

A paper on excessive infant mortality, its causes and their removal : read at the eighth annual meeting of the National Association, for the Promotion of Social Science, held at York, September, 1864.

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Mr. Trenchard

A PAPER

ON



EXCESSIVE INFANT MORTALITY,

ITS CAUSES AND THEIR REMOVAL,

READ

AT THE EIGHTH ANNUAL MEETING

OF

THE NATIONAL ASSOCIATION,

FOR

THE PROMOTION OF SOCIAL SCIENCE,

HELD AT YORK,

SEPTEMBER, 1864.

By W. S. Trenchard

LIVERPOOL:

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THE COUNCIL OF THE NATIONAL ASSOCIATION
FOR
THE PROMOTION OF SOCIAL SCIENCE.

INFANT MORTALITY.

ONE of the most important subjects of discussion to which the attention of the members of this Section has been invited, is the causes and prevention of excessive infant mortality. There are, no doubt, many concurring agencies—moral and physical—working to that result; but no correct reasoning on their nature and extent can be framed without a knowledge of the natural history of those diseases which are found to be most common and fatal in their consequences among the young. For, in this as in every other inquiry after truth, it is not only necessary to take an enlarged view of the subject, but also to bring our theories to the test of experiment and practical observation. The danger, indeed, of all hypothesis is the absence of unbiassed research; the use of all discussion is to eliminate the errors of preconceived opinion. And it is evident that on this very question there is necessity for cautious discrimination, since some writers appear only to see, and form their opinions from the existence of moral causations—the neglect, ignorance, crimes, and bad habits of parents; while pure physicians, on the contrary, are apt to ignore all antecedent or concurrent circumstances, and merely recognise the constitutional peculiarities and pathological conditions of disease. As a help to correct opinion and guide the judgment, it has appeared to me probable that it would serve a good purpose to analyse, without partiality or prejudice, the death registry of a large and varied community over a defined though lengthened period of time. It is for such a purpose that I have prepared two charts, showing a synopsis of the death records of the Borough of Liverpool during the last ten years. My remarks on these statistics will, and indeed need, be but few, for I wish rather to state facts than to write an essay.

The number of deaths registered in the Borough of Liverpool in the ten years—January 1st, 1854, to December 31st, 1863—was

130,009 ; of which 65,238, or more than half were of children under five years of age. This infantile mortality is arranged in various proportions under all the classes of our nosology. Of every thousand deaths, zymotics account for 371 ; tubercular diseases for 84 ; diseases of the brain for 116 ; of the lungs for 178 ; of the stomach and bowels for 38 ; of other organs and textures for 13. So far, physicians are able to localise with more or less accuracy the pathological accidents of four-fifths of registered deaths of children ; but the remaining one-fifth embraces premature birth, malformations, wasting, debility, privation, accident, and crimes as the causes of the fatal end.

The exanthemata are of all zymotics the most destructive to children. Thus small-pox, measles, and scarlet fever, occasioned more than a third of the total deaths registered under that class. Although these diseases are never altogether absent from Liverpool, yet their history shows periods of remarkable increase and subsidence. They will remain dormant for months and years, and then waken up to fearful intensity and force ; but so erratic their courses, so occult the influences which direct them, that no explanation can be given of the laws which regulate their progression, and no reasoning account for the sudden exacerbations and equally sudden lulls of the contagious virus. Small-pox prevailed extensively in 1858, waned in 1859, and almost disappeared from the death registry in 1860, 1861, and 1862. Measles dominated in 1854, and then for two succeeding years gradually declined in its extent and virulence, till in 1857 its effects on infant mortality were reduced from 672 to 106. Scarlatina in 1858 numbered among its victims 872 children ; but in the two following years, its death roll fell successively to 312 and 113. After each period of quietude there invariably succeeded one of renewed activity. Small-pox reassumed its epidemic force in 1863, measles in 1858, and scarlatina in 1861 and 1862. In the case of small-pox it may be surmised that the fears occasioned by the epidemic of 1858 having induced parents to vaccinate their children produced the comparative immunity of 1860 and 1861 ; while the health of those years engendered neglect which told adversely in 1863. But the most rational explanation of this alternation of rest and action is found in that remarkable characteristic of these diseases - the immunity of a person from a second attack. An epi-

