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## INFANT MORTALITY IN THE FIRST FOUR WEEKS OF LIFE

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Infant mortality in the first four weeks of life is so intimately connected with prenatal influences that we may consider this period of extra-uterine existence as closely allied in many of its aspects to the history of the fetus *in utero*. There are many conditions of the father and the mother which produce an infant unfitted to resist the physical influences of postnatal existence. A large number of infants live but a few hours or days no matter how we strive to maintain life in them. In other words, our present methods of preserving the life of the new-born do not reach such infants. Perhaps it is fortunate that this is so. The children of parents who suffer from organic diseases, such as syphilis, tuberculosis, heart disease, diabetes or nutritional disorders, may be either premature or unfitted to live. Thus we have an immense number of still-births, in some of which the infants succumb to influences not yet fully understood. Parental influence on postnatal life may not yet be an open book to us. We can understand some weaknesses of the father, such as syphilis, pulmonary diseases, general nutritional disorders, etc., but the influence on the part of the father which causes the weakness of the new-born is, in many phases, not as yet clear. Among the working classes and the absolutely poor, lack of proper food, rest and habits react against the fetus and produce a congenitally weak infant.

It will thus be seen, as I understand it, that the subject of infant mortality in the first few weeks of life must deal with certain definite considerations:

1. Infants born prematurely and congenitally weak though free from constitutional disease such as syphilis.
2. Infants apparently free from disease but too weak to live—those which fall below a definite standard of living-weight, including all still-births occurring without accidental birth complications.
3. Still-births which result from accidents in delivery or from instrumental interference.
4. Infants who are born of good weight, viable and free from constitutional disease, who die of some acquired infection or condition or of inanition. It may be further shown that the condition of life into which this class of infants is born, that is, whether they are legitimate or illegitimate, is a great factor in the continuance of life, and also, whether they are born in poverty or are surrounded by all the necessities for life is another influence to be fully considered.
5. Infants who are born prematurely, of good weight and viable, but are the subjects of constitutional disease.

We must consider in the first class the infants born prematurely and congenitally weak, those weighing less than 1,000 gm. (2 pounds), as unfitted to live.

In European hospitals premature births constitute from 16 to 20 per cent. of the total number. This depends much on what is considered premature, and those are so regarded which are born weighing less than 2,500 gm. (5 pounds). Deaths among the prematurely born in this country and among those so born in European institutions reach a very high figure. The mortality depends largely on the weight, the mode of management after birth, and whether the new-born has come under immediate treatment or has been subjected to exposure. Budin, who made a life-study of this phase of the question, disregards the infant born weighing less than 1,000 gm., for it is rarely reared.

Of infants weighing less than 1,500 gm. (3 pounds), only 1.9 per cent. survive; from 1,500 to 2,000 gm., 2 per cent. survive, giving a gross mortality of 98 per cent. for all prematures born weighing from 1,000 to 2,000 gm. The duration of life of premature infants in institutions conducted as Budin did his, is certainly discouraging, and much more hopeless is the problem outside among the poor, where the infant is not taken to an institution. On the other hand, fully 77 per cent. of the infants born in Budin's institution whose temperature and strength were conserved and who weighed 2,000 gm. (4 pounds) or less, survived. This illustrates the potent influence of exposure on the premature.

As to the further life of the prematurely born infant much depends on the mode of feeding and whether it has escaped extraneous infections. Of those premature infants weighing from 2,000 to 2,500 gm., and born in the institution, 98 per cent. survived. As illustrating the influence of feeding Budin cites fifty-four infants discharged from his institution weighing 2,800 to 3,000 gm. Forty-one per cent. of the artificially fed died, as against 15 per cent. of the breast-fed. We can thus appreciate that aside from the influence of syphilis and constitutional disease the premature infant will survive or succumb according to whether the body temperature is conserved, whether it escapes infection, and last, and as important as any, whether it is placed in a position to have artificial or breast-feeding.

