed ....              | 112,078          | 195                       | 22·8                | 19·8          | 3·17                | 2·8                   |
| 2. Fewer " ....                          | 161,560          | 166                       | 19·4                | 18·9          | 2·45                | 2·0                   |
| 3. Practically no women employed ..... } | 165,074          | 152                       | 18·1                | 18·1          | 2·46                | 1·9                   |

The sanitary conditions were strictly comparable. By the hypothetical general death-rate is meant the death-rate which would have prevailed in the groups of towns if the rate of infant mortality had been 152. The increasing zymotic death-rate with

the number of women employed is interesting, and probably arises from the increased risk of infection, due to day nurseries or day nursing. The death-rates from diarrhoea are specially important and significant.

A similar table was compiled for England:—

TABLE LVII.—*England. Groups of Towns, 1871-80.*

| Groups of Towns.                   | Population. | Rate of Infant Mortality. | Diarrhoea Death-Rate. |
|------------------------------------|-------------|---------------------------|-----------------------|
| 1. Over 15 per cent. women workers | 2,645,357   | 175                       | 36                    |
| 2. 10—15 per cent. „               | 1,500,954   | 171                       | 37                    |
| 3. Less than 10 per cent. „        | 1,127,010   | 154                       | 32                    |

These statistics, though less exact than the former, afford strong confirmatory evidence. It is therefore clear that an association exists between the general employment of women in industrial occupations and a high rate of infant mortality.

If we now investigate in more detail what are the causes of the greater mortality, it is seen to be largely due to deaths from convulsions, diarrhoea, and atrophy; causes which, as I have already said, depend for the most part on bad feeding and to premature birth.

Dr. Farr ("Vital Statistics," p. 195) compared the infant mortality in fifteen large towns, from different causes, with the infant mortality in seven textile towns, in London, and in Portsmouth from the same causes.

TABLE LVIII.—*Infant Mortality in Groups of Towns, in London, and Portsmouth.*

| Causes of Death, 1873-75.     | Fifteen Towns. | Seven Textile Towns. | Portsmouth. | London. |
|-------------------------------|----------------|----------------------|-------------|---------|
| All causes .....              | 185·3          | 194·0                | 145·9       | 159·1   |
| Eleven subjoined causes ..... | 159·5          | 167·5                | 130·9       | 135·6   |
| Measles .....                 | 2·9            | 3·2                  | 2·8         | 3·1     |
| Scarlet fever .....           | 1·8            | 1·6                  | 0·3         | 1·1     |
| Whooping cough .....          | 6·7            | 6·4                  | 5·3         | 8·3     |
| Teething .....                | 3·0            | 3·2                  | 3·0         | 3·6     |
| Diarrhoea .....               | 29·3           | 31·9                 | 32·2        | 20·4    |
| Convulsions .....             | 26·9           | 27·4                 | 21·5        | 18·5    |
| Lung diseases.....            | 29·3           | 28·1                 | 24·2        | 31·9    |
| Tubercular diseases .....     | 10·4           | 10·5                 | 11·7        | 13·8    |
| Atrophy and debility .....    | 34·8           | 40·9                 | 22·7        | 20·5    |
| Premature birth .....         | 12·4           | 13·8                 | 6·1         | 10·4    |
| Suffocation .....             | 2·0            | 0·5                  | 1·1         | 4·0     |

The number of women employed in industrial occupations in London and in Portsmouth is insignificant compared with the number not so employed.

Taking together the deaths from convulsions, diarrhoea, atrophy, and premature birth, it is seen that in London they amount to 69·8, in Portsmouth to 82·5, in the fifteen towns to 103·4, and in the seven textile towns to 114. These causes of death—at least the excess in them—must be attributed to the employment of women. The care of the babies is entrusted to others—they are fed artificially almost from birth. A case in point came under my personal observation this week (15th April), in which the mother returned to her work on the fourteenth day after her confinement, and fourteen days later the child was brought to the hospital suffering from gastric derangement due to improper feeding. The children of women engaged in industrial occupations suffer from the effects of maternal neglect. They are handicapped from the moment of birth in their struggle for existence, and have to contend not only against the inevitable perils of infancy, but also against perils due to their neglect by their mothers, and to the ignorance of those to whose care they are entrusted.

3. The next social condition which requires our consideration is IGNORANCE AND NEGLECT.

Ignorance and neglect are almost synonymous when applied to a most important peril of infant life. They are very closely associated, and for that reason we consider them together.

I have already pointed out the great influence of diseases, primarily referable to bad feeding, on infant mortality. Especially have I called attention to this factor in the ætiology of diarrhoea. I have just shown that an excessive mortality from such causes is demonstrable where women are largely employed in industrial occupations, and I have alluded to the diminution in infant mortality when women suckle their offspring in times of industrial stagnation. It cannot be too strongly emphasised that children die because they are badly fed.

The causes of this bad feeding depend (1) upon a growing disinclination to rear infants on the breast—the disinclination is noticeable in all classes of society. The dignity and duties of maternity are sacrificed to the dictates and demands of social enjoyments, or are set aside by the necessity of industrial occupation; whatever be the cause of this abrogation, it tends to the neglect of the child. It has been estimated that at least 50 per cent. of the deaths of infants are directly or indirectly due to bad feeding. If we examine the statistics of infant mortality in the different European States, the close dependence of feeding and mortality on each other is very clearly shown. The lowest mortality (10—13 per cent.) is in Sweden and Norway, where almost every child is nursed by its own mother. In Wurtemberg on the other hand only 33 per cent. of infants are

brought up on the breast. The mortality of the breast fed children was 13·5 per cent., while that of the artificially fed rose to 42·7 per cent. In Lower Bavaria the infant mortality reached the extraordinarily high proportion of 50 per cent. There maternal nursing has become the exception. In Munich the mortality of breast fed children is 15 per cent., that of children artificially reared is 85 per cent. In Berlin, according to the last estimate, only 30 per cent. of the children are fed naturally. The infant mortality is 30 per cent. ("Domestic Hygiene of the child." Uffelmann, Trans., p. 54). The same truth is shown by Dr. Hope's evidence previously referred to, and by the statistics collected by myself. It is therefore obvious that infant feeding exercises an enormous influence on infant mortality.

(2.) The second cause of bad feeding depends upon ignorance. The artificial rearing of children makes the influence of bad feeding more noticeable. Putting on one side the large number of infants who receive some breast milk, but who also receive artificial food, we shall direct attention to infants entirely reared by artificial means. In these cases ignorance has full play. The successful rearing of infants on artificial foods depends not only upon a sound knowledge of the kind of food suitable for infant feeding, but also upon a practical knowledge of its preparation; of the quantity to be administered, of the intervals which ought to elapse between successive feedings; and excessive cleanliness in the most minute details is imperative for success. Artificially fed children die even yet under the most careful supervision more frequently than breast fed children. Between 1861 and 1870 the rate of mortality at the foundling hospital was 159—the average age of the children on admission was 4 months—so that the rate of mortality was very high. Better results are possible to-day with an increased knowledge and greater resources. Those of us who see day by day large numbers of the children of the industrial classes in hospital and at their homes, cannot avoid the conclusion that the most frequent causes of the illnesses attributable to bad feeding is ignorance. Infants are fed on "anything that is going." Any liquid preparation is poured into a bottle, and the child is fed thereon. The class of food stuffs chosen is utterly inappropriate for infant feeding—this is a matter of common knowledge, and need not be further insisted upon. The children suffer and die. They are the victims of ignorance. In Preston during one year (1861) the upper class mortality (0—5 years) was 18 per thousand, of the middle class 36—37 per thousand, and of the industrial or insuring class 62—64 per thousand. This great difference can only depend upon the greater care and attention (founded upon better knowledge and greater sense of responsibility) which the children of

the upper classes receive.<sup>4</sup> The alternative of wet nursing does not need serious consideration. It can only be very partially applicable. The child of the wet nurse if living must suffer. Her child is usually illegitimate, and without attaching undue importance to the suggestion that the practice of wet nursing acts as an encouragement to illegitimacy, the result to the nursed child is not so generally satisfactory as to justify its adoption except in very exceptional cases. I might remark *en passant* that the dangers of artificial feeding are greatest at three periods of infant life: (1) during the earliest weeks of life, when experiments are being made as to the kinds of food most suitable to the infant; (2) at the period of dentition, when additional food is required; and (3) at the time of weaning, when the food is changed. Nor must it be forgotten that the growth and development of the child depends upon proper feeding. The statistics compiled by Dr. Routh, and included in his work on infant feeding, thirty years ago, are very significant, and show the far-reaching influence of early environment.

It is impossible to separate ignorance from neglect, the one merges into the other; neglect often depends upon ignorance, but often enough the cause of ignorance depends upon the neglect to acquire knowledge. Although the ignorance which we are now considering is ignorance of the care and management of children, and of the elements of household management and domestic economy, the only statistical measure we can apply is the rate of illiteracy. Criminals and drunkards are notoriously ill educated. In Liverpool during 1892 the state of education amongst those charged with offences is given below in percentages:—

TABLE LIX.—*Educational Condition of Liverpool Police Cases, 1892.*

|                        | Read and Write Well. | Read and Write Imperfectly. | Read only. | Unable to Read or Write. |
|------------------------|----------------------|-----------------------------|------------|--------------------------|
| Summary offences ..... | 0·5                  | 59·2                        | 8·5        | 31·6                     |
| Indictable „ .....     | 3·4                  | 61·7                        | 9·0        | 25·6                     |

Excessive infant mortality is chiefly found to exist among the classes in which these offences are most frequent. From the report of the sanitary condition of Boston, United States of America, in 1875, the following table has been taken:—

<sup>4</sup> Dr. Grimshaw, Registrar-General for Ireland, investigated the influence of social conditions on the rate of mortality of children under 5 years of age in Dublin. He found that among the upper class the mortality was 18·2, among the middle class 59·2, and among the artizan class 72, while the mortality among the residuum reached 116·9. [“Dublin Journal of the Local Sciences,” July, 1889.]

TABLE LX.—*Infant Mortality and Illiteracy.*

| State.              | Cholera Infantum. | Diarrhoeal Death-Rate. | Illiteracy. |
|---------------------|-------------------|------------------------|-------------|
| Maine .....         | 0·29              | 0·72                   | 21·5        |
| Vermont .....       | 0·32              | 0·92                   | 45·9        |
| New Hampshire.....  | 0·44              | 1·00                   | 23·9        |
| Connecticut .....   | 0·71              | 1·19                   | 36·6        |
| Pennsylvania .....  | 0·76              | 1·51                   | 37·4        |
| New York .....      | 0·82              | 1·88                   | 37·3        |
| „ Jersey.....       | 0·86              | 1·47                   | 40·8        |
| Rhode Island.....   | 0·91              | 1·44                   | 70·4        |
| Massachusetts ..... | 1·16              | 1·93                   | 51·4        |

By illiteracy is meant the proportion of those at the age of 10 and upwards who are unable to read. It is seen that the death-rate from diarrhoea tended to vary with the rate of illiteracy.

We may therefore conclude that with improved education there would be a diminution in the rate of infant mortality, and we may include defective education among the causes tending to excessive infant mortality.

The influence of ignorance is not confined altogether to the feeding of infants; it extends to their clothing. The sleeveless frocks and the bare legs which are considered almost *de rigueur* in all classes of society directly tend, by the unnecessary exposure occasioned by insufficient covering, to respiratory disease. Children are particularly susceptible to the influence of cold, and need to be warmly clad. More technical knowledge is required to nurse children through an illness, and the want of the most elementary knowledge of the laws of hygiene by the mother results in handicapping the child in its battle with disease. These questions are so intimately bound up with the larger question we are considering that this brief reference to them is necessary.

4. We pass naturally to the consideration of WILFUL NEGLECT AND ILL TREATMENT. The late Dr. Charles West was of opinion that the great mortality in infant life is not due to active criminality, but rather to negligence, and that the amount of criminal destruction was very small indeed compared with the non-criminal destruction. This view is true to-day in my opinion, but evidence of very general neglect has accumulated. It is however most difficult to determine when neglect becomes criminal and when ill treatment becomes active. The statistics of the National Society for the Prevention of Cruelty to Children (whether they be accepted as legal evidence or not) suffice to show how general is the neglect and ill treatment of children. "From 1884, when the Society was established, to 30th September, 1892, it has dealt with 25,349



“complaints of cruelty; of these 20,443 proved to be true. The cases were classified as under:—

TABLE LXI.—*Cruelty to Children.*

|                                |        |
|--------------------------------|--------|
| General ill treatment .....    | 4,096  |
| Abandonment and exposure ..... | 1,733  |
| Assaults .....                 | 2,374  |
| Neglect and starvation .....   | 13,411 |
| Begging .....                  | 1,699  |
| Immorality .....               | 1,141  |
| Other wrongs .....             | 895    |

“These cases affected the welfare of 56,615 children. The victims were quite young, many of them babies.” It is obvious from these statistics that a vast amount of actual wilful criminal ill treatment prevails. The evidence given before the select committees which considered friendly societies and child insurance has been, in my opinion, very generally misunderstood. It showed without any doubt that a very serious neglect of child life prevailed, and prevailed extensively. It failed, however, as I shall subsequently show, to connect the prevalence of this neglect with any system of insurance. The neglect can only be explained by the indifference with which sacrifice of child life is regarded. The children are a burden, they are “in the way.” They are persistently neglected, not infrequently ill used, and if they should happen to die, the inevitable is accepted with becoming resignation. At the same time it must be understood that this general neglect prevails only among a comparatively small proportion of the working classes, among the dissolute, intemperate, and criminal.

5. The last factor for consideration is ILLEGITIMACY. It is seen that the number of illegitimate births is relatively so small, that the effect of the known high rate of mortality among illegitimate children is comparatively trivial. Moreover, illegitimacy is diminishing in England and Wales, as the following figures show:—

TABLE LXII.—*Births, England and Wales, 1881-90.*

| Year.      | Total.  | Illegitimate. | Birth-Rate. | Illegitimate Birth-Rate. | Illegitimate per 1,000 Births. |
|------------|---------|---------------|-------------|--------------------------|--------------------------------|
| 1881 ..... | 883,642 | 43,120        | 33·9        | 1·7                      | 48·8                           |
| '82 .....  | 889,014 | 43,155        | 33·7        | 1·6                      | 48·4                           |
| '83 .....  | 890,722 | 42,646        | 33·3        | 1·6                      | 47·9                           |
| '84 .....  | 906,750 | 42,667        | 33·4        | 1·6                      | 47·1                           |
| '85 .....  | 894,270 | 42,793        | 32·5        | 1·56                     | 47·6                           |
| '86 .....  | 903,866 | 42,838        | 32·4        | 1·5                      | 47·4                           |
| '87 .....  | 886,331 | 42,134        | 31·4        | 1·5                      | 47·5                           |
| '88 .....  | 879,858 | 40,730        | 30·6        | 1·4                      | 46·3                           |
| '89 .....  | 885,944 | 40,627        | 30·5        | 1·4                      | 45·9                           |
| '90 .....  | 869,937 | 38,142        | 30·2        | 1·3                      | 43·7                           |





It is seen that not only is the absolute number of illegitimate births diminishing, but the number relatively to the total number of births is also less. The general birth-rate fell from 33.9 in 1881, to 30.2 in 1890. If the proportion of illegitimate births had fallen only in the same ratio, the rate for 1890 would have been 1.5. The actual rate for 1890 was 1.3.

The excessive mortality among illegitimate children is shown in Table LXIII, taken from Dr. Farr's "Vital Statistics."

In Sheffield it is seen that three-fifths of all the illegitimate children died in infancy. In considering the high rate of mortality among illegitimate children, it must be remembered that a larger proportion of illegitimate children are first births than of legitimate children. Out of 361 illegitimate births of which statistics are available, 65 per cent. were first children, 21.94 per cent. were second children, 11.67 per cent. were third children, 1.11 per cent. fourth, and 0.28 per cent. were fifth children.