demic is supposed to exhaust the numbers of the unprotected, and a lapse of time to be required before fresh victims are collected for the harvest of sickness and death. But this, though not altogether fallacious, is certainly not the whole truth. If we analyse the registry of measles we find that in 1858 there died 206 children between the ages of one and two, and 198 between those of two and five, a vast proportion of whom must not only have been unprotected in 1857 (the year of comparative quietude) but must also have been in that period of life which is very subject to the influences of contagion. The same may be said of scarlatina, many of whose victims in 1861 and 1862 must have lived through 1860. It is not from want of aliment that such diseases cease their ravages. This might account for their temporary migration from a court, a street, or even one district of a town to another, but not for their torpidity amidst an ever-changing population of 500,000 souls. Nor can any satisfactory explanation of the phenomena be obtained from variations of physical causation; for in Liverpool the vigilance of the Inspectors had remained unabated in bad as in good years, while the peculiarities of place and condition, the sanitary defects, and the exciting causes of constitutional derangement, were the same.

There are apparent in the statistics of the ten years some curious facts, but whether coincidences or bearing toward each other the relationship of cause and effect, must be determined on a wider field of inquiry.

1st. Small-pox was least prevalent in the third or September quarters, when the range of the thermometer is highest. It was most prevalent in the first and second quarters of 1858, and almost absent during the second and third quarters of 1861. The mean heat during the former periods was 48.5; during the latter 57.4; the range of the barometer and dew point difference being almost identical, and the only other difference being amount and duration of rain, which was greatest in 1861.

As we know from experience that a high degree of atmospheric heat soon exhausts the power of the vaccine-pox, it may be a reasonable question to ask whether the virulence of the contagion of small-pox in the clothes of patients is not weakened by summer heat, and one mode of its propagation thereby lessened.

The greatest number of the sufferers from small-pox were children

under one year of age—a strong argument for very early vaccination.

2nd. Measles was most fatal during the second or June quarter of the year, when the temperature of the air is most variable, and the mucous membranes of the lungs subjected to the vicissitudes of sudden heat and cold. The spring of 1854 was remarkable for an epidemic of this disease, and I find that the variations of a single day in May was as much as 22·3, and the difference between the highest and lowest reading of the thermometer in the quarter as great as 47·6. It is probably the comparative absence of such sudden variations in the third or September quarter which makes that season the most exempt of any from the fatal consequences of measles; and as physicians in its treatment depend more on regulated temperature than on drugs, so its prophylaxis during epidemics will be found in the avoidance of all chills or the excitors of pulmonary congestions. The most numerous victims of measles were children in the second year of their age; but whether that be due to the mucous irritation and constitutional excitability consequent on teething, or to the fact that children at that period of life having just left the breast are more exposed to cold, it is needless to inquire, since either hypothesis points to pulmonary congestions as a pathological accompaniment of the disease.

Scarlatina caused the deaths of 4,619 children. Unlike measles, it delights in the months when the fickleness of May and June has been changed for the steady heat of Midsummer, or the persistent inclemency of Winter, and presents to measles this further contrast, that its most numerous victims were found between the ages of two and five, when children first congregate together as playfellows and companions. This seems to indicate that contagion is an all-important element in its propagation.

My own observations in Liverpool convince me that overcrowding is the chief sanitary evil which encourages the spread of the exanthemata, not merely by bringing into dangerous contact the healthy with the sick, but also by intensifying the virus of the contagion by the impure emanations of families confined in close unventilated apartments. With regard to the prevention of the spread of these maladies, there appears to be wanting in all towns

