The Journal of the American Medical Association

Published under the Auspices of the Board of Trustees.

VOLUME LI

CHICAGO, ILLINOIS, SEPTEMBER 26, 1908.

Number 13

Addresses

INFANT MORTALITY.

CHAIRMAN'S ADDRESS BEFORE THE SECTION ON DISEASES
OF CHILDREN. AT THE FIFTY-NINTH ANNUAL SES-
SION, AMERICAN MEDICAL ASSOCIATION, 1908.

EDWIN E. GRAHAM, M.D.

Professor of Diseases of Children in Jefferson Medical College.
PHILADELPHIA.

The modern tendency in medicine is to concentrate each individual's efforts within comparatively narrow limits; if possible, to add some new facts or theories to present knowledge. The sum total of all the additions and advances has revolutionized medical knowledge in the last twenty years. Countless intelligent and zealous physicians working along different lines and in special departments of medicine have made it difficult, if not impossible, for any one to keep fully abreast of the times in all branches of medical science.

Perhaps this tendency in modern medical study has led to the neglect of certain broad principles of hygiene, diet, fresh air, bathing and general methods of living; these, being every one's business, have become no one's business.

John Gardner, surgeon, London, wrote in 1838 an interesting pamphlet on "Why So Large a Number of Children Perish." He appreciated certain physiologic differences between a child and an adult, and under "Dentition" wrote:

The true nature of the effect of this natural process on the health and life of children is much misapprehended. In a healthy body, the teeth are always cut without suffering, and not far wide of the ninth month. The passage of the teeth through the gums produces a slight excitement, which is not a deviation from health.

Benjamin J. Crew, of Philadelphia, wrote in 1882 an excellent article on "The Care of Deserted Infants," which was read before the Assembly Meeting of the Philadelphia Society for Organizing Charity, in March of that year. In this article he strongly advocates a combination of "placing out" and "asylum plan" for these infants and quotes statistics which clearly prove how great is the reduction in the mortality in infants under the plan of treatment advocated.

J. Brendon Curgenvin, M.R.C.S., London, 1867, writing on "The Waste of Infant Life," states that the excess of infantile mortality occurs in laboring people. The poorer and lower classes show a mortality of 35 to 55 per cent. under the age of five years; the educated and well-to-do, only 11 per cent. He analyzes the Registrar General's report, and shows clearly the causes of this excess of 24 to 44 per cent. of deaths. Reference will be made to these statistics later.

In an article written by Dr. William Farr, over thirty years ago, he stated that the mean annual death rates

of infants under one year in some of the principal countries of Europe were as follows: Out of one thousand infants there died yearly in Sweden 141.8; in Denmark, 137.5; in England, 182.6; in France, 223.2; in the Netherlands, 237.5; in Spain, 249.6; in Italy, 273.3.

The annual death rates in one thousand children under five years, according to the same authority, were: In Norway, 40.9; in Sweden, 51.4; in Denmark, 52.7; in England, 67.6; in Belgium, 74.9; in France, 79.2; in Prussia, 82.4; in Holland, 91.2; in Austria, 104.0; in Spain, 111.7; in Italy, 113.5.

A. Brothers, B.S.M.D., in his article on "Infantile Mortality During Child-Birth, and Its Prevention," in 1896, states that in the four years, 1889 to 1892, the total number of births in New York City was 173,126, and that during this period of four years 16,888 children born at term have died within the age of one month. Ten per cent. of the children, therefore, are lost before they reach the age of one month.

Collective statistics from sixteen European cities embracing 1,439,056 children show that 10 per cent. of those born alive die within the first four weeks of life. Eröss' statistics show that the greatest number of deaths occurred on the first day of life, and that the deaths diminish day by day. According to Eröss, 54.24 per cent. of the deaths among children within four weeks after birth are due to congenital debility.

William Moore, in a paper read before the Dublin Obstetrical Society in 1859, states that the proportion of deaths throughout England, under all ordinary conditions of life, is believed to be one in six within the first year. To parallel this proportion of mortality, we must pass on to those dying between the eightieth and eighty-fifth years of life.