TABLE LXIII.

| Town.   | Illegitimate Births per 1,000 Births. | Death-Rate, all Infants. | Legitimate Births Death-Rate. | Illegitimate Births Death-Rate. |
|---|---------------------------------------|--------------------------|-------------------------------|---------------------------------|
| Liverpool .....                                   | 44                                    | 214                      | 205                           | 418                             |
| Leicester .....                                   | 44                                    | 245                      | 239                           | 386                             |
| Nottingham .....                                  | 65                                    | 202                      | 191                           | 365                             |
| Glasgow .....                                     | 85                                    | 163                      | 152                           | 286                             |
| Helmsley .....                                    | 133                                   | 87                       | 75                            | 184                             |
| Salford .....                                     | 44                                    | 179                      | 171                           | 366                             |
| Radford .....                                     | 54                                    | 204                      | 187                           | 547                             |
| Driffield .....                                   | 116                                   | 206                      | 168                           | 596                             |
| Routh .....                                       | 89                                    | 107                      | 106                           | 118                             |
| Twelve districts with low infant mortality .....  | 77                                    | 107                      | 97                            | 388                             |
| Twelve districts with high infant mortality ..... | 61                                    | 203                      | 192                           | 366                             |

Many of the mothers are very young ; not infrequently attempts at abortion have been made during early pregnancy ; during pregnancy much mental worry and anxiety have been experienced by the mothers. The mothers receive but little attention at their confinements. All these factors tend inevitably to excessive mortality. They are ante-natal causes of excessive mortality of illegitimate infants, and are not truly perils of infant life.

After birth other causes operate. Illegitimate children are very often put out to nurse. The rate of mortality among illegitimate children nursed by their own mothers—for example those detained in workhouses for a period after their confinements—does not vary appreciably from the general rate of mortality for all England. Nurse children will be considered separately. Another factor is exposure. The majority of foundlings are illegitimate. The majority of illegitimate children are among the poorer sections of the community. Many foundlings are dead. The number of still-born children is unduly high. The wish to get rid of the infant at its birth acts as an incentive powerful enough either to cause the infant to be still-born, or else to cause it to die by exposure and neglect soon after its birth—by abandonment in a large number of cases.

I have heard it stated on good authority, that in the practice of certain midwives the number of still births is very high, and that this fact is well known among their *clientèle*.

The following inquest statistics are very significant:—

TABLE LXIV.—*Inquests.*<sup>5</sup>

|                                     |      |          |       |           |       |
|-------------------------------------|------|----------|-------|-----------|-------|
| Total inquests, legitimate children | .... | 0—1 year | 2,728 | 1—7 years | 2,712 |
| „ illegitimate                      | „    | 0—1 „    | 1,251 | 1—7 „     | 193   |

that is to say, that inquests on illegitimate children under 1 year of age amount to 31 per cent. of all the inquests held on infants. Yet illegitimate children form less than 5 per cent. of the total number of births. The figures for Liverpool show a similar result—

TABLE LXV.—*Liverpool Inquests.*

|                                     |       |          |     |           |    |
|-------------------------------------|-------|----------|-----|-----------|----|
| Total inquests, legitimate children | ..... | 0—1 year | 165 | 1—7 years | 68 |
| „ illegitimate                      | „     | 0—1 „    | 21  | 1—7 „     | 1  |

Illegitimate children were the subjects of 11 per cent. of all inquests, but the rate of illegitimacy in Liverpool is only 4 per cent. of births.

The fewness of the inquests on children over 1 year of age is noteworthy. The figures however are less likely to be accurate than in the case of younger children. It is obvious, however, that comparatively few illegitimate children survive the perils of infancy.

It may therefore be fairly concluded that (owing to the large number of inquests held on illegitimate children) the excessive mortality among them is in a large measure preventable. It depends chiefly on neglect, frequently wilful and criminal, to which the very existence of the child is a strong incentive. The excessive mortality of illegitimate children may shortly be traced to the following causes: to the shame and poverty of the mother, and the miserable character of the home; to the absence of support from the putative father, and the limited means of sustenance; to inducement, improper food, the indiscriminate use of opiates, and to the indifference of the nurse. As long as women who bear illegitimate children are looked upon with reproach and as unclean by their self-considered more virtuous sisters (who often enough have never fallen because they have never been tempted), as long as the father is not liable to social ostracism, and hence self-restraint is less obligatory in the male sex, so long will the inducement to neglect and the incentive to neglect and crime continue. The subsequent marriage of father and mother ought to legitimise the children as is the case in Scotland. Facilities should also be given for the affiliation of the child before birth;

<sup>5</sup> Statistics of E. Lankester, M.D., F.R.S. See Report, 1871, "Protection of "Infant Life," p. 141. Q.—3011.

but a very practical difficulty is the impossibility of the enforcement of affiliation orders in the very cases where such enforcement is most necessary. Criminal neglect may be somewhat diminished by improved and increased measures of supervision. The detention of mothers in workhouses for a lengthy period would be regarded as a needless interference with the liberty of the subject.

Much of this neglect occurs in the practice of baby farmers. The Infant Life Protection Act of 1872 did much to remedy the large amount of criminal neglect then existing, but baby farming still continues on a large scale, and the mortality among children so nursed is still enormous. Occasionally criminal proceedings are taken against the nurses. It is unnecessary to quote the evidence given in proof of this great neglect before the select committee of the House of Commons on the Infant Life Protection Act of 1890. The facilities which a well organised system of baby farming affords to get rid of a child; the frequency (amounting in many cases almost to a certainty) with which children are neglected by those to whom they are entrusted, need to be dealt with firmly and finally.

Two other factors tending to high infant mortality have still to be considered—the influence of heredity, and the frequency of developmental diseases.

These form a distinct class of perils different from those we have hitherto considered. They affect the child before birth, and are therefore not strictly perils of infant life.

First as to HEREDITY. It is well known that a tendency or predisposition to certain diseases is inherited, but with the exception of certain zymotic diseases, no disease affects a child before birth. Instances of predisposition may be cited, *e.g.*, gout, rheumatism, and tuberculosis. By the union of individuals having predisposition to the same diseases, the predisposition of the offspring to such diseases is intensified. For this reason if there be any constitutional taint, consanguineous marriages, always to be deplored, ought in those cases to be prohibited. As a preventable form of hereditary predisposition, the neurotic diathesis of children born of alcoholic parentage may be cited.

Any legislative interference however with freedom of marriage beyond the general conscience of the community, will be followed by an intensification of the very evil proposed to be prevented.

The influence of syphilis requires a brief consideration. Fournier, writing in 1885 on the depopulation of France, says syphilis destroys 68 per cent. of infants born of syphilitic parents. Le Pileur, writing from the observation of cases in prison, 1881-85, states that of 643 cases of syphilis, 130 were suitable for analysis. Of these 60 contracted syphilis after having had children, 52 con-

tracted syphilis before having had children, 18 had children before and after. The 60 women had 166 pregnancies, 72 live born children dying soon, 8 still births, 86 surviving children. The 52 women had 122 pregnancies, 93 still births, 22 live born children soon dying, 7 surviving children. The 18 women had no abortions before contracting syphilis, no still births, 27 live born children dying soon, and 16 surviving children. After infection they had 21 abortions, 6 still births, 3 live born children dying soon, and 1 surviving child.

From these and other facts he concluded that in France 14 per cent. of pregnant women are syphilitic; 7 per cent. of children conceived by syphilitic women will survive the dangers of foetal and early infant life. Of 100 conceptions, 13 perish solely from syphilis in the mother.

The gravity of the influence of syphilis thus revealed has not been realised. Apart from any question of abstract morality, the benefit of stamping out syphilis for the saving of infant life is obvious.

The number of deaths of infants registered from syphilis during the decade 1881-90 was as under :—

TABLE LXVI.

| Year.         | Number. | Year.                      | Number. |
|---------------|---------|----------------------------|---------|
| 1881.....     | 1,540   | 1886 .....                 | 1,701   |
| '82.....      | 1,666   | '87 .....                  | 1,584   |
| '83.....      | 1,773   | '88 .....                  | 1,952   |
| '84.....      | 1,733   | '89 .....                  | 1,500   |
| '85.....      | 1,652   | '90 .....                  | 1,483   |
| 1881-90 ..... | 16,584  | = 1·8 per thousand births. |         |

The second factor is DEVELOPMENTAL DISEASE AND PREMATURE BIRTH.

Deaths from these causes can scarcely be regarded as due to perils of infant life, as they are due to prenatal influences. These deaths are however very numerous, amounting to 2 per cent. of births. They all occur in infancy or during early childhood. It is a matter of regret that still births are not registered in England. It has been estimated that the number of still births is as high as 6 per cent. of the total births. Apart from the statistical value of such registration, it would tend to check the procuring of abortion, foeticide, and child murder, by preventing the burial of any still born infant unless full particulars of the birth were furnished to the district registrar. It would also be possible to investigate the causes of still birth more accurately; for example, the real influence of syphilis would be measured.

From the following table it will be seen that there has been an almost continuous increase in the deaths from developmental diseases during the past thirty years. Careful consideration has only resulted in the partial explanation of the increase. It must be remembered that the rate of infant mortality from all causes has not only *not* increased, but has actually diminished. It has therefore been suggested that the increase in the deaths registered from developmental diseases is due to the transference of deaths from one alleged cause to another :—

TABLE LXVII.—*Premature Births and Congenital Malformations.*

| Year.       | Premature Births. | Congenital Malformations. | Year.       | Premature Births. | Congenital Malformations. |
|-------------|-------------------|---------------------------|-------------|-------------------|---------------------------|
| 1861-65.... | 11·19             | 1·76                      | 1876-80.... | 13·38             | 2·39                      |
| '66-70....  | 11·50             | 1·84                      | '81-85....  | 14·17             | 3·23                      |
| '71-75....  | 12·60             | 1·85                      | '86-90....  | 16·14             | —                         |

TABLE LXVIII.—*Premature Births and Congenital Malformations.*

| Year.      | Premature Births. | Congenital Malformations. | Year.      | Premature Births. | Congenital Malformations. |
|------------|-------------------|---------------------------|------------|-------------------|---------------------------|
| 1881 ..... | 13·63             | 3·20                      | 1886 ..... | 15·09             | 3·33                      |
| '82 .....  | 13·99             | 3·31                      | '87 .....  | 15·89             | 3·29                      |
| '83 .....  | 14·41             | 3·08                      | '88 .....  | 15·98             | 3·45                      |
| '84 .....  | 14·42             | 3·15                      | '89 .....  | 16·29             | —                         |
| '85 .....  | 14·43             | 3·41                      | '90 .....  | 17·48             | —                         |

The steady and continuous increase year by year seems to prove the insufficiency of this explanation, and it does not account for the great differences in the deaths from these causes in different districts. Perhaps more live births are registered. Births which would previously have escaped registration, and have been termed still births, are included in the statistics. But this would also tend to increase the rate of infant mortality.

The increasing employment of women in industrial occupations has been suggested as an explanation. We have already considered the influence of this factor on the general rate of mortality, and have seen that it was associated with a high death-rate, ascribed to premature birth.

A third explanation associates together death from premature birth with the number of marriages of minors ; but taking a series of years it is seen that such marriages are not increasing in numbers. The influence of these marriages has been considered in so far as it relates to the general rate of mortality. Körösi, from observations at Buda Pesth, states that early marriages

conduce to high infant mortality. He further says that the children who survive are not strong, and that inexperience of the mothers is an important factor in the causation of the excessive infant mortality.

TABLE LXIX.—*Marriages of Minors per 1,000 Marriages.*

| Year.       | Males. | Females. | Year.       | Males. | Females. |
|-------------|--------|----------|-------------|--------|----------|
| 1861-65.... | 65·6   | 198·8    | 1876-80.... | 77·8   | 217      |
| '66-70....  | 71·0   | 208·4    | '81-85....  | 73·0   | 215      |
| '71-75....  | 81·6   | 223·4    | '86-90....  | —      | —        |

If the two explanations last suggested be considered together, the association between a high rate of infant mortality from developmental diseases and the occupation and health of the mother is confirmed.

Between 1881 and 1890, 162,209 deaths from developmental diseases were registered, equivalent to 18·27 per thousand births. In 1889 99 per cent. of these deaths occurred in infancy. They are slightly more numerous in males than in females. It would be interesting to know what proportion occurs in first born children.

TABLE LXX.—*Deaths from Developmental Diseases, 1889.*

| Sex.          | 1-3 Months. | 3-6 Months. | 6-12 Months. |
|---------------|-------------|-------------|--------------|
| Males .....   | 9,418       | 198         | 78           |
| Females ..... | 7,337       | 171         | 73           |

The ADMINISTRATION OF OPIATES requires brief reference.

Depending partly upon the employment of women in industrial occupations, is the general administration of opiates to infants and very young children. The extent of this was revealed during the consideration of the Infant Life Protection Act of 1872, and there is reason to believe, from inquiries which I have made myself, that the practice is still very general. I do not mean to imply that the habit is confined to operatives. It is also notoriously prevalent among baby farmers, and it is not infrequent among the general public.

Occasionally an over dose is administered. Passing notice is taken of the practice. The incident is soon forgotten, and the habit is allowed to continue without any vigorous effort to suppress it. Numerous deaths ought in reality to be attributed to this custom. The child does not thrive. It dies either from chronic infantile atrophy, or else from a more acute attack of gastric disease. Proof of administration is generally absent. In towns the favourite form of administration is as a soothing syrup, but

frequently laudanum itself is given. Paregoric of less than standard strength is often extensively retailed by grocers.

During a recent visit to a colliery village in North Wales, I learnt that three quarts of laudanum were sold in one week at one shop to the villagers. It was, so I was informed, in general use by the colliers and their wives—especially by the latter. No “soothing syrup” was ever asked for.

This information was confirmed by the leading chemist of the neighbouring town. The laudanum was frequently given to infants. The dose was carefully regulated, and “no accident” ever occurred. The mother before leaving home for work placed a lump of sugar in the bottom of a small teacup, and added one, two, three, four, or five drops of laudanum, according to the age and previous habits of the child; she then added a teaspoonful of boiling water. This punch (as the mixture is locally called) was administered to the child, who slept till the mother returned. The attention of the British Medical Association has been directed to this custom, and steps are being taken to render the law as to the sale of opiates more stringent. The sale of soothing syrups containing narcotics, the general sale of paregoric and laudanum, require to be restricted. The drugs ought to be properly labelled, and they ought to be of standard strength.

Lastly we have to consider the influence of CHILD INSURANCE.

The idea that child insurance is directly responsible for much of the waste of child life is very prevalent. For the last half century child insurance, either in the form of burial insurance or of life insurance, has been in existence; originating in Liverpool and other towns where high infant mortality prevailed. For the past twenty years it has been alleged that this child insurance tends to excessive infantile mortality,<sup>6</sup> for in 1871, Mr. Curgenven, giving evidence before the Select Committee on the Bill for the Protection of Infant Life, stated his belief that “children insured “in burial clubs die in a much larger proportion than children not “so insured;” other witnesses were of a like opinion. The committee merely stated in its report that it had been suggested to them “that no infant or very young person should be entered in a “burial club, or become the subject of life insurance.”

The report of the Royal Commission on friendly societies in 1874, expressed the opinion that “infant life assurance if badly “administered was mischievous” (a fact which no one would venture to question), and added, “that if well administered it was “not harmful but beneficial.”

<sup>6</sup> The statistics of the Prudential Assurance Company show that the mortality (0—1 year) among the insured is less than the general mortality among infants—even if the deaths which occur during the first month of life are eliminated.