the means of ready and easy disinfection of the clothes and beds of the sick. It is not sufficient that linen, cotton, and flannel articles be cleaned, or the apartments purified by lime-washing, if the mattresses, beds, and woollen garments remain as fomites of contagion. Something more remains not only to be done, but to be rendered practically easy of being done, by the means being placed within the reach of the poorest inhabitants. In the year 1831 the celebrated physician and philosopher, Dr. Henry, of Manchester, performed many experiments to prove that heat of 212° Fahr. destroyed the qualities of contagion. He described an apparatus by which the air of a chamber or vessel could be raised to this degree, and proposed that, in lieu of the then oppressive quarantine regulations, all the textile fabrics of commerce should be subjected to this heat. Although his views as respected customs' regulations were not followed, the scientific truth remains a boon to humanity. His plan of disinfection has been adopted in our model prisons with admirable success, and I am glad to be able to state that the Health Committee of Liverpool have favourably entertained the principle of erecting, at the public charge, such chambers in different parts of the town for the convenience of the poor. It may require years before the lower orders of society can be educated to a perfect appreciation of the benefits of a scheme which at no cost and little trouble will tend to destroy the plague that robs them of their little ones; but so manifest are the effects of an elevated temperature in destroying vermin, and thereby promoting cleanliness and comfort, that for these results alone there can be no doubt of Henry's Stoves being extensively used. The establishment of these stoves will also enable pawnbrokers and other tradesmen to purify from infection the clothes, bedding, and furniture of households broken up by death, or of families who selfishly and treacherously sell what they fear to retain. The extent to which diseases, especially small-pox, scarlatina, and typhus are propagated from the stores of dealers in old clothes and similar second-hand articles, is very great; and as it would require only the trouble of carrying and placing such fomites in the stove for four or five hours to render them innocuous, it is reasonable to believe that it will be extensively practised. Some slight charge might be made for the use of the stove; but as the dire enemy against which we war with the weapons of sanitary

science is emphatically a public one, we must raise no impediment to the force or efficiency of our armoury, but carry on, if need be, the battle at the public cost.

Hooping cough which, next to diarrhœa, caused more deaths among children than any other single zymotic, was less affected by variations of season and of age ; but, as in its prominent symptoms it resembles bronchitic affections, like them it was most fatal in the first and fourth quarters of the year, when the temperature is lowest.

Diarrhœa caused 6,653 deaths, of which 5,737 were of children below five years of age. Indeed, so peculiarly is it the scourge of earliest infancy that 3,565, equal to fifty-three per cent. of its victims at all ages, occurred among infants below one year of age ; and of the remaining number, 1,633, or more than half among those who were between their first and second year. It is the most fatal of all our zymotics ; nor during the short period over which its dread reign extends, is it second to the Asiatic cholera, even when that awful visitant sweeps as a destroying pestilence over the land. But diarrhœa is perennial ; it comes as an epidemic with a punctual constancy, year after year, and marks the months of August and September as unerringly as do the notes of the cuckoo the approach of spring. The average number of deaths in Liverpool from this disease during the March and June quarters of the year is four or five weekly ; but during the month of August it rises to 50, 60, or 70 in the same period. The cause of this vast and sudden increase of deaths of children in those sunny months of summer when nature intended the young to be joyous, healthy, and happy, is a question worthy of our most serious consideration. That atmospheric heat is a concomitant of its increased death-rate is certain ; that the two are relatively proportionate is very probable ; and that the year 1857, the year of greatest mortality from diarrhœa, was also the period when the range of the thermometer was highest, is, though a single fact, more than an accidental coincidence. I have stated that 1857 was the highest ; for we must omit from our calculation the year 1854 when cholera was epidemic, as there then prevailed an exceptional predisposition to bowel complaints. But to assert that the summer temperature of our English climate is *per se* the cause of infant mortality is to assume

that the tender infant which requires the constant aid of artificial, cannot endure the more genial influence of natural, heat. This might be the cause if children below one year of age were insulated or exposed to the direct rays of the sun ; but not otherwise. The summer heat, however, is indirectly not innocuous, since it promotes putrefactive and chemical changes, and generates poisonous gases from decaying vegetable and animal matter. I know no disease, not even typhus, which is a more unerring test of the presence of sanitary defects ; for the delicate organisation of infant life is more susceptible to the noxious influence of depressing or irritating miasms than is the coarser temperament of the adult ; and as enteric fever is called pythogenic because it springs from putrefactive fermentation, so diarrhoea for the same reason may be rightly termed the pythogenic disease of infancy. Epidemic diarrhoea is never present without the co-existence of sanitary evils of more or less magnitude. In this it differs from whooping-cough and the exanthemata, whose contagion spreads from centres to large peripheries, and frequently embraces localities of natural salubrity. This peculiarity is not merely a striking feature in the history of zymotics, but it is also one which shows the necessity of diversity in the manner of adopting the several modes of prevention. In some the object to be attained is chiefly to check the extension of disease ; in the other to remove the first and original cause of the mischief. Yet, apart from the laws which regulate the diffusion of the poison of infection, they all unite in the one great and universal principle of being more intensified in their action, and more fatal in their effects under the influence of the depressing and enervating accidents of squalid filth, close apartments, and unventilated dwellings. If we visit districts afflicted with either typhus or diarrhoea, we find the other residents, especially children, suffering from chronic weakness and debility, as if the miasm, too attenuated to produce active symptoms of functional derangements, was gradually undermining the strength of the constitution. Indeed, the slow inroads of disease occasioned by what may be termed the chronic taint of impurities, deserves the most serious attention of the physician and of the social economist. Its ravages are so insidious that irreparable injury is done before alarm of the latent enemy is aroused, and on so great a scale of numbers,