Dr. D. Meredith Reese, of New York, reported at the meeting of the American Medical Association in May, 1857, that nearly 50 per cent. of the total deaths in large cities occurred in children under five years of age. In New York City in the fifty years, 1804 to 1853, the whole mortality was 363,242, including still-births, and during this period 176,043 children under the age of five years died, nearly 49 per cent. of the entire number of deaths.

M. Bertillon stated before the Academy of Medicine of Paris that in a period of ten years there have been in France 9,700,000 births; of those born 1,500,000 died within the first year of life.

J. Maule Sutton, M.D., of London, in 1872, drew attention to the influence exerted on infant mortality by the social status of the parents. His figures give a mortality of 77 per thousand for children under one year of age in urban population; and a lower percentage for rural population. These same districts, excluding the upper-class births, gave a mortality of 158 per

thousand. He studied the infant mortality among the children of the farmers of Devonshire and Norfolk, two agricultural counties. The infant mortality was 95 per thousand in the farming class; the rate among the children whose parents were not farmers was 130 per thousand.

John S. Parry, M.D., of Philadelphia, in 1871, quotes Dr. A. Jacobi as saying that "of 100 infants born alive to the gentry of England (1844) there died 20; to the working classes, 50. In the aristocratic families of Germany there died in four years 5.7 per cent.; among the poor of Berlin, 34.5 per cent. In Brussels the mortality, up to the fifth year, was 6 per cent. in the families of capitalists, 33 among tradesmen and professional people and 54 among the workingmen and domestics." Quoting De Villiers, he further writes that "the mortality among the children of the workingmen of Lyons is 35 per cent., and in well-to-do families and agricultural districts it is 10 per cent."

Dr. George Reid, in 1906, in London at the National Conference on Infant Mortality, in considering social status as an etiologic factor, divides the working class into three divisions: 1. Those among whom the proportion of employed, married and widowed females between eighteen and fifty years of age reached or exceeded 12 per cent. 2. Those among whom the proportion was 6 to 12 per cent. 3. Those among whom the proportion was below 6 per cent. The decades 1881 to 1890, 1891 to 1900, and four years 1901 to 1904 were studied. The infant mortality was always highest in group 1 and lowest in group 3. The average yearly infant mortality rates of group 1 were 195, 212 and 193; group 2, 165, 175, 156; group 3, 156, 168, 149. These statistics point out in no uncertain manner the fact that the infants of women employed in industrial and manufacturing plants during the time of their married life and motherhood are born into this world with less chance of battling with the problem of living than those whose mothers are not compelled to undergo this kind of work. The wives of farmers may and often do perform hard work, but it is done more or less out of doors, and not in the vitiated and contaminated atmosphere of a mill or factory.

Helle examined into the social status of the parents of 170 infants dying in Graz during 1903 and 1904; 112 infants who died had very poor parents; 49 children had poor parents; 9 had well-to-do parents, and no deaths occurred among the children of the rich; the percentage of the four classes being 65.9, 28.8, 5.3, 0. The general infant mortality in Graz has markedly decreased in the last twenty years, while the mortality due to gastrointestinal lesions does not show a marked diminution.

In Brün, a city of 110,000 inhabitants, the health statistics for fifteen years show that the general infant mortality during this time decreased very much, while that due to gastrointestinal lesions changed very little.

In Berlin, 1903, Newman investigated 2,701 infant deaths. Where the families were in one-room dwellings he found 1,792 deaths; in two-room dwellings, 754 deaths; in three-room dwellings, 122 deaths, and in larger dwellings, 43 deaths. It seems to be an established fact that the percentage of deaths among infants of the poor largely exceeds the mortality among the infants of the rich.

The hygienic surroundings of the infant—city or country life—are factors which play an important part

in the sum total of infant mortality. In England and Wales, 77 per cent. of the whole population is urban; fifty years ago the population was equally divided between urban and rural districts. A considerable portion of this urban population lives in small towns, more closely resembling country than city life. In the year 1904, in England and Wales, 59.1 per cent. of the people lived in large towns of over 20,000 inhabitants; in 1801, only 16.7 per cent. lived in large towns.