In consequence of this report, the Statute of George III which prohibited the insurance of the life of another in which there was no insurable interest, was repealed in so far as children under the age of 10 years are concerned, but the amount was limited to 6*l.* under the age of 5 years, and to 10*l.* for children over 5 and under 10 years of age. Burial insurance thus became life insurance, and the burial clubs (with which so much that was objectionable was associated) were suppressed. It must be remembered that the insurance of the life of another is valid under the common law where there is an insurable interest, and much of the misunderstanding in reference to child insurance and its result depends directly upon forgetfulness of this fact.

In 1889 the committee on friendly societies stated in their report that evidence was tendered to show not only that infant insurance acts as an incentive to crime, but also that a widespread system exists under which much neglect, cruelty, and crime take place with impunity. They reject the statistical evidence in regard to child insurance, owing to the impossibility of drawing therefrom a safe conclusion. They admit that insurance for burial expenses is highly valued by the working classes for perfectly legitimate reasons, and that an unnecessary hardship would be inflicted on them if it were prohibited. "The question "is whether the defenceless state of the children of the poorer "classes is such as to make it imperative that this system of "insurance should be prohibited or more stringently guarded." Although numerous suggestions for the amendment of the existing law were offered, the committee contented themselves with recommending that the age for juvenile assurance should be extended to 16 years, and that the total sum insured for on death under the age of 5 years should be diminished to 4*l.* They also urged the addition to the certificate of death of a column for particulars of insurance.

In 1890 a Committee of the House of Lords considered the Children's Life Insurance Bill, introduced by the Bishop of Peterborough, but admittedly drafted by the Rev. Benjamin Waugh, the honorary director of the National Society for the Prevention of Cruelty to Children. The Bill was eventually withdrawn. The evidence given by several witnesses, including medical men, coroners, and two judges of the high court, was very conflicting, and convincing evidence of specific cases of child murder *by parents* for the sake of insurance money was wanting. A strong belief was expressed that insurance is an incentive to crime, inasmuch as it familiarises the parent or guardian with the prospect of pecuniary benefit on the death of the child insured. But this belief, be it well or ill founded, seemed to be grounded

upon surmise, hearsay, or general impression. Even where specific cases were adduced, the insurance could have been effected under the ordinary law, because it was an insurance coupled with an interest.

Mr. Justice Wills admitted that the vast majority of insurances were attended with no mischief to the child, and that it was only the residuum that needed consideration. He was opposed to the prohibition of child insurance, and thought it would be a mistake. Mr. Justice Day was opposed to infant insurance even if it were proved that it never tempted parents to commit crime.

I have briefly reviewed the more important evidence existing on the subject. I have weighed, as carefully as I am able, all the information I have gathered. I have discussed the subject with medical men resident in districts where insurance prevails extensively, and my own conclusion is that the evils of child insurance have been unnecessarily exaggerated, and that the deaths of the children commonly attributed to insurance, ought really to be ascribed to the causes we have been considering in the earlier part of this essay. The incentive to child neglect and child murder is not the prospective receipt of insurance money. Neglect and crime would continue even if insurance were abolished straightway. High infant mortality depends upon the light estimation in which child life is held, and the careless indifference with which it is treated. Cases of neglect are more frequent into which the element of insurance does not enter, than those upon which it is supposed to exercise influence.

The Rev. B. Waugh estimated that over 1,000 children die, or are made to die, every year for the sake of the insurance money. He estimates that 33 per cent. of the children of the industrial classes are insured.

From statistics supplied by the manager of the Prudential Assurance Company, and arranged by Captain Marshall in the "Fortnightly Review" for December, 1890, it appears that 80 per cent. of such children are insured. Probably the truth lies between these two estimates. Child insurance is much more general in towns than in the country, and, as we should naturally expect, it is more prevalent where a high rate of infant mortality prevails than where infant life is comparatively secure.

Inquest statistics show that about 50 per cent. of children are insured. Dr. Hope, in the investigation at Liverpool previously referred to, found that nearly 64 per cent. were insured. So that it is probable that Mr. Waugh is guilty of as much under estimation as Captain Marshall is of over estimation. My own records (though as yet too few to give any reliable estimate) show,

however, that among hospital patients Captain Marshall's figure is not too high.

It is obvious, however, that child insurance is very general, and it follows that the influence of a small number of deaths directly caused for the sake of the insurance money, would not affect to any appreciable extent the general mortality statistics. It is therefore impossible to make any use of them to estimate the influence of insurance. The only available means of estimating the influence of insurance is the number of proved cases of infanticide for the sake of the insurance money. Such instances in people who are permitted by the Act to insure are comparatively few in number. The report of the 1889 committee states merely that the allegations of culpable and even wilful neglect and violence have been, in some case, well founded, and that the object of such neglect and violence has not been disconnected with the sums payable on the death of the children. This, it will be noticed, is an extremely cautious statement.

Under the Friendly Societies Act, 1875, no insurance money may be paid on a child's death except to the parent or the personal representative of such parent. The great majority of the cases remaining after deducting those in which insurance was permissible under the common law, have occurred owing to the loose interpretation placed upon the words "personal representative" by those who are called upon to comply with the Act. Evidence from this source is therefore wanting.

To sum up. I repeat that in my opinion child insurance has been accorded an importance far beyond its merits. The same amount of energy directed to the suppression of an obviously preventable form of death, *e.g.*, suffocation in bed, might result in a greater saving of child life than would result from the total suppression of insurance. It would be as rational to interdict fire insurance because of a few cases of arson, as to prohibit child insurance because of a few cases of proved infanticide.

If the inducement offered by the small sum received from insurance on the death of a child is sufficient to determine infanticide, it is overwhelming evidence of the light estimation in which child life is held. The proper remedy therefore is not the suppression of insurance, but the raising of the estimation in which child life is held.

I am of opinion that the lower scale of payments adopted by the 1889 committee might fairly be accepted, and that a system of child insurance registration should be tried by the local authorities as a temporary and tentative measure. By such a register accurate information as to the influence of child insurance would be obtained, and its future definitely determined.

Payment to the undertaker is objectionable. Medical supervision is impracticable. I had formulated a scheme by which children before insurance were to be seen by the parish medical officer at a uniform fee of 1s., but it would not be possible to carry the scheme into execution.

It would be impossible to replace the present system of collecting societies by any State system of child insurance without collectors. The evil of the present system depends, according to its opponents, upon the touting by rival collectors; but a non-collecting society, founded in Liverpool by the late Mr. Robertson Gladstone, has only met with a very partial measure of success.

The ideal insurance system would be an endowment system. The life of the child, not its death, would become the source of profit.

Summing up the causes of excessive infant mortality, and therefore (as I have shown) the perils of infant life, we find them to depend upon:—

(1.) Pre-natal causes leading to death from premature birth, from congenital malformation, and from hereditary diseases.

(2.) Sanitary conditions, insanitation leading to excessive mortality from zymotics and diseases of the respiratory system.

(3.) Social circumstances, *e.g.*, ignorance, occupation, &c., leading to the neglect of children, and consequent excessive mortality from diarrhoea, convulsions, and atrophy.

(4.) Crime and wilful neglect.

During the composition of this paper I have taken the opportunity of calling the attention of all sorts and conditions of men (and of women) to the awful sacrifice of child life which prevails. The reply has invariably been to this effect: "Poor things, they are happier dead." This carelessness is lamentable, for it ignores one reality; for every child who dies, there are many who survive, stunted in growth, dwarfed in development, and crippled. We can measure the loss of children by death; we cannot estimate the influence upon the nation of the weak damaged children who survive. An inquiry into the previous history of prostitutes in Russia, revealed the curious fact that in a large proportion of cases they were the offspring of degenerate parents, of parents addicted to intemperance, or of parents with constitutional disease (*e.g.*, tuberculosis).

The difference in the physique of children born and reared in towns and of children born and reared in the country is very marked. It would be of great interest to follow out at length the influence of the aggregation of population in large centres on the growth and development of the human body. The increase which has been noticed in recent years in the number of short sighted

people has been attributed to the want of exercise of the eye for distant vision by the residents in our large towns. The influence of daily confinement in schools, and afterwards in offices badly ventilated, badly lighted, and badly appointed, must be great. It is of interest to note that the death-rate at school ages from nervous diseases has not diminished, while the death-rate from other causes is less during the last decade. And in other directions the influence of town life may be traced.

The most difficult part of the problem we are considering is the treatment of the ills we have discovered; what means can be suggested by which a diminution of these evils may be attained?

Idealists who depict imaginary communities free from all the vices and defects of actual life, lose sight of one most important factor. They do not remember that there is an immense amount of cruelty and wickedness in human nature which is only kept under, even in the most highly developed races, by the strong arm of coercion. Every reform which has ever been made has necessitated a new creation of officials, whose duty it is to enforce certain essential wholesome regulations. Behind religion, morality, education, cleanliness, we always see the policeman, who punishes the wrong doer; his duties are always tending to grow.

Whatever may be suggested as a remedy for the ills we have been considering, will inevitably necessitate fresh pains and penalties, as well as authority to enforce them. Some writers are consequently led to advocate the treatment of the most glaring evils only, and to consider that the deep seated causes are beyond human aid. But this paper would be in no wise complete if it did not make some attempt to consider the ultimate basis of infant perils, even though preventive measures cannot be suggested which would effect a radical cure.

In the most general sense it may be said that in a civilised race infant perils are caused by poverty. Into the still wider question of how far poverty is due to individual characteristics I do not propose to enter. The poverty to which I allude is national, not individual poverty, and it is, I think, in some degree independent of individual characteristics.

It must not be forgotten that a great accumulation of wealth in a few hands is always accompanied by a corresponding amount of pauperism and want spread over a large number of people. So that while England is the richest country in the world, its wealth is a measure of its poverty—which is more widespread and more hopeless than anywhere else.

This condition is owing to the peculiar position into which we have drifted in our social arrangements.

The natural end of man's existence is to cultivate the ground. Although some are set apart for other duties as soon as the progress of civilisation demands division of labour, there must always be some who produce from the ground an equivalent.

At the present time we, in England, are in the abnormal position of ceasing more and more to cultivate the ground, and of spending all our energies in producing articles of which it is becoming more and more difficult to dispose.

When machinery first became applied to all kinds of manufactures, England obtained a practical monopoly, and for a time supplied the world with machine-made goods. The demand for labour to direct and assist this machinery caused the owners of machinery to offer wages which tempted the field labourers to take to the new work, and so began that steady migration from the fields to the towns, which has been the great economical feature of this century.

We cannot shut our eyes to the fact that our monopoly is at an end, and that the demand for machine goods is becoming less and less. The goods are produced on so vast a scale that employment has become intermittent. Periods of active production are followed by periods of stagnation, during which the surplus machine products are being worked off. This uncertainty of employment has had much to do with the absence of thrift (which is greatly to be deplored) among the working classes.

It is impossible to formulate any scheme to cause the people to return to agriculture. Even supposing that by peasant proprietorship, allotments, or any one or the other devices which have been suggested, they were brought back to the land, the next period of commercial prosperity, with its high wages, would inevitably tempt them back to the towns again. The development of civilisation connotes growth of luxury. A return to the simple primitive habits of our ancestors is a dream that can never be realised.

Therefore although I think that many of the social evils which I have alluded to would vanish if the bulk of the population returned to agriculture, I do not consider it worth while to discuss this solution further—it is impossible. I accept large towns as inevitable. I shall therefore confine myself to the methods of treating some of the worst features of town existence in so far as they affect infant life.

A few words first, however, in reference to individual poverty. Considerable attention has been given lately to the unemployed. Labour bureaux have been organised. Harebrained schemes have been originated by philanthropists and paid agitators to provide work for everybody "at fair wages for a fair day's work." The temporary utility of such schemes has been already indicated in



the general discussion. There has, however, been one practical gain from the attempt made. It has been demonstrated that many of the unemployed are naturally incapable of continuous steady work. Whether from constitutional idleness or from intemperance, the honest, sympathetic help extended to many of them has been wasted. The majority have been found not to retain the employment given. In many cases poverty is due to individual not to national causes.

Aggregation in towns has hitherto always implied overcrowding, and the measures which have been adopted to combat this evil have not been in the right direction. I have discussed the question of the influence upon health of the blocks of model dwellings with the assistance of the statistics afforded by block dwellings in London, and have stated my belief that the immense outlay of money involved in their construction has not been justified by the result. The remedy has not gone to the root of the evil. It has not diminished overcrowding. On the contrary, it has increased it. The only good achieved has been obtained by regulating it. The risk of zymotic diseases is increased. It is inevitable that under any system of close aggregation, however carefully regulated, filth diseases, whether from the fouling of soil, air, or water will continue. Another factor has been introduced into our social system, which suggests a more practical and radical solution of the problem. Of late years the great development of our railway system, enclosing our towns by a rapidly growing network of railways, offers means of transport from one point to another within a reasonable time. No system of travelling is so cheap. There is now nothing to prevent workmen and others from living in the healthy open outskirts of our towns, which have hitherto been the exclusive dwelling places of the wealthier classes. Bills recently introduced into Parliament have shown at what small cost workmen's trains can be run, 5, 10, or even 15 miles. Compulsory legislation in this direction would benefit the whole community. It is not sufficient for us to wait for an enlightened policy to be inaugurated by the railway companies themselves. They are vast bodies with great inertia, with internal selfish interests, slow to move without the application of external forces. It can be readily shown that the plan is feasible. The increased volume of traffic moreover will occur when ordinary traffic is least heavy. The advantages are many and obvious. Even where they do not directly affect infant life, yet by improving the general standard of health, they are certain to react favourably on infant mortality.

One suggestion may be made here. Since indirect taxation is always more readily paid than direct taxation, free railway passes

might be attached to the workmen's dwellings in the suburbs. These passes would be paid for by a charge in the rent remitted by the landlord to the railway company. The objections to residence in the suburbs would thus be largely reduced—the full expense being easily known.

In towns themselves we can only move in the direction of removing the more obvious consequences of overcrowding. Not enough activity is yet shown in demolishing grossly insanitary property. If it be demolished, the method is often bad. A wholesale demolition is made in a particular district. The adjacent property is still further crowded, and this congestion is often long in being relieved. It is true that provision is made in the Acts for adequate accommodation for the ejected tenants, but more efficient enforcement of the provisions is desirable. Vested interests, and the want of adequate independent authority, interfere with the enforcement of existing powers. The appointment of County Medical Officers of Health is being followed by greater attention to the sanitary conditions of rural and urban districts. Improvement is being made, but it needs to be expedited.

In our system of national education some more prominent place should be given to domestic training. It is useless to advocate greater parental responsibility unless we at the same time prepare the children to bear that responsibility. Moral training must be left to our moral teachers: to ministers of religion and to others. Hitherto too much attention has been given by them to matters of faith and religion, to the exclusion of the relations of man to man in the circumstances of every day life. As long as educated people regard the sacrifice of child life with equanimity, as an unmixed blessing, it is useless to expect less educated people to regard it as reprehensible, however different the points of view may be.

It is difficult to dissociate ignorance from responsibility. As I have already shown, half the deaths of infants are attributable to bad feeding. This bad feeding depends upon ignorance.