that it is only when extraneous forces, such as specific contagions come into play, that the dire effects can be adequately realised. Measles is not to the healthy and the strong a lethal malady; but if it attacks children, weakened by the slow poisoning of a mephetic atmosphere, it commits ravages only to be equalled by the most deadly pestilence; and so with all the other zymotics. The first effect of breathing impure air is low vitality; then follow deranged nutrition, tubercular depositions, the strumous diathesis. And from this source springs a host of maladies, not merely consumption, *tabes mesenterica*, and hydrocephalus, but in the young the inflammations and diseases of the brain, which with convulsions are pathologically the first stages of hydrocephalus. Nor can we practically separate the influence of scrofula from any class in the whole catalogue of infant disease, whether it be manifest in bronchitis, pneumonia, pulmonary congestion, or the various forms of atrophy and marasmus. Thus it is evident that if our children are surrounded in their young existence by hosts of maladies, there is given to us by a wise and beneficent Providence, the means of defending them from the assault, or at least of mitigating its violence.

It is how to use our conservative armoury to the best advantage; how most successfully to apply the teaching of sanitary science on behalf of the helpless innocents, that will occupy the attention of the members of this Society. It would be a tedious prolixity in me to recapitulate truths fully recognised by all who have thought on this subject, or to dwell upon such first principles of hygiene as the necessity of obtaining proper space around buildings, of avoiding overcrowding of houses on superficial area, of securing good drainage, and removing middens and every other cause of prejudicial nuisance. These precautions, which belong to the external condition and neighbourhood of the dwellings of our poor, are very properly placed under the responsibility of official surveillance. Their importance is not only fully recognised, but, I believe, very honestly met by the strenuous exertions of Boards of Health.

It is, however, in regulating the hygiene of the inner homes and social habits of the poor that the greatest and almost insuperable difficulties are to be found. By what machinery, either of science, religion, or charity, shall the idle selfishness of parents be changed to self-denying love of offspring? How shall we not only pre-

vent the neglect of ordinary cleanliness, but secure proper food and clothing for children reared in the squalid precincts of indigence and want? How inculcate the commonest rules of sanitary science on mothers who keep infants for days wet and dirty in close un-ventilated rooms, or huddle them half smothered in the corners of beds occupied by two, sometimes three, or more adults of the family? Nor is it mere apathy, ignorance, or carelessness against which we have to contend. The researches of Lyon Playfair drew public attention to the fearful extent to which, in the families of our working classes, laudanum and other narcotics were indiscriminately administered to children for the purpose of quieting them either at night or during the absence of their parents. Though this baneful practice is not as rife in Liverpool as in the manufacturing districts, yet I have many reasons to believe that it extensively prevails. The formulas most frequently used are syrup of poppies, Godfrey's cordial, and paregoric; but some druggists vend their own nostrums under attractive names. One druggist, whose "Infant Preservative" has a local celebrity, informed me that from his own shop he dispenses on an average a gallon and a-half to two gallons per week, independently of what is sold by his agents in other parts of the town.

As on the labels of direction for use he prescribes three drops to an infant two or three days old, and gradually increases the dose to a teaspoonful and a-half for a child of two years old, some idea may be formed of the large number of children to whom it is administered. The narcotics are given nightly at bedtime and on washing days when the mothers are busy or on occasions when they go out for any length of time.

Then, if we turn to the records of the Coroner's Court during the Decenniad, we find that of the 2,215 instances of sudden or violent deaths of children, no fewer than 828 were suffocated in bed; the occasion being too frequently the drunkenness of parents. How to correct these moral and sanitary evils is a problem most difficult of solution. Laws, however stringent, are perfectly impotent for good in this respect; for the offenders are by their very wretchedness and squalid misery beyond the penalties of fines.