It seems clear to me that this tendency to live more in large towns has much to do with the stationary infant mortality in England and Wales. City life means for the parents, often, long hours of work in a factory or mill; living in a small house in a small street, often poor food and not uncommonly dissipation of drink and perhaps immorality.

Epidemic diarrhea is mostly a disease of large towns and cities. It can be positively stated that geologic strata, character of soil and climate have nothing to do with infant mortality, nor is it entirely a question of poverty. Overwork, poor hygienic surroundings and poor housing seem to be two powerful factors causing infant deaths. Density of population *per se* may and does mean a good deal in causing deaths in infants. Urban England has a higher infant mortality than rural England. However, in first-class modern houses, the population may in a given area be dense, but the infant death rate may be small if other factors are present, as good hygiene, food, fresh air, healthful occupations and good social status.

If a town is distinctly industrial or manufacturing, the mortality invariably exceeds that of the town where the occupations have more of an agricultural tendency. Table 1, by Newman, shows the infant mortality in the county of Wiltshire, in which there are no large towns; it shows also that even under favorable conditions the city mortality exceeds the rural mortality; it also shows the high mortality of large towns, and the mortality of England and Wales, and rural England and Wales.

TABLE 1.—INFANT MORTALITY RATES IN WILTSHIRE AND ENGLAND AND WALES, 1900-1904.

Districts.	1900.	1901.	1902.	1903.	1904.
County of Wiltshire.....	94.0	93.7	97.23	85.63	95.99
Urban Districts (Wilts.)..	95.6	106.8	93.63	89.27	100.32
Rural Districts (Wilts.)..	115.7	83.8	99.89	82.76	92.52
England and Wales.....	154.0	151.0	133.0	132.0	145.0
Large towns in England..	172.0	168.0	145.0	144.0	160.0
Rural England and Wales..	138.0	137.0	135.0	118.0	125.0

In these two countries the highest infant mortality occurs in large towns; next, in large towns and rural districts; and the lowest mortality in rural districts.

TABLE 2.

Age.	Of 100,000 infants born, the number surviving at each age.			Annual death rates per 1,000 living in each successive interval of age.		
	Three rural counties: Herts., Wilts., Dorset.	Five mining and manufacturing counties: Staffs., Leic., Lancs., W.R. Yorks., Durham.	Three selected towns: Preston, Blackburn, Leicester.	The three rural counties.	The five mining counties.	The three towns.
At birth..	100,000	100,000	100,000	213	331	382
3 months	94,820	92,051	90,874	75	154	240
6 months	93,068	88,574	85,574	61	128	180
12 months	90,283	83,081	78,197	...	...	...

Table 2, by Newman, shows the remarkable difference in infant mortality in three agricultural counties, five mining and manufacturing counties, and three towns where textile industries and mining are largely followed.

This table covers the three years, 1889 to 1891, and shows that of 100,000 infants born in the rural counties 10,000 died; in the manufacturing counties 17,000 died, and in the manufacturing towns, 22,000. An important point to notice in this table is that the town rates are most in excess of the rural rates in the later months of the first year of life, showing clearly that the congenital conditions, atrophy and immaturity can be left out of consideration, and that the continuous ill effect of town life finally kills many children that have made a strong but useless struggle against their environment. Epidemic diarrhea plays a powerful part in this sacrifice of infant life in those towns where textile industries, manufacturing and mining flourish.

The deaths occurring during the first year of life are very unevenly distributed. This applies to all countries, and all statistics that I have been able to find prove this absolutely. The greatest percentage of deaths occurs in the first three months of life, and I believe that this percentage is increasing and not decreasing. In London during the years 1839 to 1844, 24,354 infants died during the first three months of life, an infant death rate of 68 per thousand. In the same city in the years 1898 to 1903, 56,963 infants died during the first three months of life, a death rate of 72 per thousand. According to Newman, there has been, in recent years, an increased percentage of infant deaths in England and Wales during the first three months, and a slight decrease in the percentage of deaths during the last six months of the first year. Newman asserts that infants die more from immaturity at the present time and that consequently more infants begin life with less vitality than in former periods. He also states: "Children under twelve months of age die in England to-day, in spite of all our boasted progress and in spite of an immense improvement in the social and physical life of the people, as greatly as they did seventy years ago."