In the breast-fed of this class, as in other classes of infants, the mortality is low as compared to the infant artificially fed. Whereas the mortality among prematurely born breast-fed infants is about 15 per cent., that of the premature infants on bottle-feeding is 41 per cent. In the classification of infants born at full term, the fact that the breast-fed baby is more resistant to the inroads of disease than the bottle-fed infant will be further demonstrated. This does not underestimate the rôle played in the first month of life of the other causes of death which are to be considered.

## STILL-BIRTHS

Still-born infants are all infants born dead or who have lived only a few hours after birth. These form an immense quota of infants either premature or congenitally weak, with or without constitutional taint, who are either born alive and live a few minutes or hours or are born dead at full term or are living at birth and die shortly afterward from injuries due to accident, as in instrumental or manual interference. The following table taken from Tugendreich, who quotes Prünzing, is interesting as showing clearly the percentage of still-births which have been caused by faulty labor:

Head presentation.....	1.8
Face presentation.....	11.4
Breech presentation.....	20.7
Transverse presentation.....	31.0
Prolapsed cord.....	56.3
Placenta praevia.....	38.3
Induced labor.....	19.3
Version foot.....	30.0
Version head.....	20.0
Breech extraction.....	18.8
Cesarean section.....	25.0

Still-births in Germany in 1906 numbered 62,261 of 2,084,738 births and the number has not materially diminished in recent years. This covers, in round numbers, 3 per cent. of all births and 6 per cent. of all deaths.

The statistics obtained by me in New York for the years 1911 and 1912 present a similar condition. In 132,776 births there were 6,749 still-births, or 5 per cent.

The number of deaths from those causes which produce still-births is considerable. On the other hand, the infant born at full term is subject to the dangers of various infections, though of late years these sources of infection have been reduced. Advances in the methods of governing the conditions which surround the parturient woman have considerably reduced the danger of infecting the new-born. Some diseases of the new-born which were formerly prevalent are now uncommon. Malformation and constitutional disease will remain as prevalent in the future as they have been for decades past.

Morbidity among the new-born is of great interest. First and foremost it is noticeable that among breast-fed infants the mortality is not so high as among the bottle-fed; hence, it is seen that though morbidity may be as frequent, resistance to the inroads of disease is much more successful among breast-fed than among bottle-fed infants. Thus of 2,923 infants dying in Berlin of various causes, 373 were breast-fed, the remainder either were bottle-fed, or the method of feeding was not mentioned in the death certificates. Another matter of interest is that of 10,170 deaths in the first year of life, 2,923 occurred in the first month, that is, 28 per cent., and only 7 per cent. occurred in breast-fed infants. (Howarth, Boeckle, Groth, Finklestein, Dietrich, Tugendreich. Moreover, we find that in the heated term, from July to September, deaths among bottle-fed infants outnumber those among the breast-fed as 1 to 4 (Tugendreich). This applies more to infants in the first month of life than to those below one year of age, and proves distinctly that the dangers which threaten the artificially fed infant, such as poverty, heat, ignorance, crowding, unskilful feeding and decomposed food, do not apply in the same degree to the breast-fed infant.

A much-discussed influence on the morbidity of new-born infants or of those below the age of one year, is

the social position of the parents. It has been shown time and again that the mode of feeding is not of itself a cause of mortality, except as it is practiced among the poor and ignorant. Among the well-to-do and the intelligent classes the same causes of mortality do not obtain as among the poor, and hence, also, the morbidity of the infant population varies. Krieg and Senteman have shown that under the more favorable conditions of home comforts and surroundings, mortality and morbidity among bottle-fed infants are reduced fully 50 per cent. The social standing of the family affects the mortality of breast-fed infants but little, whereas it is of far-reaching influence among bottle-fed infants. The number of children in the family among the very poor is of some influence. Tugendreich has studied this question in Berlin and found that among the breast-fed infants in families containing six children, the mortality was only one-third as large as that among bottle-fed infants in families containing the same number of children, or 19.8 per cent., as compared to 43.2 per cent.