The remedy must be sought for in the effects of moral suasion rather than in legislative restrictions; for, unless the heart

and conscience of mothers are found responsive to our efforts, it will be a vain attempt to direct their holy duties and affections by a police espionage or the terrors of punishment. Active cruelty may be punished, because it is palpable and evident; but what jurist can, in mere legal phraseology, define the boundaries of maternal love, and say where passive neglect first assumes the character of cruelty and crime. It is only in the teaching and ministering charity of educated women that there rises one beam of hopeful amendment in this respect. The sympathy of woman finds an echo in the hearts of mothers, who, if not altogether deaf to religion, meet its teachings with hypocritical apothegms, framed less on resignation to the Divine behest than on the promptings of calculated selfishness.

I know nothing more distressing than to hear mothers, who make no efforts to save the children who remain, express their thankfulness that their little one is now at rest. It is more than the mockery of Christian resignation; it is the language of that dread philosophy of indifferentism to infant life which is engendered by the struggles of poverty and indigence, and which frequently leads to infanticide.

If I have ventured to speak hopefully of help from the teaching of educated women, it is because many are now working as district visitors and lay sisters of charity in the cause of social improvement. The enlightened benevolence of Florence Nightingale, and the success of her untiring exertions to improve the well-being of our soldiers, is an encouraging example and stimulus to those who are prepared to enter upon this wider field of charity.

In conclusion, I repeat that in submitting this paper to the Section I have refrained from laying down any hypothetical theory, but contented myself with a statement of facts bearing on the question of the causes of infant mortality. These facts, however, unmistakably show that a great portion of the deaths of children is attributable either to the type or constitution of epidemic disease or to moral causes, or to defects in the internal economy of houses of the lower classes, with which the law does not and cannot grapple.

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LIVERPOOL.

*Public Offices, Liverpool,
September, 1864.*

A SYNOPSIS OF THE ANNUAL AND QUARTERLY MORTALITY OF THE BOROUGH OF LIVERPOOL DURING THE LAST TEN YEARS.

POPULATION		1852.			1853.			1854.			1855.			1856.			1857.			1858.			1859.			1860.			1861.			1862.			1863.			1864.			1865.			1866.			1867.			1868.			1869.			1870.			1871.			1872.			1873.			1874.			1875.			1876.			1877.			1878.			1879.			1880.			1881.			1882.			1883.			1884.			1885.			1886.			1887.			1888.			1889.			1890.			1891.			1892.			1893.			1894.			1895.			1896.			1897.			1898.			1899.			1900.			1901.			1902.			1903.			1904.			1905.			1906.			1907.			1908.			1909.			1910.			1911.			1912.			1913.			1914.			1915.			1916.			1917.			1918.			1919.			1920.			1921.			1922.			1923.			1924.			1925.			1926.			1927.			1928.			1929.			1930.			1931.			1932.			1933.			1934.			1935.			1936.			1937.			1938.			1939.			1940.			1941.			1942.			1943.			1944.			1945.			1946.			1947.			1948.			1949.			1950.			1951.			1952.			1953.			1954.			1955.			1956.			1957.			1958.			1959.			1960.			1961.			1962.			1963.			1964.			1965.			1966.			1967.			1968.			1969.			1970.			1971.			1972.			1973.			1974.			1975.			1976.			1977.			1978.			1979.			1980.			1981.			1982.			1983.			1984.			1985.			1986.			1987.			1988.			1989.			1990.			1991.			1992.			1993.			1994.			1995.			1996.			1997.			1998.			1999.			2000.			2001.			2002.			2003.			2004.			2005.			2006.			2007.			2008.			2009.			2010.			2011.			2012.			2013.			2014.			2015.			2016.			2017.			2018.			2019.			2020.			2021.			2022.			2023.			2024.			2025.			2026.			2027.			2028.			2029.			2030.			2031.			2032.			2033.			2034.			2035.			2036.			2037.			2038.			2039.			2040.			2041.			2042.			2043.			2044.			2045.			2046.			2047.			2048.			2049.			2050.			2051.			2052.			2053.			2054.			2055.			2056.			2057.			2058.			2059.			2060.			2061.			2062.			2063.			2064.			2065.			2066.			2067.			2068.			2069.			2070.			2071.			2072.			2073.			2074.			2075.			2076.			2077.			2078.			2079.			2080.			2081.			2082.			2083.			2084.			2085.			2086.			2087.			2088.			2089.			2090.			2091.			2092.			2093.			2094.			2095.			2096.			2097.			2098.			2099.			2100.		
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