The report of the Registrar General of England, for 1903, shows for England and Wales, 51.4 per cent. of infant deaths in the first three months; 19.9 per cent. in the second three months, and 28.7 per cent. in the last six months of the first year of life. In the year 1904, in Berlin, 53.6 per cent. of deaths of infants under one year occurred in the first three months. These deaths are, of course, distributed over the entire calendar year, and this observation consequently is not contradicted by the fact that the greatest number of deaths occur in the hot months. Births occur in each month with fair regularity, and the congenital conditions which contribute so largely to this mortality in the first few weeks of infant existence are consequently distributed with fair regularity throughout the year.

The added deaths from gastrointestinal disease, occurring as they do in great excess in the hot months, cause the great increase in the total infant mortality for the heated term.

The outside and home employment of mothers is a factor in infant mortality that was appreciated long since, and led Sir John Simon in 1856 to state that "infants perish under the neglect and mismanagement which their mothers' occupation implies." In Dundee a large percentage of the female population, of girls and married women, work in the jute and hemp factories. The labor is unskilled, the wages small and the hours 6 a. m. to 6 p. m. These women and girls are, as a class, subnormal in weight and general physical development; many of the children are born and raised in houses con-

taining only one or two rooms, or in large tenements, where overcrowding and, usually, uncleanness exist. In the ten years, 1893 to 1902, the infant mortality was 176 per thousand births; in 1904, out of 174 deaths, 125 were due to prematurity and immaturity, and over 49 per cent. of the deaths occurred in the first three months of life.

In England the Factory Act of 1901 states: "An occupier of a factory or workshop shall not knowingly allow a woman or girl to be employed therein within four weeks after she has given birth to a child." This is positive legislation of a far-reaching character. If the hygienic conditions of air, light and cleanliness were only adequately controlled by law in these mills or factories, and such provisions for sanitary surroundings as are needful were insisted on, much could be done to remove the injurious influences of this class of employment. Much has already been accomplished in this direction, but much still remains to be accomplished.

In Kearsley, a town of Lancashire, of 9,500 population, the infant death rate increased from 179 per thousand in 1894-1903 to 192 in 1903, and 229 in 1904; and this is due, according to J. C. Eames, M.D., medical officer of the town, to the town having "developed into more of a manufacturing district."

In Mulhouse, Mr. Dollfus, who owned a large cotton mill, established a fund to which all the married women subscribed, and he personally contributed. Each woman subscribing received from the fund sufficient for her support during the two months following her confinement. On resuming work at the end of this two months, she was granted time at mid-day to return home and care for her baby. This procedure alone reduced the infant mortality more than 50 per cent.

In 1876 there was established in England a Society for Nursing Mothers. The object of the Society is to save the child's life by preserving the health of the mother. The mothers are cared for in institutions for several weeks before confinement, being well fed and housed; but what is more important is that, during the first year of the child's life, the mother is cared for wholly or in part, as it is necessary. A physician and nurse visit her at her house and give her the assistance she may require. Each month the child is weighed, carefully examined, and if sick is always cared for. The Society has cared for over forty thousand children, and the saving of infant life has been very great.

In Paris since 1904 the Couplet dining-rooms have gone one step ahead of anything done, as far as I know, in America. They have established restaurants in the poorer districts of Paris; any woman who is nursing a baby is given free of all cost two good meals each day. They feed the mother and the mother nurses the baby.

Since all empires are built of babies, unless a change in the trend of statistics of infant mortality shall take place, our future generations will fail to develop physically and numerically along the lines which are both normal and natural. Race suicide is not a theory, but a fact. France is actually facing slow extinction: its birth rate is smaller than that of any other European nation. The trouble and expense incident to the care and rearing of children does not appeal to all women of the present day; motherhood is not always synonymous with wifehood. A high birth rate is usually, but not invariably, linked with prosperity.

The foreign-born population of the United States has apparently a larger percentage of children than the

native population, but this excess of fecundity is probably no more than that which usually is found in urban populations in poor districts, and the high infant mortality commonly found among this foreign element more than reduces its growth to the level of native-born Americans.