In rural districts infant mortality is low; this fact cannot be explained by the abundance of fresh air, or by the high standard of general education which obtains there. It can only depend upon the better training of the young girls, who are familiarised from their earliest youth with the care and the management of children. The excessive mortality in towns depends largely upon the want of this knowledge. The highest standards in board schools and other schools might well include sound elementary instruction on this subject: not theoretical instruction as to the percentage of proteids in milk and such like, but practical rules for the feeding and care of infants. I do not depreciate the value



of sound scientific teaching, however elementary, of physiology, but there is a long step between theory and practice. The practice must be taught in the schools, for there is no method afterwards of imparting it, except by the voluntary action of the young girls themselves. The development of technical instruction by the local authorities affords another opportunity of imparting this knowledge. The adoption of domestic training as a subject of technical instruction, and the appointment of well qualified lady teachers to instruct the industrial classes through the medium of mothers' meetings, and of other religious and social assemblies, as well as by well organised special classes, would be a step in the right direction. Some work of this kind is being already attempted; but the teaching is not continuous, and depends upon voluntary aid. House to house visitation would be best of all. This would be however of necessity optional, and depend entirely for its success upon the tact of the lady teachers. A mission field exists neglected and uncultivated as wide and as important as that of India or of China—with only one disadvantage, that it is too near home. The Buckinghamshire County Council has set an example, in this direction. Through the energy and initiation of Dr. De Ath, the County Medical Officer of Health, ladies are being trained as rural health missionaries. Their duties are to lecture in a popular and homely way on the management of personal health, and on the management and care and feeding of infants. Special stress is laid on house to house visitation and industrial teaching. Much tact is required to avoid giving offence—a point humourously and yet pitifully illustrated in a recent copy of "Punch," where an irate mother resents the teaching of the new young doctor as to the management of her children, on the ground that she ought to know all about it, having buried fourteen of her own! This teaching however requires to be very carefully watched—the rural health missionaries must be well and soundly instructed. The work must be undertaken in earnest and devotedly continued. The results will not be seen immediately; time must elapse for the seed which is sown to grow and bring forth fruit. The soil is barren, and the harvest will not be rich.

With regard to the employment of women in industrial occupations, it is to be regretted that the necessity exists for married women to be so employed. The influence of their employment, as I have shown, on their offspring is twofold: the children when they are born are less fitted to enter upon the competition of life, and after they are born the necessity for their mothers to work causes them to be neglected. A woman under the present law may not be employed for a month after her confinement, but this period is not long enough, and it seems impossible, under existing con-

ditions, to prolong it without inflicting much hardship. The mortality among the infants of the female operatives employed in the factory of M. Dolfus, a cotton manufacturer of Mülhouse, was reduced from between 40 and 50 per cent. to about 26 per cent. by the establishment of a maternity fund, to which the married women paid contributions, which were supplemented by M. Dolfus. The women were enabled by this fund to remain away from work for a longer period after their confinements. A grant is made by many friendly societies on the birth of a child to pay for the attendance of a doctor and of a nurse. This principle might easily be further extended, but such a universal obligatory insurance could not be enforced. The establishment of numerous day nurseries, or crèches, conveniently situated in industrial centres, is the only practical remedy, together with the prohibition of the entrusting of infants to ignorant and careless neighbours for hire or reward. In our large towns children are left under the care of older children scarcely bigger than their charge, or are obliged to entrust them to the tender mercies of a complaisant neighbour, more ignorant of babies than the mother herself. Some trust to opiates. Two day nurseries in Liverpool, with an annual attendance of nearly 4,000 children, an average of 44 per day, managed wisely and economically, expended at the rate of nearly 6*d.* per child per day, or about 3*s.* 6*d.* per week. The utmost charge that can be made is 1*s.* a-week, so that 2*s.* 6*d.* a-week per child must be met by donations or subscriptions. It is hardly fair to expect that this deficiency should be defrayed in this way, and in view of the evidence tendered before the Infant Life Protection Act of 1890, by which it was urged that no child ought to be allowed to be received from the custody of its parents for hire unless by a registered person, the establishment by county councils of a widespread system of day nurseries seems desirable. This plan is strongly advocated by many county medical officers of health.

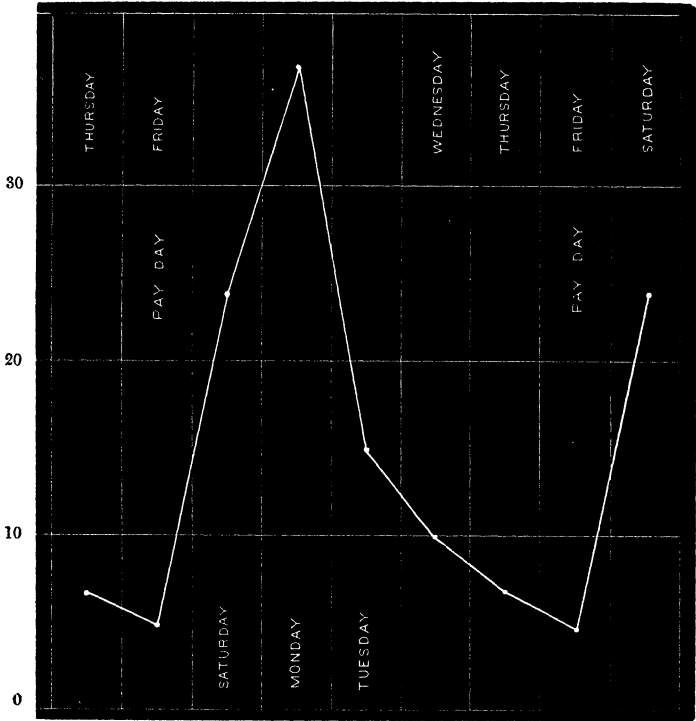
I have already indicated the great influence which intemperance exercises directly on infant mortality, and have referred to the influence it exerts on the wage-earning power of the people. I include here the summary of an investigation made for me by the chief of a large manufactory in Liverpool. The results are really worse than the figures would imply, for by the method of time keeping adopted by the firm, a quarter day lost in the morning would be neutralised by any overtime worked.

TABLE LXXI.—*Analysis of Men Losing a Quarter or a Half Day on the various Days of the Week. Friday Evening being Pay Night.*

[Seventeen men for twenty weeks.]

|                |    |                 |    |
|----------------|----|-----------------|----|
| Saturday ..... | 57 | Wednesday ..... | 25 |
| Monday.....    | 89 | Thursday .....  | 18 |
| Tuesday.....   | 37 | Friday .....    | 14 |

Percentages of men “losing time” on each day of the week.



From inquiries made, the inference that the loss of the “first quarter” is due to the previous night’s dissipation is fully confirmed.

Intemperance, whether regarded as a cause or as a consequence of our social conditions, is directly responsible for much of the poverty, privation, and crime, and for the neglect which leads to the sacrifice of child life. Although there is no necessary relation between the number of public houses and the amount of drunkenness, yet a diminution in the number of public houses is urgently needed. In Liverpool a district (upon which houses for the sale of drink are prohibited by the terms of the leases granted by the

landlord) has a lower death-rate than adjoining districts. The houses are better kept and are better maintained than similar houses in other parts of the city. Licences should be placed under the control of the ratepayers. A maximum number of licensed houses in any area should be fixed by law.

I cannot help believing that early education has most influence of all in preventing the formation of the drink habit. The majority of drunkards begin to drink to excess in early life; some when on the down grade after maturity; comparatively few through failure in business, grief, or poignant emotion during the period of maturity.

Attention requires to be directed to the quality of the beer and spirits retailed, and firm measures ought to be taken for the prevention of the sale of injurious drink. A compulsory modification in the character of the beer would be followed by excellent results.

A few points remain to be mentioned: The question of the Contagious Diseases Acts is too wide to be considered. To the influence of syphilis I have called attention, and any method whereby its frequency could be diminished, involving no further interference with the liberty of the subject than that of the Contagious Diseases Acts, ought to be accepted as necessary and urgent.

The form of death certificates, and the question of death certification, is at present under consideration by Parliament. The majority of uncertificated deaths are deaths of infants. A revision of the form of the death certificate so as to include particulars of insurance, the appointment of medical men as registrars by whom the certificates would be scrutinised, and immediate inquiry made into doubtful or suspicious cases, are desirable. It is impossible under present conditions for any medical man to initiate on his own responsibility an inquiry in cases where unconfirmed suspicion alone exists. Reference to the coroner is cumbrous, unsatisfactory, and often nugatory. Finally, the coroner's inquiry at present held on children found dead, whether foundlings or whether children overlain, ought to result in some more useful and practical result than the usual formal return of a verdict with an occasional censure.

Lastly, the Imperial Parliament has already provided, in the Prevention of Cruelty to Children Act, some means of repressing the graver forms of neglect. These means require to be extended by the provision of punishment for overlying. Administration of opiates should be prohibited: soothing syrups containing narcotics being suppressed. It is to be regretted that the Act is chiefly administered by voluntary societies. Power ought to be entrusted to the local authorities to undertake the duties hitherto performed

by children's protection societies. Private philanthropy, however excellent, ought not to be allowed to undertake public work.

It may be urged that the remedies I have proposed are utterly inadequate to cope with the gravity of the conditions I have been discussing; and the contention is reasonable. But more drastic reforms are either impossible or premature. I have insisted that the preventable forms of child neglect are in the main referable to want of parental responsibility—a condition which, it is certain, largely depends on ignorance. The remedy—the only remedy—in which I have any faith or confidence—is education.

“My people are destroyed for lack of knowledge.” “Knowledge is power, and power implies trust. We who enjoy knowledge are the trustees of power. People are ignorant because they are ignorant, they do not desire knowledge because they have not even the knowledge to know that knowledge is desirable. They are to be pitied and to be helped! By whom are they to be pitied, and by whom are they to be helped, but by those to whom the highest privileges of knowledge are entrusted?”

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## APPENDIX.

*Analysis of Methods of Feeding Infants.**Five Hundred Consecutive Cases from the Infirmary for Children, Liverpool.*TABLE 1.—*Methods of Feeding.*

| Ages.             | Breast. | Breast and Food. | Food. | Total. |
|-------------------|---------|------------------|-------|--------|
| 0— 3 months ..... | 54      | 23               | 34    | 111    |
| 3— 6 „ .....      | 38      | 25               | 39    | 102    |
| 6—12 „ .....      | 54      | 37               | 60    | 151    |
| Over 1 year ..... | 9       | 33               | 94    | 136    |
| Total.....        | 155     | 118              | 227   | 500    |

TABLE 2.—*Percentages. Methods of Feeding.*

| Ages.             | Breast. | Breast and Food. | Food. |
|-------------------|---------|------------------|-------|
| 0— 3 months.....  | 48·7    | 20·7             | 30·6  |
| 3— 6 „ .....      | 37·2    | 24·5             | 38·3  |
| 6—12 „ .....      | 35·7    | 24·5             | 39·8  |
| Over 1 year ..... | 6·6     | 24·2             | 68·2  |

TABLE 3.—*Methods of Feeding in relation to Digestive Disorders.*

| Ages.             | Digestive Disorders. |                  |       | Other Illnesses. |                  |       |
|-------------------|----------------------|------------------|-------|------------------|------------------|-------|
|                   | Breast.              | Breast and Food. | Food. | Breast.          | Breast and Food. | Food. |
| 0— 3 months ....  | 21                   | 13               | 30    | 33               | 10               | 4     |
| 3— 6 „ ....       | 12                   | 14               | 34    | 26               | 11               | 5     |
| 6—12 „ ....       | 19                   | 24               | 50    | 35               | 13               | 10    |
| Over 1 year ..... | 6                    | 29               | 78    | 3                | 4                | 16    |
| All cases .....   | 58                   | 80               | 192   | 97               | 38               | 35    |

TABLE 4.—*Methods of Feeding in relation to Digestive Disorders. Percentages.*

| Ages.             | Breast. | Breast and Food. | Food. |
|-------------------|---------|------------------|-------|
| 0— 3 months.....  | 88·8    | 56·5             | 88·2  |
| 3— 6 „ .....      | 31·6    | 56·0             | 89·0  |
| 6—12 „ .....      | 35·2    | 65·0             | 83·0  |
| Over 1 year ..... | 66·6    | 87·8             | 83·0  |
| All cases .....   | 37·4    | 68·0             | 84·5  |

*Note.*—The numbers in Table 4 show percentages of children fed on breast, breast and food, or food, who suffer from digestive disorders. It is seen that 60 per cent. of infants were suffering from digestive disorder, and 64 per cent. of all the children examined.

*Apprehensions for Drunkenness, Rate of Infant Mortality, Infant  
Death-Rate from Violence, Marriage-Rate, Birth-Rate.*

| Town.                       | Apprehensions<br>per 10,000,<br>1876.* | Rate<br>of Infant<br>Mortality,<br>1871-80. | Violence.<br>Infant<br>Death-Rate,<br>1871-80. | Marriage-<br>Rate,<br>1871-80. | Birth-<br>Rate,<br>1871-80. |
|-----------------------------|--|---|--|--------------------------------|-----------------------------|
| 1. Liverpool .....          | 420                                    | 217   | 14.0   | 29.84                          | 35.08                       |
| 2. Newcastle-on-Tyne .....  | 373                                    | 176   | 4.25   | 17.27                          | 37.86                       |
| 3. South Shields.....       | 330                                    | 164   | 1.94   | 16.06                          | 43.81                       |
| 4. Durham .....             | 305 {                                  | 176 {                                       | 0.81 {   | 18.94 {                        | 46.37 {                     |
| 5. Warrington .....         | 293                                    | 151   | 1.32   | 16.19                          | 41.11                       |
| 6. Birkenhead.....          | 288                                    | 133   | 1.12   | 13.55                          | 37.68                       |
| 7. Gateshead .....          | 283                                    | 170   | 2.29   | 14.98                          | 44.08                       |
| 8. Manchester .....         | 276 {                                  | 190 {                                       | 2.41 {   | 38.49 {                        | 38.97 {                     |
| 9. Salford.....             | 270                                    | 207   |  | 26.00                          | 40.78                       |
| 10. Tynemouth.....          | 266                                    | 184   | 1.62   | 16.52                          | 42.39                       |
| 11. Newcastle-under-Lyne... | 266                                    | 161   | 1.35   | 15.37                          | 41.14                       |
| 12. Hartlepool .....        | 257                                    | 147   | 1.22   | 13.54                          | 40.27                       |
| 13. Chesterfield .....      | 239                                    | 166   | 1.85   | 17.67                          | 43.36                       |
| 14. Ashton-under-Lyne ..... | 237                                    | 149   | 1.42   | 15.53                          | 44.53                       |
| 15. Rochdale.....           | 234                                    | 179   | 0.96   | 17.84                          | 37.82                       |
| 16. Wakefield .....         | 229                                    | 158   | 0.814  | 16.94                          | 34.96                       |
| 17. Great Grimsby .....     | 215                                    | 154   | 1.13   | 16.43                          | 41.45                       |
| 18. Wigan .....             | 203                                    | 152   | 1.27   | 16.54                          | 35.34                       |
| 19. Sunderland.....         | 196                                    | 172   | 0.81   | 17.34                          | 45.77                       |
| 20. Newport.....            | 194                                    | 166   | 1.52   | 19.31                          | 41.07                       |
| 21. Derby.....              | 172                                    | 142   | 1.58   | 19.10                          | 38.23                       |
| 22. Cardiff.....            | 171                                    | 146   | 1.24   | 22.34                          | 38.60                       |
| 23. Oldham .....            | 159                                    | 142   | 1.13   | 18.14                          | 35.88                       |
| 24. Lancaster .....         | 159                                    | 174   | 0.93   | 16.62                          | 37.67                       |
| 25. Halifax .....           | 151                                    | 139   | 1.08   | 16.17                          | 32.60                       |
| 26. Swansea .....           | 139                                    | 157   | 0.53   | 18.62                          | 35.10                       |
| 27. Kendal .....            | 138                                    | 141   | 0.594  | 19.95                          | 41.75                       |
| 28. Hereford.....           | 134                                    | 105   | 1.07   | 14.02                          | 31.95                       |
| 29. Stalybridge.....        | 133                                    | 121   | 1.45   | 13.65                          | 28.74                       |
| 30. Carlisle .....          | 131                                    | 179   | 0.96   | 17.84                          | 37.82                       |
| 31. Nottingham .....        | 130                                    | 153   | 1.09   | 17.03                          | 32.95                       |
| 32. Stockport .....         | 122                                    | 184   | 2.11   | 24.95                          | 32.58                       |
| 33. Shrewsbury .....        | 122                                    | 182   | 1.53   | 20.25                          | 35.70                       |
| 34. Blackburn .....         | 121                                    | 140   | 1.67   | 14.00                          | 28.18                       |
| 35. Scarborough .....       | 120                                    | 191   | 0.525  | 17.18                          | 39.30                       |
| 36. Berwick .....           | 119                                    | 160   | 1.82   | 17.83                          | 31.57                       |
| 37. Bolton .....            | 118                                    | 117   | 2.30   | 13.18                          | 30.61                       |
| 38. Hull.....               | 118                                    | 167   | 0.93   | 17.33                          | 39.20                       |
| 39. York.....               | 112                                    | 178   | 1.33   | 25.17                          | 37.88                       |
| 40. Chester .....           | 111                                    | 157   | 1.61   | 17.11                          | 32.36                       |
| 41. Walsall .....           | 104                                    | 131   | 1.44   | 16.96                          | 33.04                       |
| 42. Preston .....           | 103                                    | 168   | 0.65   | 14.72                          | 42.95                       |
| 43. Wolverhampton.....      | 100                                    | 212   | 0.79   | 17.27                          | 37.86                       |
| 44. Huddersfield .....      | 99                                     | 161   | 1.46   | 15.86                          | 39.75                       |
| 45. Beverley .....          | 93                                     | 156   | 0.48   | 16.37                          | 34.42                       |
| 46. Doncaster .....         | 91                                     | 136   | 1.10   | 14.13                          | 32.28                       |
| 47. Macclesfield .....      | 87                                     | 167   | 1.03   | 15.05                          | 35.24                       |
| 48. Worcester .....         | 87                                     | 152   | 0.75   | 17.92                          | 32.83                       |
| 49. Birmingham .....        | 86                                     | 176   | 1.93   | 15.08                          | 32.00                       |
| 50. Leeds .....             | 82                                     | 179   | 10.92  | 19.66                          | 39.89                       |
| 51. Newark .....            | 73                                     | 188   | 2.14   | 23.97                          | 39.33                       |
| 52. Carmarthen .....        | 69                                     | 145   | 1.23   | 14.41                          | 32.28                       |
| 53. Lincoln .....           | 63                                     | 110   | 0.36   | 14.89                          | 30.74                       |
| 54. Bradford .....          | 62                                     | 162   | 1.04   | 16.56                          | 34.21                       |
| 55. Kidderminster .....     | 61                                     | 177   | 1.11   | 18.08                          | 37.97                       |
| 56. Middlesbrough .....     | 57                                     | 138   | 2.87   | 16.12                          | 33.93                       |
| 57. Sheffield .....         | 56                                     | 152   | 1.47   | 15.39                          | 44.04                       |
| 58. Congleton .....         | 52                                     | 183   | 1.52   | 26.30                          | 42.50                       |
|                             | 49                                     | 145   | 0.38   | 13.70                          | 35.31                       |