The question of legitimacy or illegitimacy of the infant is a potent factor, not only as to morbidity, but also as to mortality. The illegitimate infant suffers, as a rule, the disadvantages of poverty, indifference of the parents to its fate and the physical weaknesses with which these infants are well known to be affected. Thus Weinberg shows that the number of still-births among illegitimate infants is fully 1 per cent. higher than among infants born in wedlock. The influence of this condition is found to exert itself in infants below one year of age as a cause of inanition, atrophy, gastrointestinal disorders, and, therefore, as a cause of mortality.

Before considering in detail the statistics at present available to me in America on infant mortality in the first month of life, it is well to consider the difference between the mortality among such infants in institutions devoted to their care and that among the people at large. I have shown that in Paris the results among the premature are much better as to infants born in institutions than among those brought to the institutions from their homes or places of birth. This is such a self-evident fact that it would seem needless to enlarge on it, yet Budin lays special stress on the increased mortality among the premature who have been subjected to reduction of temperature by exposure, and he also lays stress on feeding as an element in conserving the life of the premature. In institutional work we would expect, to a degree, a marked reduction in septic influences and a reduction of mortality among the new-born which could be traced to this cause, yet we have no statistics on this point. The feeding in maternity institutions, it would seem, should be ideal, and yet from what can be learned, at least in America, this condition is not always present. It is difficult to understand why artificial feeding should be in vogue in maternity hospitals, especially as in these institutions so many women may have an excess of food for their own infants which might be given to those who are not blessed with the maternal breast, yet such a procedure is far from being attempted. The care of the premature, at least in America, has not reached that degree of perfection which our advanced ideas demand. Thus in addition to still-births there is a proportion of deaths in these institutions which are due, as my studies seem to indicate, to avoidable causes. This is true also outside of maternity hospitals.

MORTALITY IN THE NEW-BORN IN THE  
UNITED STATES

The statistics of infant mortality in the United States, as in other countries, are based on the annual reports of boards of health for infants below the age of one year. None of these reports give us an idea of the mortality during the first four weeks of life, unless specially computed. In a circular letter which I sent to all the boards of health in the United States in 1912, I made inquiry as to the availability of such statistics. It was impossible to obtain any reliable information, except from two or three sources. I therefore determined to compile the desired statistics from the records of the Board of Health of New York City. In order to do this, every death certificate was inspected, and the diagnosis as to cause was obtained from these sources. This was most laborious; at the same time the results were instructive, inasmuch as the actual causes of death were obtained, and our conclusions were drawn from the causes which will be found in the tables. It must be kept in mind that there is a measure of error in this, for not every physician can make a positively correct diagnosis, nor can such diagnosis, even if made by the skilful, be absolutely relied on without a post-mortem examination. It should be borne in mind also that the board of health statistics include those of all hospitals, so that the sets of institutional statistics are duplicated in the gross statistics of the city authorities.

For the sake of conciseness, the causes of death in infants under four weeks of age must be grouped. The first great group should include the diseases of the newborn, including the prematurely born; the second, the diseases of the respiratory organs; the third, the diseases of nutrition, which would include marasmus, inanition and disturbances of the stomach and intestine; the fourth, malformations, and finally the various injuries received in delivery.

## STATISTICS FOR 1911 AND 1912

The total population at this time, the number of births, still-births, illegitimate births, the number of deaths in infants under one month and the number of deaths in infants under one year, with their relation to the total population for 1911 are recorded in Table 1.