The Royal Commission in New South Wales, recently appointed, after much careful study and thought, decided that the main factor in the reduction of the birth rate was: "A diminution in fecundity and fertility in recent years due to the deliberate prevention of conception and destruction of embryonic life, and to pathologic causes consequent on the means used, and the practices involved therein." The remedy for this is not easy to apply; all nations are becoming more extravagant in their methods of living—automobiles and babies may be incompatible possessions—if we have one, we must often renounce the other.

Infanticide by neglect or intention undoubtedly causes the death of many hundred infants each year. Women in the poorer walks of life should be urged to nurse their children, entirely or in part, as long as possible. Part breast and part bottle feeding is much better than all bottle feeding; weaning should never be done prematurely unless by the advice of a physician. Women with illegitimate children should be kept in the hospital and made to nurse their babies until after the third month. After this age, the child is better able to withstand the perils of artificial food, and the mother, from her association with the child, has perhaps become sufficiently fond of it to make an effort to protect its life. If a child is born, and no one is with the mother at the time of its birth, the danger of death at the time of delivery is greatly increased, and the secrecy of birth may induce the mother, under certain conditions, to destroy the child's life.

The giving of opiates to children, either in the form of paregoric or of a soothing syrup, is pernicious and should always be absolutely forbidden. Overlaying, either by accident or design, is in certain portions of this and other countries, very common; an infant, of course, should never sleep in the same bed with its mother.

Infant life insurance and burial clubs cause the death by neglect of many; statistics prove that a much greater number of children insured and in burial clubs die than of those children in the same cities and towns living under exactly similar conditions. Coroners' inquests should be rigid and impartial, and if there is any question or possibility of infanticide, the case should be thoroughly investigated and proper punishment imposed on the guilty. Of 864 children dying under one week of age in Philadelphia, inquests showed, according to Parry, that 210 died from "unknown causes," 293 from "asphyxia," 94 "still-born," 62 from "exposure and neglect" and 22 from "want of medical attention." In these cases the coroner's physician believed that the majority of those which he examined were murdered.

The death rate per thousand is well known to be much higher among illegitimate than among legitimate children. An interesting fact, which is perhaps not always appreciated, is that in large cities the death rate among illegitimate infants is much greater than in country districts. In Glasgow in 1873 the death rate for illegitimate infants was 293 per thousand; for legitimate infants, 154 per thousand. In London in 1902 the death rate of illegitimate children was almost twice as great as the death rate of legitimate children. The

infant death rate of London, as a whole, exceeds the rural infant death rate by about 20 per cent. The deaths among illegitimate infants in London exceeds the rural death rate among illegitimate infants by over 50 per cent.

According to Dr. Norman Kerr, in 1894 the proportion of female inebriety in England had increased greatly in the recent years preceding 1894. He asserts that prison experience shows a distinct increase of drinking to excess among women. According to the annual death rates from alcoholism in England and Wales, per million living, from the year 1875 to 1904, the mortality due to inebriety is distinctly increasing. The average for every five years from 1875 to 1904 was: 1875 to 1879, 25 deaths per million living; 1880 to 1884, 29 deaths per million; 1885 to 1889, 36 deaths; 1890 to 1894, 50 deaths; 1895 to 1899, 58 deaths; 1900 to 1904, 71 deaths. In studying these figures it seems as if there can be no reasonable doubt that alcoholism is increasing among the women of England and Wales, although some allowance should probably be made for the more accurate diagnosis of recent years. Dr. Scott, quoted by Newman, believes that alcoholism is increasing among the women of Scotland.

Alcohol is a distinct poison to children, but the number of deaths caused by the giving of alcohol direct in any form to children is certainly very small in the United States. It has, however, been clearly shown that suffocation in bed and overlaying is twice as common on Saturday as any other night in the week; and the prevalence of drinking among the poor on that night is proverbial. An alcoholic mother rarely supplies her baby with a good breast-milk, and what is perhaps more important is the fact that the milk from such a mother may even contain alcohol. Alcoholism among women is perhaps increasing in America, but it is surely less common than in England.