\* From Fourth Report Select Committee (House of Lords) on Intemperance, Appendix, Table i.

Other statistics from Registrar-General's Report, 1871-80.

*Deaths in the Ten Years 1871-80, England and Wales.*

|  | All Ages.  | Under<br>1 Year. | 1       | 2       | 3       | 4       | Total<br>under 5. |
|--|------------|------------------|---------|---------|---------|---------|-------------------|
| Annual death-rate per }<br>1,000 ..... | 21·27      | 177              | 65·9    | 27·7    | 18·0    | 12·5    | 63·12             |
| Mean population, 1871-81               | 24,343,348 | 720,002          | 639,202 | 659,285 | 644,006 | 633,575 | 3,296,070         |
| All causes .....                       | 5,178,311  | 1,277,326        | 421,330 | 182,703 | 115,934 | 83,065  | 2,080,358         |
| Small pox .....                        | 57,422     | 7,686            | 2,502   | 2,320   | 2,328   | 2,533   | 17,369            |
| Measles .....                          | 91,948     | 19,925           | 34,586  | 16,254  | 8,948   | 4,927   | 84,640            |
| Scarlet fever .....                    | 174,232    | 10,183           | 25,342  | 29,901  | 27,599  | 21,980  | 115,005           |
| Diphtheria .....                       | 29,426     | 2,065            | 3,126   | 3,182   | 3,734   | 3,463   | 15,570            |
| Whooping cough .....                   | 124,532    | 53,239           | 38,610  | 16,053  | 8,261   | 4,203   | 120,366           |
| Typhus .....                           | 13,975     | 90               | 107     | 187     | 261     | 284     | 929               |
| Enteric fever .....                    | 78,421     | 1,767            | 2,708   | 3,118   | 2,842   | 2,745   | 13,180            |
| Simple continued fever....             | 25,643     | 1,038            | 1,550   | 1,704   | 1,660   | 1,382   | 7,334             |
| Puerperal fever .....                  | 17,944     | —                | —       | —       | —       | —       | —                 |
| Diarrhœa and dysentery..               | 221,552    | 140,467          | 35,422  | 6,375   | 2,067   | 1,132   | 185,463           |
| Cholera .....                          | 6,104      | 2,214            | 692     | 205     | 147     | 86      | 3,344             |
| Cancer.....                            | 115,031    | 59               | 55      | 95      | 117     | 88      | 414               |
| Scrofula .....                         | 31,016     | 8,561            | 4,788   | 1,906   | 1,105   | 831     | 17,191            |
| Tabes mesenterica .....                | 77,393     | 38,367           | 18,962  | 5,837   | 2,312   | 1,362   | 66,840            |
| Phthisis .....                         | 515,099    | 10,131           | 7,503   | 3,551   | 2,179   | 1,903   | 25,267            |
| Hydrocephalus .....                    | 77,260     | 26,524           | 19,259  | 8,229   | 4,877   | 3,731   | 62,620            |
| Diseases of the—                       |            |                  |         |         |         |         |                   |
| Nervous system .....                   | 674,279    | 222,308          | 42,668  | 17,278  | 10,258  | 6,823   | 299,335           |
| Circulatory system ....                | 318,373    | 1,306            | 486     | 355     | 374     | 447     | 2,968             |
| Respiratory „ ....                     | 915,340    | 228,908          | 108,543 | 36,788  | 17,609  | 10,416  | 402,264           |
| Digestive „ ....                       | 238,061    | 31,308           | 5,074   | 2,418   | 1,745   | 1,515   | 42,060            |
| Urinary „ ....                         | 95,413     | 980              | 1,113   | 1,002   | 982     | 895     | 4,972             |
| Generative „ ....                      | 13,341     | 66               | 27      | 16      | 8       | 6       | 123               |
| Suicide .....                          | 16,967     | —                | —       | —       | —       | —       | —                 |
| Childbirth .....                       | 22,617     | —                | —       | —       | —       | —       | —                 |
| Violence .....                         | 161,373    | 18,943           | 6,539   | 6,114   | 4,603   | 3,849   | 40,048            |
| Other causes .....                     | 1,065,549  | 451,191          | 61,668  | 19,815  | 11,918  | 8,464   | 553,056           |

Rate of infant mortality ..... 149

Marriages ..... 1,960,543 = 16·11 per thousand.

Births ..... 8,588,782 = 35·28 „



*Influence of Back-to-Back Dwelling Houses on Mortality.*

[“Manchester Statistics, 1870-83.” By Dr. Tatham.]

| Group.                   | Number of Enumeration Areas. | Percentage of Back-to-Back Houses. | Population. | Death-Rate per 1,000 Population per Annum. |                                |           |                           |            |
|--------------------------|------------------------------|------------------------------------|-------------|--|--------------------------------|-----------|---------------------------|------------|
|                          |                              |                                    |             | All Causes.                                | Principal Infectious Diseases. | Phthisis. | Other Pulmonary Diseases. | Diarrhoea. |
| A. Regent Road District— |                              |                                    |             |  |                                |           |                           |            |
| I                        | 72                           | —                                  | 54,264      | 26·1                                       | 4·9                            | 2·7       | 5·7                       | 1·54       |
| II                       | 10                           | 18                                 | 8,773       | 29·1                                       | 4·9                            | 2·7       | 7·5                       | 1·85       |
| III                      | 6                            | 50                                 | 4,380       | 37·3                                       | 7·6                            | 4·5       | 8·6                       | 2·83       |
| B. Greengate District—   |                              |                                    |             |  |                                |           |                           |            |
| I                        | 9                            | —                                  | 8,713       | 27·5                                       | 4·5                            | 2·8       | 6·6                       | 1·42       |
| II                       | 13                           | 23                                 | 11,749      | 29·2                                       | 4·8                            | 3·3       | 7·8                       | 1·55       |
| III                      | 12                           | 56                                 | 11,405      | 30·5                                       | 6·2                            | 3·6       | 7·9                       | 2·12       |
| One area of Group III }  |                              | 100                                | 892         | 38·4                                       | 8·7                            | 5·2       | 9·2                       | 3·36       |

*Dr. Russell's Statistics on the Influence of the Dwelling House on Mortality.*  
Glasgow, 1888.

| Disease.  | Death-Rates per 100,000. |                             |                         |
|---|--------------------------|-----------------------------|-------------------------|
|   | One and Two Room Houses. | Three and Four Room Houses. | Five Rooms and upwards. |
| Zymotic diseases .....  | 478                      | 246                         | 114                     |
| Acute diseases of the lungs, including consumption..... }     | 985                      | 689                         | 328                     |
| Nervous diseases and diseases of nutrition in children..... } | 480                      | 235                         | 91                      |
| Accidents and syphilis in children ....                       | 32                       | 11                          | —                       |
| Miscellaneous unclassified diseases ....                      | 799                      | 764                         | 590                     |
| All causes .....  | 2,774                    | 1,945                       | 1,123                   |

*Death-Rates at all Ages, and Rates of Infant Mortality in Twenty-Eight  
Large Towns, 1887.*

|                              |      |     |
|------------------------------|------|-----|
| England and Wales .....      | 18·8 | 145 |
| Twenty-eight large towns.... | 20·8 | 168 |
| Manchester.....              | 28·7 | 191 |
| Preston .....                | 27·9 | 214 |
| Blackburn .....              | 25·5 | 201 |
| Newcastle .....              | 25·3 | 174 |
| Oldham .....                 | 23·8 | 187 |
| Liverpool .....              | 23·7 | 186 |
| Huddersfield .....           | 23·0 | 181 |
| Plymouth .....               | 22·7 | 196 |
| Salford .....                | 22·2 | 195 |
| Cardiff.....                 | 21·9 | 172 |
| Wolverhampton.....           | 21·7 | 176 |
| Sheffield .....              | 21·6 | 177 |
| Bolton.....                  | 21·3 | 171 |
| Leeds .....                  | 21·1 | 172 |
| Halifax .....                | 21·0 | 153 |
| Birkenhead.....              | 21·0 | 156 |
| Bristol.....                 | 20·4 | 149 |
| Norwich .....                | 20·4 | 158 |
| Bradford.....                | 19·9 | 178 |
| Sunderland.....              | 19·7 | 151 |
| Birmingham .....             | 19·7 | 176 |
| London .....                 | 19·6 | 158 |
| Portsmouth .....             | 19·5 | 143 |
| Leicester.....               | 19·5 | 209 |
| Hull .....                   | 19·2 | 165 |
| Nottingham .....             | 18·7 | 170 |
| Derby .....                  | 17·1 | 142 |
| Brighton.....                | 16·9 | 149 |

*Influence of the Dwelling House on Mortality.*

[NEWSHOLME, Society M.O.H., 13th April, 1892.]

| District. | Number of Inhabited Houses. | Number of Families. | Number of Tenements with less than Five Rooms. | Proportion of such Tenements per Cent. | Families to each House. | Population. | Deaths. | Death-Rate. |
|-----------|-----------------------------|---------------------|--|--|-------------------------|-------------|---------|-------------|
| A .....   | 1,228                       | 1,731               | 1,122  | 64·8                                   | 1·41                    | 7,224       | 404     | 27·99       |
| B .....   | 2,538                       | 3,451               | 1,721  | 49·9                                   | 1·36                    | 14,835      | 707     | 23·83       |
| C .....   | 4,871                       | 6,609               | 3,109  | 47·0                                   | 1·36                    | 27,871      | 1,004   | 18·01       |
| D .....   | 3,596                       | 4,840               | 1,943  | 40·2                                   | 1·35                    | 20,109      | 674     | 16·75       |
| E .....   | 2,326                       | 3,263               | 1,300  | 39·8                                   | 1·40                    | 13,883      | 412     | 14·84       |
| F .....   | 1,432                       | 1,596               | 258  | 16·2                                   | 1·11                    | 8,857       | 231     | 12·98       |
| G .....   | 2,521                       | 2,813               | 410  | 14·6                                   | 1·11                    | 15,419      | 333     | 10·79       |
| H .....   | 668                         | 748                 | 113  | 15·2                                   | 1·12                    | 5,112       | 89      | 8·70        |
|           | 19,380                      | 25,051              | 9,976  | —                                      | 1·29                    | 113,310     | 3,854   | 17·01       |

| District. | Deaths. | Phthisis. | Tubercular. | Bronchial Catarrh, Pneumonia. | Respiratory. | Premature Births. | Others. |
|-----------|---------|-----------|-------------|-------------------------------|--------------|-------------------|---------|
| A .....   | 404     | 41        | 49          | 19                            | 10           | 25                | } 519   |
| B .....   | 707     | 79        | 54          | 31                            | 14           | 32                |         |
| C .....   | 1,004   | 124       | 117         | 42                            | 28           | 49                |         |
| D .....   | 674     | 80        | 68          | 27                            | 7            | 29                | } 977   |
| E .....   | 412     | 31        | 47          | 21                            | 6            | 16                |         |
| F .....   | 231     | 22        | 13          | 12                            | 9            | 7                 |         |
| G .....   | 333     | 21        | 20          | 10                            | 7            | 5                 |         |
| H .....   | 89      | 3         | 5           | 2                             | 3            | 1                 |         |

| District. | Percentage of Total Population. | Total Deaths. | Deaths from Zymotics. | Measles and Whooping Cough. | Diarrhoea. | Phthisis. | Tubercular. | Bronchial Catarrh, &c. | Respiratory. | Premature Births. | Others. |
|-----------|---------------------------------|---------------|-----------------------|-----------------------------|------------|-----------|-------------|------------------------|--------------|-------------------|---------|
| D—H ....  | 56·03                           | 13·72         | 1·18                  | 0·55                        | 0·38       | 1·15      | 0·54        | 2·18                   | 0·24         | 0·44              | 7·99    |
| J .....   | 24·59                           | 18·11         | 2·22                  | 1·25                        | 0·69       | 2·10      | 0·75        | 3·31                   | 0·50         | 0·88              | 8·25    |
| A and B   | 19·38                           | 25·18         | 2·72                  | 1·30                        | 1·25       | 2·34      | 1·13        | 5·37                   | 0·54         | 1·29              | 11·77   |