Systematic nursing and medical care are wonderful aids in the prevention of infant mortality, and account largely for the difference between the infant mortality of the rich and poor. Home treatment, or perhaps better say maltreatment, of very young infants often destroys what little chance of life the infant would otherwise have had. The poor and ignorant classes often call "the doctor" too late to save the patient.

It is not an easy task to form an accurate idea of how many or what proportion of infant deaths are due to congenital causes and those diseases which, if not actually congenital, still leave the child more susceptible to their development than is the child whose parents are free from such diseases. Herbert M. Rich, in 6,866 deaths under one year of age, found 23.2 per cent. to be due to malformations, congenital debility and premature birth. Syphilis is certainly responsible for many premature and early deaths. In London and in most English cities the mortality from prematurity and atrophy is about 45 per thousand, these deaths almost all occurring in the first three months of life. Smallpox, malaria, typhoid fever and tuberculosis are all diseases that may and do exert an influence on the infant. Lead, mercury and phosphorus may exert a distinct antenatal effect, and the influence of alcohol has already been alluded to. In fact, any and all toxemias may influence the child during intranuterine life.

Gastrointestinal diseases are not only the most common diseases of infancy and childhood, but they are also responsible for more deaths than any other class of

diseases. Infantile diarrhea is especially apt to occur in the first year of life, although very common in children under two years of age. Hot weather, bad feeding and poor hygiene are the chief etiologic factors. It is often seen in epidemics, is very dangerous, and is the common cause of deaths among infants in cities in summer. Epidemics have often been traced to infected milk, although one must remember that milk may be infected at the farm, in transit or by the consumer.

Cases of this disease are rare among the rich, compared to the number one sees among the poor; they are rare in the country, compared with the number seen in the cities. The diarrheal death rate is, as a rule, highest in those countries where the infant mortality is greatest. Russia has the highest infant death rate of any European country, and Germany ranks second in the percentage of infant deaths. Taking 42 of the largest German cities, in the years 1904-5-6, there occurred 67,633 deaths of infants under one year of age; of these 28,422 were due to gastrointestinal disease.

In certain American cities it has recently been clearly proved in many instances that this enormous summer death rate, due to the diarrheal diseases, can be reduced. Clean milk must be provided for the poor at a nominal cost, and this milk must be properly modified for children of different ages and conditions. A campaign of education among the mothers of this poor class must be carried on persistently and continuously; visiting nurses must be supplied; and fresh air and improved hygiene must be insisted on. It is not asserting too much to say that a reduction of 50 per cent. in summer infant mortality may be accomplished by these means.

It is an old truth thoroughly appreciated by American physicians that breast-fed infants do well, whether they belong to the rich or the poor, but I do not believe that it is appreciated how great a difference exists in the infant mortality between breast-fed and bottle-fed infants. In the year 1903, 4,075 infants died in Munich; of these 83 per cent. were artificially fed. In Berlin since 1885 the census gives the character of the feeding of all living children. Taking the five years, 1900 to 1904, only 9 per cent. of the deaths occurred in breast-fed babies, and Budin has shown that only about 9.5 per cent. of the infant mortality in Paris occurs in breast-fed children. Of course, breast feeding is usually associated with other favorable factors, and bottle feeding often combined with many unfavorable associated conditions, but the figures are truly startling.

In war times the infant mortality often declines in manufacturing centers, in spite of the fact that the general mortality rate increases. During the siege of Paris, 1870-71, it is claimed the general mortality rate doubled, yet the infant mortality rate declined 40 per cent. Under such conditions infants do not die, and why? In times of war or great industrial depression the poor woman, having no work, stays at home and nurses her baby, and the child lives. In prosperity she works all day, gives her baby the bottle, and it dies.

It is both interesting and instructive to note that any considerable variation in the infant death rate in any locality is almost invariably linked with a corresponding change in the diarrheal death rate, the mortality from other causes changing, as a rule, comparatively little.

The factors contributing to infant mortality are so many and varied and the difficulties in controlling these harmful influences are so great that at the present day

one is forced to admit that, while the preventable death rate is very large, still among the poor there must be a large necessary death rate.