*Analysis of Causes of Death during the Year 1889.*

| Causes of Death.                              | All Ages. | Months,<br>0—3. | Months,<br>3—6. | Months,<br>6—12. | Under<br>1 Year. | 1—     | 2—    | 3—    | 4—    | Under<br>5 Years. |
|---|-----------|-----------------|-----------------|------------------|------------------|--------|-------|-------|-------|-------------------|
| 0. All causes, males .....                    | 266,102   | 34,328          | 14,414          | 21,814           | 71,056           | 21,616 | 8,000 | 4,979 | 3,538 | 109,189           |
| 1. Specific febrile or zymotic diseases ..... | 34,408    | 3,254           | 3,416           | 6,004            | 12,674           | 7,179  | 3,074 | 2,100 | 1,431 | 26,458            |
| 2. Parasitic diseases .....                   | 368       | 237             | 48              | 18               | 303              | 11     | 6     | 3     | 7     | 330               |
| 3. Dietetic " .....                           | 1,186     | 79              | 44              | 27               | 150              | 3      | 0     | 1     | 0     | 154               |
| 4. Constitutional diseases .....              | 45,427    | 878             | 1,455           | 2,395            | 4,728            | 2,651  | 978   | 601   | 418   | 9,376             |
| 5. Developmental " .....                      | 21,059    | 9,418           | 198             | 78               | 9,694            | 35     | 8     | 5     | 3     | 9,745             |
| 6. Local diseases .....                       | 137,272   | 12,340          | 7,096           | 11,821           | 31,257           | 10,678 | 3,458 | 1,924 | 1,413 | 48,730            |
| 7. Violence.....                              | 12,587    | 718             | 241             | 134              | 1,093            | 302    | 321   | 292   | 233   | 2,241             |
| 8. Ill-defined and not specified causes ..... | 13,795    | 7,904           | 1,916           | 1,337            | 11,157           | 757    | 155   | 53    | 33    | 12,155            |
| 0. All causes, females.....                   | 252,251   | 26,374          | 11,610          | 18,158           | 56,142           | 20,268 | 7,762 | 4,923 | 3,518 | 92,613            |
| 1. Specific febrile or zymotic diseases ..... | 35,368    | 2,713           | 2,949           | 5,372            | 11,084           | 7,195  | 3,277 | 2,263 | 1,611 | 25,380            |
| 2. Parasitic diseases .....                   | 339       | 184             | 42              | 18               | 244              | 19     | 18    | 11    | 3     | 295               |
| 3. Dietetic " .....                           | 712       | 66              | 34              | 20               | 120              | 8      | 1     | 0     | 0     | 129               |
| 4. Constitutional diseases.....               | 46,240    | 614             | 1,150           | 1,891            | 3,655            | 2,273  | 806   | 529   | 411   | 7,674             |
| 5. Developmental " .....                      | 23,040    | 7,337           | 171             | 73               | 7,581            | 40     | 11    | 9     | 6     | 7,647             |
| 6. Local diseases .....                       | 129,971   | 8,709           | 5,379           | 9,471            | 23,559           | 9,686  | 3,273 | 1,875 | 1,319 | 39,712            |
| 7. Violence.....                              | 4,910     | 719             | 234             | 131              | 1,084            | 243    | 214   | 180   | 135   | 1,856             |
| 8. Ill-defined and not specified causes ..... | 11,671    | 6,032           | 1,651           | 1,182            | 8,865            | 804    | 162   | 56    | 33    | 9,920             |

*Infant Mortality and Density of Population.*

| Registration County. | Rate of Infant Mortality. |       | Estimated Population<br>middle of 1891. | Acreage.   | Acres<br>per<br>Person. |
|----------------------|---------------------------|-------|---|------------|-------------------------|
|                      | 1881-90.                  | 1891. |   |            |                         |
| ENGLAND AND WALES    | 142                       | 149   | 29,081,047                              | 37,239,351 | 1·28                    |
| I. LONDON .....      | 152                       | 155   | 4,221,452                               | 74,692     | 0·18                    |
| II. SOUTH EASTERN—   |                           |       |   |            |                         |
| Surrey .....         | 110                       | 110   | 575,078                                 | 453,028    | 0·78                    |
| Kent .....           | 116                       | 118   | 808,872                                 | 970,060    | 1·2                     |
| Sussex .....         | 109                       | 109   | 556,136                                 | 947,132    | 1·7                     |
| Hampshire .....      | 112                       | 116   | 668,681                                 | 1,046,576  | 1·5                     |
| Berkshire .....      | 105                       | 116   | 268,888                                 | 574,808    | 2·1                     |
| III. SOUTH MIDLAND—  |                           |       |   |            |                         |
| Middlesex.....       | 128                       | 119   | 580,607                                 | 178,755    | 0·3                     |
| Hertford .....       | 108                       | 102   | 215,480                                 | 441,623    | 2·0                     |
| Buckingham.....      | 116                       | 112   | 164,537                                 | 410,176    | 2·5                     |
| Oxford .....         | 113                       | 122   | 188,372                                 | 489,727    | 2·6                     |
| Northampton .....    | 132                       | 135   | 308,971                                 | 632,982    | 2·0                     |
| Huntingdon .....     | 107                       | 110   | 50,199                                  | 204,473    | 4·0                     |
| Bedford.....         | 131                       | 115   | 166,298                                 | 307,050    | 1·8                     |
| Cambridge .....      | 121                       | 119   | 196,373                                 | 573,793    | 2·9                     |
| IV. EASTERN—         |                           |       |   |            |                         |
| Essex.....           | 126                       | 124   | 766,903                                 | 904,194    | 1·1                     |
| Suffolk .....        | 114                       | 110   | 353,948                                 | 923,709    | 2·6                     |
| Norfolk.....         | 135                       | 142   | 460,649                                 | 1,308,719  | 2·8                     |
| V. SOUTH WESTERN—    |                           |       |   |            |                         |
| Wilts.....           | 103                       | 100   | 255,264                                 | 797,457    | 3·1                     |
| Dorset .....         | 96                        | 83    | 189,045                                 | 610,582    | 3·2                     |
| Devon .....          | 121                       | 125   | 636,860                                 | 1,643,390  | 2·5                     |
| Cornwall .....       | 137                       | 147   | 318,326                                 | 879,328    | 2·7                     |
| Somerset .....       | 110                       | 113   | 510,507                                 | 1,066,938  | 2·0                     |
| VI. WEST MIDLAND—    |                           |       |   |            |                         |
| Gloucester .....     | 124                       | 134   | 549,474                                 | 700,080    | 1·2                     |
| Hereford .....       | 109                       | 121   | 113,243                                 | 519,141    | 4·5                     |
| Salop.....           | 117                       | 120   | 254,390                                 | 933,582    | 3·6                     |
| Stafford.....        | 156                       | 163   | 1,105,845                               | 766,688    | 0·69                    |
| Worcester.....       | 134                       | 139   | 423,551                                 | 434,554    | 1·0                     |
| Warwick .....        | 150                       | 155   | 803,624                                 | 610,587    | 0·76                    |

*Infant Mortality and Density of Population—Contd.*

| Registration County. | Rate of Infant Mortality. |       | Estimated Population middle of 1891. | Acreage.  | Acres per Person. |
|----------------------|---------------------------|-------|--------------------------------------|-----------|-------------------|
|                      | 1881-90.                  | 1891. |                                      |           |                   |
| VII. NORTH MIDLAND   |                           |       |                                      |           |                   |
| Leicester .....      | 164                       | 174   | 380,624                              | 535,103   | 1·4               |
| Rutland .....        | 111                       | 154   | 22,094                               | 107,352   | 4·8               |
| Lincoln .....        | 132                       | 136   | 467,221                              | 1,731,718 | 3·7               |
| Nottingham .....     | 154                       | 154   | 506,936                              | 604,181   | 1·1               |
| Derby .....          | 134                       | 139   | 433,628                              | 556,869   | 1·2               |
| VIII. NORTH WESTERN  |                           |       |                                      |           |                   |
| Cheshire .....       | 142                       | 149   | 710,245                              | 643,745   | 0·9               |
| Lancashire .....     | 166                       | 176   | 3,970,532                            | 1,307,381 | 0·3               |
| IX. YORK—            |                           |       |                                      |           |                   |
| West Riding .....    | 156                       | 168   | 2,471,437                            | 1,776,884 | 0·7               |
| East „ .....         | 149                       | 153   | 400,948                              | 696,296   | 1·7               |
| North „ .....        | 135                       | 139   | 354,907                              | 1,253,649 | 3·5               |
| X. NORTHERN—         |                           |       |                                      |           |                   |
| Durham .....         | 152                       | 168   | 1,028,241                            | 765,075   | 0·7               |
| Northumberland ....  | 142                       | 159   | 508,041                              | 1,290,312 | 2·5               |
| Cumberland .....     | 123                       | 132   | 266,951                              | 970,161   | 3·6               |
| Westmorland .....    | 100                       | 110   | 66,257                               | 503,073   | 7·5               |
| XI. WELSH—           |                           |       |                                      |           |                   |
| Monmouth .....       | 140                       | 160   | 276,184                              | 427,848   | 1·5               |
| South Wales .....    | 140                       | 157   | 1,054,519                            | 2,676,723 | 2·5               |
| North „ .....        | 119                       | 126   | 450,689                              | 1,989,157 | 4·4               |

*Statistics of Block Buildings.*

| District.                                  | Year.     | Scarlatina. | Diphtheria. | Typhoid. | Measles. | Pertussis. | Diarrhoea. |
|--|-----------|-------------|-------------|----------|----------|------------|------------|
| Peabody Dwellings ....                     | 1888-89   | 343         | 539         | 73       | 1,040    | 858        | 563        |
| London .....                               | "         | 226         | 339         | 143      | 549      | 553        | 568        |
| Peabody Dwellings ....                     | 1890 .... | 634         | 147         | 97       | 1,026    | 2,052      | 391        |
| London .....                               | " ....    | 197         | 320         | 149      | 724      | 741        | 672        |
| Improved Industrial Dwellings } .....      | 1886-90   | 238         | 149         | 62       | 344      | 617        | 352        |
| Metropolitan Association Dwellings } ..... | "         | 222         | 369         | 74       | 593      | 482        | 556        |

|  | Death-Rate,<br>1886-89. | Birth-Rate,<br>1886-90. | Year.        | Rate<br>of Infant<br>Mortality. | Density<br>of<br>Population. |
|--|-------------------------|-------------------------|--------------|---------------------------------|------------------------------|
| Peabody Dwellings ....                     | 19'11                   | 40'24                   | 1882-90 .... | 139'2                           | 751                          |
| Metropolitan Association Dwellings } ..... | 18'79                   | 32'98                   | '86-90 ....  | 121'0                           | —                            |
| Improved Industrial Dwellings } .....      | 12'46                   | 35'21                   | '86-90 ....  | 130'0                           | —                            |
| London .....                               | 15'74                   | 30'81                   | '82-90 ....  | 151'9                           | 58                           |

|  |                  | Peabody<br>Buildings. | London. |
|--|------------------|-----------------------|---------|
| Mean annual death-rate per<br>1,000 living, 0—5 years .... | Measles .....    | 6'25                  | 4'21    |
|  | Pertussis .....  | 5'08                  | 4'25    |
| Mean annual death-rate per<br>1,000 living, all ages ..... | Measles .....    | 1'04                  | 0'55    |
|  | Pertussis .....  | 0'86                  | 0'55    |
|  | Phthisis .....   | 1'82                  | 1'77    |
|  | Tubercular ..... | 2'63                  | 2'53    |

There was also an excess of deaths from respiratory diseases, violence, and ill-defined causes.

In 1884 there were 10,144 living rooms provided in the Peabody buildings, occupied by 18,453 persons. In that year the birth-rate was 4'46 per cent. (1'09 per cent. higher than the London rate). The general death-rate was 1'91 per cent. (0'12 lower than the London rate). The rate of infant mortality was 13'87 per cent. (1'37 per cent. below the average for London).—*Newsholme: Royal Statistical Society's Journal.*

*Analysis of Causes of Death, Infants, 1881-90.*

|                                    | 1881.   | 1882.   | 1883.   | 1884.   | 1885.   | 1886.   | 1887.   | 1888.   | 1889.   | 1890.   | 1881-90. |
|------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| <i>Total births</i> .....          | 883,642 | 889,014 | 890,722 | 906,750 | 894,270 | 903,866 | 886,331 | 879,868 | 885,944 | 869,937 | —        |
| <i>Total deaths</i> .....          | 114,976 | 125,020 | 122,226 | 133,128 | 123,130 | 134,870 | 128,287 | 120,079 | 127,198 | 130,955 | —        |
| <i>Miasmatic Diseases.</i>         |         |         |         |         |         |         |         |         |         |         |          |
| Small pox, vaccinated .....        | 14      | 2       | 1       | 7       | 10      | 1       | 2       | 2       | —       | 1       | 40       |
| " unvaccinated .....               | 144     | 43      | 32      | 118     | 166     | 9       | 20      | 51      | —       | —       | 583      |
| " no statement .....               | 161     | 84      | 93      | 129     | 166     | 21      | 39      | 69      | 2       | 2       | 766      |
| Chicken pox .....                  | 72      | 59      | 56      | 72      | 58      | 53      | 43      | 68      | 55      | 53      | 589      |
| Measles .....                      | 1,518   | 2,852   | 1,944   | 2,447   | 2,991   | 2,498   | 3,387   | 1,964   | 3,129   | 2,636   | 25,366   |
| Epidemic rose rash .....           | 5       | 18      | 13      | 5       | 19      | 14      | 24      | 22      | 14      | 19      | 183      |
| Scarlet fever .....                | 760     | 774     | 653     | 586     | 391     | 392     | 444     | 362     | 342     | 357     | 5,061    |
| Typhus .....                       | 1       | 1       | 4       | 1       | 1       | 1       | 1       | —       | —       | —       | 10       |
| Influenza .....                    | 28      | 23      | 27      | 21      | 52      | 33      | 35      | 34      | 27      | 295     | 575      |
| Whooping cough .....               | 4,656   | 6,309   | 4,517   | 5,011   | 5,764   | 5,685   | 4,750   | 5,409   | 5,327   | 5,979   | 53,407   |
| Mumps .....                        | 31      | 18      | 17      | 16      | 29      | 14      | 18      | 18      | 20      | 19      | 200      |
| Diphtheria .....                   | 128     | 186     | 174     | 250     | 209     | 208     | 225     | 245     | 274     | 224     | 2,123    |
| Cerebro-spinal fever .....         | 2       | 2       | 1       | 3       | 1       | 1       | 1       | 1       | —       | 3       | 15       |
| Simple and ill defined fever ..... | 50      | 44      | 51      | 31      | 32      | 29      | 23      | 20      | 34      | 27      | 341      |
| Enteric fever .....                | 40      | 40      | 39      | 45      | 37      | 45      | 30      | 22      | 34      | 34      | 366      |
| <i>Diarrhæal Diseases.</i>         |         |         |         |         |         |         |         |         |         |         |          |
| Cholera .....                      | 101     | 111     | 111     | 276     | 113     | 223     | 235     | 105     | 142     | 180     | 1,597    |
| Diarrhoea, dysentery .....         | 9,408   | 10,680  | 9,962   | 17,754  | 8,821   | 16,514  | 14,101  | 8,212   | 12,279  | 11,615  | 119,346  |
| <i>Malarial Diseases.</i>          |         |         |         |         |         |         |         |         |         |         |          |
| Remittent fever .....              | 32      | 21      | 23      | 20      | 13      | 14      | 10      | 7       | 9       | 4       | 153      |
| Ague .....                         | 1       | 4       | 4       | —       | —       | —       | —       | —       | —       | 3       | 12       |



*Analysis of Causes of Death, Infants, 1881-90—Contd.*

|                                      | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1881-90. |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| <i>Zoogenous Diseases.</i>           |       |       |       |       |       |       |       |       |       |       |          |
| Hydrophobia .....                    | —     | —     | —     | —     | —     | —     | 1     | —     | —     | —     | 1        |
| Splenic fever .....                  | —     | —     | —     | —     | 1     | —     | —     | —     | —     | —     | 1        |
| Cow pox, vaccination .....           | 56    | 65    | 51    | 49    | 50    | 45    | 45    | 44    | 55    | 43    | 508      |
| <i>Veneral Diseases.</i>             |       |       |       |       |       |       |       |       |       |       |          |
| Syphilis.....                        | 1,540 | 1,666 | 1,773 | 1,733 | 1,652 | 1,701 | 1,584 | 1,452 | 1,500 | 1,483 | 16,084   |
| <i>Septic Diseases.</i>              |       |       |       |       |       |       |       |       |       |       |          |
| Phagedæna .....                      | 10    | 14    | 9     | 10    | 13    | 11    | 8     | 19    | 12    | 10    | 116      |
| Pyæmia septicæmia.....               | 90    | 79    | 74    | 80    | 66    | 54    | 64    | 63    | 60    | 58    | 688      |
| Erysipelas.....                      | 644   | 663   | 641   | 618   | 578   | 428   | 589   | 526   | 398   | 394   | 5,419    |
| <i>Parasitic Diseases.</i>           |       |       |       |       |       |       |       |       |       |       |          |
| Thrush .....                         | 790   | 693   | 819   | 829   | 672   | 787   | 681   | 522   | 542   | 639   | 6,924    |
| Others—vegetable parasites .....     | 4     | 6     | 2     | 4     | 3     | 4     | 4     | 3     | 2     | —     | 32       |
| Hydatid diseases .....               | —     | —     | 1     | —     | —     | 1     | —     | —     | —     | —     | 2        |
| Others—animal parasites .....        | 2     | 5     | 4     | 5     | 5     | 2     | 5     | —     | 3     | —     | 31       |
| <i>Dietetic Diseases.</i>            |       |       |       |       |       |       |       |       |       |       |          |
| Starvation—want of breast milk ..... | 407   | 407   | 426   | 247   | 225   | 227   | 267   | 261   | 269   | 232   | 2,968    |
| Scurvy .....                         | 1     | 2     | 1     | —     | 4     | 1     | 2     | 1     | 1     | 2     | 15       |
| <i>Constitutional Diseases.</i>      |       |       |       |       |       |       |       |       |       |       |          |
| Rheumatic fever .....                | 7     | 5     | 7     | 11    | 9     | 6     | 4     | 6     | 9     | 7     | 71       |
| Rheumatism.....                      | 2     | 1     | —     | —     | —     | —     | —     | 1     | —     | 2     | 6        |
| Rickets .....                        | 118   | 125   | 138   | 164   | 162   | 251   | 202   | 280   | 294   | 362   | 2,096    |
| Cancer .....                         | 9     | 12    | 7     | 13    | 10    | 15    | 9     | 11    | 15    | 18    | 119      |
| Tabes mesenterica .....              | 3,788 | 4,123 | 3,809 | 4,282 | 3,493 | 4,463 | 3,810 | 3,523 | 3,907 | 4,046 | 39,194   |

*Analysis of Causes of Death, Infants, 1881-90—Contd.*

|                                       | 1881.  | 1882.  | 1883.  | 1884.  | 1885.  | 1886.  | 1887.  | 1888.  | 1889.  | 1890.  | 1891-90. |
|---------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| <i>Constitutional Diseases—Contd.</i> |        |        |        |        |        |        |        |        |        |        |          |
| Tubercular meningitis .....           | 2,231  | 2,104  | 2,112  | 2,167  | 2,086  | 2,145  | 1,917  | 2,023  | 1,890  | 2,001  | 20,676   |
| Phthisis .....                        | 771    | 815    | 820    | 768    | 687    | 763    | 723    | 616    | 586    | 698    | 7,247    |
| Other tuberculoses—scrofula.....      | 900    | 978    | 978    | 1,167  | 1,204  | 1,364  | 1,301  | 1,275  | 1,417  | 1,404  | 11,988   |
| Purpura .....                         | 49     | 79     | 72     | 63     | 67     | 91     | 57     | 78     | 81     | 43     | 680      |
| Anæmia leucocythæmia .....            | 239    | 257    | 232    | 202    | 202    | 202    | 222    | 217    | 175    | 157    | 2,111    |
| Diabetes mellitus.....                | 1      | 1      | 4      | 5      | 2      | 2      | 3      | 4      | 3      | 6      | 31       |
| Others and ill defined.....           | 1      | 2      | —      | 2      | 1      | 1      | 2      | 2      | 6      | 2      | 19       |
| <i>Developmental Diseases.</i>        |        |        |        |        |        |        |        |        |        |        |          |
| Premature birth .....                 | 12,048 | 12,434 | 12,872 | 13,076 | 12,904 | 13,642 | 14,086 | 14,063 | 14,439 | 15,208 | 134,772  |
| Atelectasis .....                     | 628    | 687    | 600    | 541    | 673    | 667    | 707    | 823    | 745    | 757    | 6,828    |
| Cyanosis .....                        | 759    | 801    | 771    | 797    | 898    | 876    | 764    | 759    | 832    | 798    | 8,055    |
| Spina bifida .....                    | 593    | 612    | 563    | 596    | 611    | 577    | 636    | 686    | 582    | 542    | 5,998    |
| Imperforate anus.....                 | 194    | 203    | 208    | 285    | 191    | 185    | 180    | 170    | 187    | 159    | 1,962    |
| Cleft palate, hare lip .....          | 188    | 182    | 203    | 196    | 187    | 194    | 184    | 190    | 198    | 176    | 1,898    |
| Other congenital defects .....        | 238    | 250    | 196    | 234    | 279    | 302    | 217    | 319    | 292    | 369    | 2,696    |
| <i>Diseases of Special Senses.</i>    |        |        |        |        |        |        |        |        |        |        |          |
| Otitis; otorrhœa.....                 | 48     | 56     | 56     | 67     | 64     | 83     | 68     | 85     | 93     | 117    | 737      |
| Epistaxis and nose .....              | 23     | 11     | 25     | 9      | 22     | 23     | 13     | 19     | 22     | 19     | 186      |
| Ophthalmia and eye .....              | 37     | 31     | 31     | 37     | 39     | 37     | 43     | 31     | 42     | 25     | 353      |
| <i>Diseases of Nervous System.</i>    |        |        |        |        |        |        |        |        |        |        |          |
| Inflammation of brain .....           | 1,832  | 1,945  | 2,113  | 2,140  | 2,117  | 2,445  | 2,330  | 2,211  | 2,363  | 2,361  | 21,857   |
| Apoplexy .....                        | 138    | 130    | 170    | 119    | 118    | 110    | 115    | 99     | 106    | 144    | 1,249    |
| Softening .....                       | 1      | —      | 2      | 2      | 1      | 5      | 1      | 1      | —      | 2      | 15       |
| Hemiplegia .....                      | 4      | 4      | 1      | 8      | 3      | 4      | 11     | 17     | 9      | 27     | 88       |

*Analysis of Causes of Death, Infants, 1881-90 —Contd.*

|  | 1881.  | 1882.  | 1883.  | 1884.  | 1885.  | 1886.  | 1887.  | 1888.  | 1889.  | 1890.  | 1881-90. |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| <i>Diseases of Nervous System—Contd.</i> |        |        |        |        |        |        |        |        |        |        |          |
| Chorea .....                             | 2      | —      | 2      | —      | —      | —      | 2      | —      | —      | —      | 6        |
| Epilepsy .....                           | 63     | 68     | 78     | 105    | 104    | 100    | 89     | 84     | 93     | 78     | 862      |
| Convulsions .....                        | 17,978 | 18,460 | 18,280 | 18,772 | 18,136 | 18,693 | 17,894 | 17,252 | 17,999 | 17,897 | 181,861  |
| Laryngismus .....                        | 425    | 428    | 467    | 434    | 426    | 415    | 419    | 437    | 410    | 380    | 4,241    |
| Tetanus .....                            | 3      | 1      | 7      | 3      | 3      | 3      | 4      | 3      | —      | 2      | 29       |
| Paraplegia .....                         | 42     | 39     | 45     | 60     | 49     | 54     | 39     | 43     | 48     | 26     | 445      |
| Others and ill-defined .....             | 443    | 651    | 652    | 639    | 567    | 609    | 550    | 537    | 450    | 407    | 5,505    |
| <i>Diseases of Circulatory System.</i>   |        |        |        |        |        |        |        |        |        |        |          |
| Endocarditis .....                       | 2      | 3      | 9      | 6      | 12     | 11     | 7      | 9      | 11     | 16     | 86       |
| Pericarditis .....                       | 10     | 5      | 11     | 7      | 8      | 8      | 14     | 11     | 7      | 17     | 98       |
| Angina .....                             | —      | 1      | 1      | 1      | —      | —      | —      | —      | —      | —      | 3        |
| Syncope .....                            | 70     | 65     | 88     | 85     | 81     | 109    | 130    | 101    | 124    | 163    | 1,016    |
| Aneurism .....                           | —      | —      | 1      | 1      | —      | —      | 10     | 2      | —      | —      | 4        |
| Embolism .....                           | 9      | 9      | 1      | 6      | 3      | 4      | 7      | 11     | 7      | 13     | 73       |
| Phlebitis .....                          | 4      | 4      | 7      | 3      | 3      | 2      | 6      | 5      | 2      | 2      | 38       |
| Others and ill-defined .....             | 54     | 60     | 123    | 102    | 107    | 122    | 228    | 185    | 218    | 186    | 1,385    |
| <i>Diseases of Respiratory System.</i>   |        |        |        |        |        |        |        |        |        |        |          |
| Laryngitis .....                         | 166    | 168    | 197    | 208    | 202    | 220    | 224    | 212    | 222    | 255    | 2,074    |
| Croup .....                              | 370    | 409    | 440    | 419    | 455    | 402    | 441    | 381    | 375    | 340    | 4,082    |
| Other diseases of larynx .....           | 27     | 21     | 38     | 23     | 15     | 21     | 22     | 39     | 30     | 16     | 252      |
| Emphysema .....                          | 1      | 5      | 15     | 17     | 12     | 11     | 12     | 8      | 7      | 16     | 104      |
| Bronchitis .....                         | 14,104 | 16,323 | 15,845 | 15,341 | 17,473 | 16,533 | 16,045 | 16,373 | 16,118 | 17,231 | 161,586  |
| Pneumonia .....                          | 5,119  | 5,785  | 5,647  | 5,489  | 6,088  | 5,682  | 6,075  | 6,134  | 6,335  | 7,139  | 59,493   |
| Pleurisy .....                           | 36     | 34     | 43     | 49     | 42     | 53     | 48     | 44     | 47     | 53     | 449      |
| Others and ill-defined .....             | 1,223  | 1,329  | 1,290  | 1,359  | 1,398  | 1,315  | 1,248  | 1,259  | 1,226  | 1,159  | 12,806   |

*Analysis of Causes of Death, Infants, 1881-90—Contd.*

|                                      | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1881-90. |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| <i>Diseases of Digestive System.</i> |       |       |       |       |       |       |       |       |       |       |          |
| Stomatitis .....                     | 215   | 250   | 264   | 363   | 274   | 340   | 338   | 288   | 396   | 281   | 3,009    |
| Dentition .....                      | 2,469 | 2,539 | 2,562 | 2,676 | 2,608 | 2,715 | 2,379 | 2,354 | 2,418 | 2,534 | 25,254   |
| Sore throat .....                    | 87    | 97    | 84    | 92    | 82    | 90    | 90    | 77    | 77    | 87    | 863      |
| Dyspepsia .....                      | 126   | 162   | 166   | 188   | 158   | 225   | 190   | 183   | 212   | 235   | 1,845    |
| Hæmatemesis .....                    | 23    | 18    | 18    | 22    | 22    | 23    | 21    | 20    | 26    | 18    | 211      |
| Melæna .....                         | 57    | 45    | 52    | 36    | 41    | 65    | 54    | 56    | 39    | 41    | 486      |
| Diseases of stomach.....             | 323   | 296   | 407   | 541   | 545   | 809   | 708   | 667   | 727   | 932   | 5,955    |
| Enteritis .....                      | 908   | 1,049 | 1,010 | 1,261 | 1,101 | 1,702 | 1,588 | 1,532 | 2,084 | 2,462 | 14,692   |
| Ulceration of intestine .....        | 23    | 27    | 33    | 19    | 24    | 24    | 16    | 14    | 20    | 26    | 226      |
| Ileus .....                          | 164   | 213   | 135   | 97    | 195   | 206   | 196   | 212   | 223   | 228   | 1,869    |
| Strangulation .....                  | 8     | 4     | 2     | 1     | 1     | 2     | 3     | 8     | 5     | 4     | 38       |
| Intussusception .....                | 134   | 139   | 145   | 144   | 148   | 156   | 133   | 171   | 164   | 166   | 1,500    |
| Hernia .....                         | 72    | 68    | 74    | 79    | 82    | 96    | 56    | 69    | 81    | 64    | 741      |
| Fistula .....                        | 1     | 2     | —     | —     | —     | 1     | 3     | 4     | 2     | —     | 13       |
| Peritonitis.....                     | 147   | 170   | 183   | 177   | 178   | 189   | 194   | 165   | 162   | 198   | 1,763    |
| Ascites .....                        | 12    | 13    | 11    | 13    | 10    | 11    | 16    | 8     | 9     | 9     | 112      |
| Gallstones.....                      | 1     | —     | —     | —     | —     | —     | 2     | —     | —     | 1     | 4        |
| Cirrhosis .....                      | 2     | 1     | 4     | 3     | 6     | 5     | 9     | 3     | 1     | 1     | 35       |
| Other liver diseases.....            | 839   | 864   | 820   | 899   | 796   | 858   | 821   | 787   | 773   | 764   | 8,221    |
| Others and ill-defined.....          | 383   | 450   | 391   | 200   | 89    | 94    | 125   | 257   | 191   | 252   | 2,432    |
| <i>Diseases of Lymphatic System.</i> |       |       |       |       |       |       |       |       |       |       |          |
| Lymphatic diseases .....             | 34    | 38    | 8     | 17    | 20    | 30    | 20    | 17    | 18    | 23    | 225      |
| Diseases of spleen .....             | 6     | 5     | 8     | 7     | 15    | 7     | 8     | 7     | 5     | 2     | 70       |
| Bronchocle .....                     | —     | —     | —     | 1     | —     | 3     | —     | 6     | 4     | 5     | 19       |

*Analysis of Causes of Death, Infants, 1881-90—Contd.*

|   | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891-90. |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| <i>Diseases of Urinary System.</i>      |       |       |       |       |       |       |       |       |       |       |          |
| Acute nephritis .....                   | 39    | 52    | 56    | 65    | 77    | 69    | 58    | 84    | 86    | 73    | 659      |
| Bright's disease .....                  | 37    | 38    | 41    | 55    | 66    | 57    | 56    | 46    | 62    | 46    | 504      |
| Uremia .....                            | 7     | 10    | 5     | 5     | 10    | 7     | 2     | 10    | 5     | 9     | 70       |
| Suppression of urine .....              | 9     | 13    | 15    | 16    | 8     | 16    | 14    | 10    | 13    | 15    | 129      |
| Calculus .....                          | —     | —     | —     | —     | 1     | 1     | 2     | —     | —     | —     | 4        |
| Hæmaturia .....                         | 4     | 4     | —     | 5     | 2     | 2     | 2     | 4     | 2     | —     | 25       |
| Diseases of bladder .....               | 4     | 3     | 3     | 3     | 7     | 6     | 8     | 4     | 7     | 6     | 51       |
| Others .....                            | 15    | 20    | 20    | 28    | 42    | 29    | 25    | 31    | 19    | 29    | 258      |
| <i>Diseases of Bones and Joints.</i>    |       |       |       |       |       |       |       |       |       |       |          |
| Caries .....                            | 14    | 24    | 27    | 22    | 39    | 26    | 20    | 20    | 28    | 15    | 235      |
| Arthritis .....                         | 14    | 9     | 11    | 16    | 14    | 17    | 10    | 15    | 10    | 23    | 139      |
| Others .....                            | 39    | 38    | 25    | 18    | 22    | 38    | 44    | 36    | 26    | 38    | 324      |
| <i>Diseases of Reproductive System.</i> |       |       |       |       |       |       |       |       |       |       |          |
| Ovarian disease .....                   | —     | 1     | —     | —     | —     | —     | —     | —     | —     | —     | 1        |
| Uterus .....                            | 8     | 10    | 9     | 9     | 7     | 6     | 5     | 8     | 11    | 13    | 86       |
| Pelvic abscess .....                    | 1     | —     | 2     | 2     | 1     | —     | 1     | —     | 1     | —     | 8        |
| Perineal ab-cess .....                  | 2     | 2     | 2     | 4     | 1     | 1     | 3     | 1     | 2     | 1     | 19       |
| Testes, penis, &c. ....                 | 19    | 27    | 19    | 23    | 21    | 15    | 11    | 21    | 14    | 21    | 191      |
| <i>Diseases of the Skin.</i>            |       |       |       |       |       |       |       |       |       |       |          |
| Carbuncle .....                         | 2     | 2     | 4     | —     | 1     | —     | 7     | 3     | 3     | 3     | 25       |
| Phlegmon .....                          | 53    | 53    | 74    | 68    | 68    | 80    | 65    | 84    | 57    | 97    | 699      |
| Lupus .....                             | —     | —     | 1     | —     | —     | 2     | —     | —     | —     | 1     | 4        |

VOL. LVII. PART I.