Several years ago the mayor of Huddersfield, England, offered a gift of \$5 to every child born in his town that lived to the age of twelve months. All classes, rich and poor, were included; the mortality in the Huddersfield district was immediately reduced more than 50 per cent.

In Yonkers, N. Y., a campaign was undertaken in 1894, having as its object the reduction of the infant mortality rate. The physicians of Yonkers, aided by the public press, established milk stations, and instituted and carried out a campaign of education among mothers. A sanitary inspection of the tenement district was adopted and nurses were appointed to visit the sick. The Board of Health also passed a regulation requiring in all new tenements a sufficient amount of light and air. The deaths from digestive diseases were reduced more than 50 per cent. Dr. S. E. Getty believes that, of all the means employed, the most important was the establishment of the milk dispensaries.

That a general propaganda against infant mortality has been vigorously pushed all over the United States is shown by the census, 1880 and 1890. In 1880 the general infant mortality of the United States was 246 per thousand; in 1890 it had fallen to 159 per thousand, and during the same period it is gratifying to note that the infant mortality in cities decreased from 303 to 184 per thousand. This is surely a record to be proud of.

In France, 1874 to 1893, the average infant mortality was 167 per thousand. Ten years later, in 1903, it was only 137 per thousand. In Paris it was only 101; wonderful Paris has the smallest birth rate and the lowest death rate of any large European city.

The physicians of the United States have accomplished much in the last ten years, and yet when we consider how remarkably successful have been the efforts directed to save infant life, should we not, as the representative body of the American profession, feel chagrined that we have not accomplished more? Certainly 50 per cent. of all infant deaths at the present day are preventable.

Hospitals for infants have been established all over the world, and we are establishing new ones almost daily, and yet some physicians question whether they do good or harm. Going back to the year 1871, we find that 29.82 per cent. of all the children born in Philadelphia died before the end of their first year. In the same year, in the foundling ward of the Philadelphia Hospital, 73.65 per cent. died. The death rate among the foundlings was 43.83 per cent. more than among infants of the same age of Philadelphia. These children were, as a rule, in fair health on entering the hospital. Of these infants, 74.69 per cent. died from diarrheal diseases, and only 25.31 per cent. from all other causes. At this period, the records of the foundlings' ward in the Philadelphia Hospital were about the same as the records from the foundling hospitals in other large American cities. Dr. A. Jacobi, at this date, had the courage to point out publicly the enormous mortality in the foundling institutions of New York, and as a consequence was asked to resign from the hospital staff.

What is the condition in our infant hospitals at the present day? My personal opinion is that in the modern infant hospital, where the air space is ample, and the windows are kept open day and night; where the milk is the best and the milk-room thoroughly up to

date; where the ratio of nurses to patients is not less than one to five; where the sick are promptly isolated from the well, and "mothering" is understood—that in such a hospital the physician is an optimist and not a pessimist.

Many of the infants will die, but most of them will live. If one considers that many of those who die are "weaklings" on admission, and that the greatest proportion of deaths occurs in the first three months of life, one is apt to believe that the best of the modern infant hospitals are worthy institutions and should be supported. Much depends on the character of the feeding, but here as ever, the truth that breast feeding is better than bottle feeding is well exemplified.

Of 300 infants admitted to the Dresden Children's Polyclinic in 1900 to 1901, there were 53 deaths. All the deaths, 53 in number, were among the bottle-fed babies. Among 93 breast-fed babies, during the same period, in the same hospital, there was not a death. Breast-feeding is surely a powerful measure with which to combat death.

According to the census of 1900, the infant mortality per 1,000 in the United States was in those states where registration was in force:

	Per 1,000 births.
District of Columbia.....	274.5
Rhode Island.....	197.9
Massachusetts.....	177.8
New York.....	159.8
Connecticut.....	156.8
Maine.....	144.1
New Hampshire.....	172.0
New Jersey.....	167.4
Vermont.....	122.1
Michigan.....	121.3

The census of 1900 shows the returns for infant mortality from many cities and towns of the United States. The infant mortality in some of these cities is very high, over 400 per 1,000 in Charleston, S. C. A number of them show a mortality over 300, and over 100 cities exhibited an infant mortality above 175 per 1,000.