H

*Analysis of Causes of Death, Infants, 1881-90—Contd.*

|                                       | 1881.  | 1882.  | 1883.  | 1884.  | 1885.  | 1886.  | 1887.  | 1888.  | 1889.  | 1890.  | 1881-90. |
|---------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| <i>Diseases of the Skin—Contd.</i>    |        |        |        |        |        |        |        |        |        |        |          |
| Ulcer.....                            | 51     | 48     | 56     | 32     | 30     | 32     | 48     | 36     | 41     | 41     | 415      |
| Eczéma.....                           | 216    | 238    | 242    | 285    | 255    | 270    | 238    | 266    | 255    | 263    | 2,543    |
| Pemphigus.....                        | 35     | 65     | 47     | 55     | 49     | 61     | 68     | 66     | 77     | 70     | 593      |
| Others.....                           | 128    | 124    | 112    | 151    | 108    | 112    | 107    | 100    | 96     | 98     | 1,136    |
| <i>Violence.</i>                      |        |        |        |        |        |        |        |        |        |        |          |
| Fractures.....                        | 82     | 63     | 72     | 76     | 77     | 63     | 89     | 76     | 59     | 64     | 121      |
| Gunshot.....                          | —      | —      | —      | —      | —      | —      | —      | —      | 2      | —      | 2        |
| Cut, stab.....                        | 1      | —      | —      | 3      | 2      | —      | —      | 4      | 1      | 4      | 15       |
| Burn, scald.....                      | 114    | 103    | 126    | 104    | 98     | 110    | 119    | 114    | 103    | 110    | 1,101    |
| Poison.....                           | 34     | 26     | 39     | 21     | 27     | 18     | 24     | 18     | 23     | 22     | 252      |
| Drowning.....                         | 64     | 49     | 38     | 24     | 24     | 17     | 24     | 30     | 30     | 34     | 384      |
| Suffocation.....                      | 1,389  | 1,388  | 1,431  | 1,377  | 1,365  | 1,445  | 1,505  | 1,647  | 1,633  | 1,776  | 14,956   |
| Others.....                           | 194    | 199    | 296    | 290    | 303    | 294    | 280    | 321    | 228    | 300    | 2,685    |
| Murder.....                           | 134    | 101    | 110    | 98     | 90     | 96     | 114    | 100    | 98     | 88     | 1,029    |
| <i>Others and Ill-defined Causes.</i> |        |        |        |        |        |        |        |        |        |        |          |
| Dropsy.....                           | 78     | 70     | 82     | 48     | 30     | 26     | 27     | 25     | 15     | 21     | 422      |
| Debility, Atrophy and Inanition.....  | 18,832 | 19,449 | 20,450 | 21,181 | 18,904 | 20,819 | 18,972 | 18,417 | 18,615 | 18,890 | 194,529  |
| Mortification.....                    | 82     | 30     | 26     | 16     | 17     | 12     | 18     | 22     | 14     | 26     | 213      |
| Tumour.....                           | 7      | 10     | 16     | 15     | 11     | 22     | 8      | 6      | 7      | 8      | 110      |
| Abscess.....                          | 196    | 242    | 213    | 235    | 209    | 223    | 239    | 219    | 184    | 188    | 2,148    |
| Hæmorrhage.....                       | 19     | 14     | 11     | 4      | 7      | 6      | 21     | 9      | 13     | 10     | 114      |
| Sudden.....                           | 57     | 58     | 74     | 97     | 86     | 89     | 98     | 96     | 69     | 86     | 810      |
| Others.....                           | 1,373  | 1,180  | 1,364  | 1,389  | 1,307  | 1,294  | 1,235  | 1,184  | 1,105  | 1,075  | 12,556   |

DISCUSSION *on* DR. JONES'S PAPER.

THE PRESIDENT said he was sure that all those present would feel, with him, that the paper just read was well worthy of being connected with the name of Howard. There was good ground for hope in the figures laid before them, for one, at least, of the causes of the high death-rate among infants was remediable, namely ignorance. This high mortality was commonly associated, in the minds of most people, with murder for the sake of the insurance money, and it was very satisfactory to find that there was no sufficient evidence to bear out such a supposition. Poverty, and still more, ignorance and folly, were the causes of the large death-rate. The improper feeding of the children was due to the extraordinary recklessness on the part of the poor, and the same food was often given to infants under one year as to adults. One reason why the mortality among Scotch children was less than amongst the English seemed to be that the food generally consumed there was more suitable for children than in England. Dangers from illness, such as croup and the like, could often only be obviated by lavish expenditure, and in these cases the poor were at a great disadvantage; but the majority of the causes of infantile death would disappear if the people were better educated.

Mr. F. HENDRIKS concurred with the President in taking a hopeful view of the figures. He had been rather struck with the observation to the effect that the mortality tended to increase where the purse was lighter. Statistical information was wanting as to the rates of infant mortality amongst the classes and the masses; but some twenty years ago, the late Mr. Charles Ansell (junior) had collected statistics in reply to a large number of circulars sent to the upper and professional classes regarding this point. The returns were, of course, of a purely voluntary nature, and the results, therefore, not perfectly satisfactory: but the impression he had gathered from Mr. Ansell's researches was that the mortality during the first five years of life did not differ much in the two classes. That inquiry did not, however, cover more than some 50,000 children. He was afraid that the actuaries could not throw much light upon this question, as very few of them had anything to do with the insurance of children in particular.

Dr. FRANCIS WARNER said that he was not fully competent to speak upon the statistics of infant mortality, but he would like to say a few words concerning his own observations among school children. The author had referred to the laborious occupations of women in connection with the developmental condition of their children, this subject had now an important bearing on the labour question, and there was no doubt that the large number of badly-developed children, who reached adult age, had greatly increased

the number of the unemployed. The President had spoken of the advantages possessed by the wealthy in rearing children, but he (Dr. Warner) had found (*Journal of the Royal Statistical Society*, March, 1893, pp. 71—95) that, contrary to expectation, ill-development among children did not appear to be more common amongst the very poorest classes than amongst the middle and better class families. The proportion of cases of low nutrition and of defective development was in fact rather higher in the middle class than in the poorest elementary schools, and he did not think the born-chance of living, and the physical development of the poorer children were less than those of the better classes. Atrophy without disease generally occurred among children with small and imperfect brains, and such children if they grew up were apt to be delicate. An improvement in the general conditions of development among the child population would greatly diminish the infant mortality, and would also prevent many children from growing up mere weaklings. The proportion of ill-developed children varied much in different districts, and conditions of building were of importance. Dr. Jones had spoken with qualified approval of the artisans block-dwellings, and his (Dr. Warner's) own observations had led him to conclude that degenerative changes were possibly taking place (especially among the girls, who were more susceptible to conditions of environment) in neighbourhoods where many such buildings existed. He had noticed this more particularly in the city of London, where not only did the people inhabit the large block dwellings, but the neighbourhood consisted, as it were, of deep valleys overshadowed by high mountains. The same thing could be said of the higher class residential property in Kensington and Chelsea, for there the children were much inferior to those of poor districts like Islington; and these conclusions appeared to be confirmed by inquiries amongst the schools in these districts.

He would be glad to know if Dr. Jones could state anything concerning the different mortality, in boys and girls, of the conditions of defective development. He had, himself, found that while a greater number of boys showed the conditions of bad development (except small heads), yet when the girl had some mal-development she was more delicate than the boy, and he should suspect that developmental causes conduced more to mortality among girls than among boys. Again, the variation of infant mortality according to the nationality would be extremely interesting; the conditions of development among Jews, Irish, and English varied greatly. He agreed that much good was to be expected from more general education, and this appeared to him one reason why the Jewish children, sometimes living under the most disadvantageous circumstances and in great poverty, as in Whitechapel, were yet seldom affected with atrophy, &c. The converse of this held good among the Irish, among whom education was not so general, and not of such long standing.

Mr. NOEL A. HUMPHREYS thought that, in one or two respects, the statistics might be improved. He entirely approved of con-



fining the term "infant" to children under 1 year of age, and also of the method of calculating infant mortality by the proportion of deaths under that age to the births: this method was above suspicion now that birth registration was practically complete. But partly from necessity, Dr. Jones had also adopted another method, which was open to very grave objection. He had in Tables II and III calculated the proportion of deaths under 1 year to the estimated number of persons living under 1 year of age. In the census returns the number of persons living under 1 year of age was very much under-estimated, because parents in their census schedules frequently returned a child in its first year, as aged 1 year, and consequently the number of children under 1 year of age is very considerably under-stated in the census returns. With regard to the influence of female occupation upon infant mortality—a subject of which the importance could scarcely be over-rated—he thought that this question had been pre-judged without sufficient evidence. It was well known that the infant death-rate was high in Lancashire and the West Riding of Yorkshire, where many women were employed in the factories, and also that it was low in rural districts, where there was much less female occupation. He was quite prepared to believe that factory employment of married women must be injurious to the health of their children; still, statistics did not entirely support the assertion that factory employment was the main cause of the high rate of infant mortality in Lancashire. In Durham and South Wales, both mining districts, where females were consequently not much engaged in industrial occupations, the infant mortality was higher than in the West Riding of Yorkshire. Again, the gradual increase in the number of premature births had been attributed to the increasing employment of women; but the death-rate from premature births was higher in Norfolk and Suffolk than in Lancashire and the West Riding of Yorkshire, where the industrial employment of women had reached its highest development: 37 to 43 per cent. of the women in the two latter counties were engaged in some occupation, against only 20 per cent. in Norfolk and Suffolk. Of course it was impossible to say that premature births and the employment of females were *not* connected, but the question required fuller and more careful investigation. His own inquiries led him to the belief that overcrowding and other general insanitary conditions had a much greater influence on the rate of infant mortality than female occupation, and he hoped that some reliable statistics might shortly be prepared in order to throw more light on this important question.

Mrs. FAWCETT said that it must not be overlooked, in considering the effect of the employment of women on infant mortality, that the present century, which had eminently been one of the uprise and growth of women's occupation, was also a century of the most rapid increase in the population. The number of the people had more than trebled itself since 1800 (the population of England and Wales having grown in that time from nearly 9,000,000 to

29,000,000), whereas it took something like four centuries from the time of the Black Death up to the year 1800 to even double the population. Therefore it seemed that general insanitary conditions were a much more important factor than industrial employment in the high rate of infant mortality. Although no doubt in many cases children suffered from the absence of the mothers from home, there were compensating circumstances, such as her being able to provide them with better food and better sanitary surroundings with the result of her labour, and this was the more marked in the case of children who had weathered the storms of the first year of infancy. These advantages, she thought, went a long way towards compensating the ill effects of the mother's industrial employment.

Mr. A. H. BAILEY said that a good many years ago, he, with a friend, had made an investigation into the rate of mortality among the families of the peerage, and amongst other remarkable results he had found that the rate in the children of these families differed in a marked degree from that of the population generally, being much more favourable. Those observations were more to the purpose than Mr. Ansell's statistics. He was very glad to hear Dr. Jones's opinion as to the insurance on the lives of children. He considered it a shameful thing to say that human beings effected insurances on the lives of their children in order to make a monetary profit. There was one society at the present moment which had insurances on the lives of more than 2,000,000 children: that Society had investigated the mortality among those children with extreme accuracy, with the result that the mortality was found to be less among them than among the children throughout the country generally. As a matter of fact, mothers desired to have what they called a decent funeral, and the death-rate among infants was so high, that they persuaded the husband to lay by a penny a week, for which they could obtain a minimum sum of thirty shillings, and a maximum of ten pounds. It was not thrift, it was simply a provision for a calamity to which infants were peculiarly liable.

Mr. ROWLAND HAMILTON wished to thank Dr. Jones for this contribution to the many sources of inquiry made with regard to the system of national education. The great work done by the Educational Department had been the training of teachers. Many men and women were engaged in teaching with much zeal and earnestness, and it was through the agency of training colleges that they hoped to enlarge the range of the subjects taught. With regard to the insurance of infants, he had himself made some inquiries into the subject, and had come to the conclusion that the general charge of insuring children to obtain the money on their early death was a gross libel upon the masses. Poor people spoke of the death of their children, or of their own, in a way which was perhaps somewhat shocking to others. Death was more familiar to them, and there might be some reasons for the safeguards adopted by many prominent insurance companies; but

it must not be forgotten that one of the reasons for the institution of friendly societies was to secure the seemly funeral for their dead, which was so great an object of desire to the class who supported the institution.

Mr. E. A. RUSHER asked whether Dr. Jones had any special reason for the assertion that, while the Rev. Benjamin Waugh estimated that 33 per cent. of the children of the industrial classes were insured, and Captain Marshall estimated the same proportion at 80 per cent., the truth probably lay between these two figures. He himself thought that the 80 per cent. was very much nearer the actual fact. This would also seem to be in close agreement with Dr. Jones's own experience, that "85 per cent. of the children in his own hospital were insured."

Dr. HUGH JONES, in reply, said that the statement that "the heavier the purse the less the mortality," was borne out by certain statistics from Preston, where it was found that the child mortality among the upper class was much less than among the lower. In answer to Dr. Warner, he could also state that the death-rate from congenital malformation was higher for boys than for girls. The influence of nationality was a difficult subject to tackle in Liverpool, owing to the variety of races there represented, and it was a subject which, for the sake of peace, it was better to avoid. He quite agreed with Mr. Humphreys as to the importance of considering the rate of infant mortality rather than the infant death-rate. He held a very definite opinion that the industrial occupation of women did conduce to excessive infant mortality. The impression left upon his mind by his hospital experience was that where the mother was at work, the infant was almost always neglected; and when such children were admitted into hospital, they generally proved bad patients. There were some statistics on this point. During the last twenty-five years the general death-rate in Belgium had decreased from 24 or 25 per cent. to 20·25, and the sanitation there had greatly improved, yet the rate of infant mortality had risen from 148 to 159 per cent.; and the only explanation which had been offered was the more frequent employment of women in industrial occupations during the last twenty-five years. The statement as to the proportion of children insured required a little explanation. He was decidedly of opinion that Mr. Waugh had under-estimated, as much as Captain Marshall had over-estimated, the proportion, in spite of the fact that he, himself, had found that 85 per cent. of his hospital patients were insured. But in dealing with hospital statistics he had entirely confined himself to children under 18 months old; and the number of policies which lapsed between the ages of 18 months and 10 years was quite sufficient to account for the discrepancy between his figures and those obtained from inquest statistics.

A cordial vote of thanks to Dr. Jones brought the proceedings to a close.

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