The important point to be decided is as to the influence which has been exerted on this infant death rate in recent years. Have we been able to reduce in any appreciable degree this great and unnecessary waste of infant life? A careful study will show that a great saving of life has been accomplished in recent years, and much will surely be accomplished in the future.

In 1903 the infant mortality of France was 137. In the previous twenty years it was 167, and yet this death rate ought to be still more greatly reduced, for we know that Ireland has an infant death rate below 100. Norway in 1902 had an infant death rate of 75, and Sweden 107 per 1,000.

Of all European countries, Russia has the highest infant death rate, 270 per 1,000. Germany has the next highest mortality, averaging in recent years a little over 200. Medical science and skill have reached a very high plane in both these countries, and infant mortality has been greatly reduced during the last thirty years. It is to be hoped that the useless waste of life in these two countries will quickly be much more distinctly diminished, and it is believed they will soon show as great a reduction as has occurred in France.

There has been a great decrease in the proportion of infants dying under one year of age in the United States during the last twenty years. The infant mortality for the United States in 1880 was 246 per 1,000; in 1890 it had fallen to 159 per 1,000. During the same period the mortality in the cities of the United

States fell from 303 to 184 per 1,000. In New York City in 1891, the death rate in children under 5 years of age was 96.6 per 1,000; in 1896 it had fallen to 77.5 per 1,000, and in 1900 the mortality under 5 years of age was only 67 per 1,000.

Many figures might be quoted showing that in recent years infant mortality has distinctly lessened. In London in January, 1908, the deaths of infants under 1 year of age to 1,000 births, was 115. According to George B. Mangold, U. S. Department of Commerce and Labor, the infant mortality in New York City in 1891 was 241.9 per 1,000; in 1900 it was 191.7 per 1,000; and in 1906 it was 167.8 per 1,000. The mortality has gradually declined. In New York City the death rate of children under 5 years of age was 96 per 1,000 in 1891; in 1904, it was 54 per 1,000. In the same community the deaths from measles, scarlet fever and diphtheria have become distinctly less; and diarrheal diseases in small children have decreased 62 per cent. since 1881.

School nurses are now provided and medical inspection of schools is now well recognized and practiced in many of our large cities. According to Dr. W. M. L. Coplin: "A necessity for medical attention was detected in 27,481 children in the schools of Philadelphia in 1905, and 31,544 children in 1906." Dr. A. C. Abbott, chief of the bureau of health of Philadelphia, shows that in the years 1903-5 a distinct decrease in the infant death rate occurred. Philadelphia shows a very decided decrease in infant mortality since 1897.

Thomas A. Buckland, city chemist for St. Louis, states that there has been a decrease in infantile mortality since 1904. W. Ernest Wende, M.D., health commissioner of Buffalo, states that infant mortality is decreasing in that city. Samuel E. Allen, health officer of Cincinnati, states the proportion of deaths of children under 2 years of age to the total mortality has decreased considerably since 1886. In the year 1886 it was 32.56 per cent.; in the year 1906 it had decreased to 21.92 per cent.

Milwaukee and Minneapolis and the nine largest cities in the State of New York, according to George W. Goler, M.D., show a decrease in infant mortality.

The following have occurred to me as being important factors in lessening infant mortality:

- Abatement of nuisances.
- Milk inspection; milk dispensaries; visiting nurses.
- Free antitoxin.
- Improved sanitation.
- Good food.
- Education of girls and married women in the duties and requirements of motherhood.
- Maternity fund in all industrial establishments where married women are employed.
- Care of poor pregnant women before and after confinement.
- Laws carefully protecting all children who are cared for by private individuals, apart from their parents; rigid enforcement of these laws.
- Elementary principles of hygiene taught in all schools, public and private.
- Nursing of all babies as far as possible, by their mothers.
- Sending children to the country in summer.
- Pasteurizing milk during the hot months.
- Farming out, under proper medical supervision, of foundlings and institution infants, and the appointment of nurses to visit these infants regularly.

1713 Spruce Street.