TABLE 1.—BOARD OF HEALTH OF THE CITY OF NEW YORK.  
BOROUGH OF MANHATTAN

Year	Number of Births	Number of Still-Births	Number of Illeg. Births	Number of Deaths 1 Mo. and Under	Number of Deaths Under One Year	Population
1911 .....	66,537	3,438	1,550	2,732	8,223	2,389,204
1912 .....	66,249	3,311	1,541	2,547	7,675	2,487,796

Of 66,537 births of all kinds, there were 2,732 deaths of infants in the first four weeks of life, or 4.1 per cent. of all births. That is, in round numbers, one infant in every twenty-five, or four in every hundred, died before reaching the age of one month. On its face, this is not so bad a record, until it is compared with the mortality in infants aged under one year. The number of deaths in such infants was 8,223 out of the total number of 66,537 births. Thus fully 33.2 per cent. of the deaths occurred before the first four weeks of life were completed, which is a rather startling record.

The largest number of deaths occurred in premature or congenitally weak infants. This includes also those, who, through unskilful management, died from inanition as a result of incorrect feeding, exposure, etc. There were 1,365 of these deaths, or fully one-half of the total mortality for this age. In 517 death was due to diseases of the respiratory organs, and in 206 to distinct complications occurring in the stomach or intestine, such as diarrhea or gastro-intestinal infection. This latter group must include a number of deaths in infants which belong to the first group of causes, under that of inanition. The next largest number of infants, 517, died of injuries occurring at birth or of sepsis with umbilical hemorrhage or cerebral hemorrhage resulting from instrumental delivery.

In further analyses we find among premature and congenitally weak infants that the highest mortality occurs during June, July, August and September, as a result of gastro-intestinal disease.

Syphilis does not give a large quota of deaths; only 47 in a total of 2,732.

Malformations, including those of the heart, give 134 deaths in the sum total.

In 1912 (Table 3) there were 66,249 births, with 2,547 deaths in infants aged under one month; a slightly lower rate (3.9 per cent.) than that of the previous year. Of these deaths, there were 7,675 in infants under one year. Thus, 34.5 per cent. of the deaths in infants under one year occurred in the first four weeks of life. There was an increase of 100,000 in the population, so that if this is taken into account, the total death-rate will remain about the same, or slightly less, for infants under one year.

Taking up the main groups of causes of death as indicated for the previous year, we find here also a very close correspondence. The total number of deaths occurring in the first four weeks of life being 2,547, the first group includes the premature and congenitally weak and the conditions allied thereto. Fully one-half of the deaths, or 1,388, were caused by these conditions. Respiratory diseases claimed 265 victims; gastro-intestinal diseases and allied infections, 120; malformations, including those of the heart, 156, and injuries, hemorrhages and cerebral hemorrhages, incidental to birth or following the application of forceps, 459. The latter classification in both years does not include still-births.

If we now pass in review the statistics and lessons drawn from a study of infant mortality within the first four weeks of life in a large city of two and a half millions of population, we see, first, that the greatest number of deaths at this time of life are caused by premature birth and lack of strength on the part of the infant to adapt itself to new conditions, but more than anything else the fact is impressive that of this vast number of infants, 5,279, who died within the first month of life, fully 60 per cent. died as a result of neglect, ignorance and the surroundings of poverty, for while prematurity alone may not account for a death, prematurity and exposure will. Many infants adjudged weak are worn out by incorrect feeding and inanition, and could well be saved by care from the moment of birth. This has been shown by Budin, who calculated the mortality in the class of premature infants brought into his hospital, and found the mortality in those from the outside was fully twice as great as among the premature infants born in the wards.

Respiratory diseases claim a large quota, and many of the deaths among these must have been brought about

by neglect, filth and ignorance. Aside from still-births, which are quoted by these statistics in a separate class, we cannot help being startled by the large number of deaths which are peculiar to the conditions of birth, such as umbilical hemorrhage (sepsis); atelectasis, due either to faulty care after delivery or to premature birth; injury by forceps, in which the infants die some time after birth, and finally cerebral hemorrhage, which is generally due to instrumental delivery. Fully 936 out of 5,279 deaths of infants in New York City during 1911 and 1912 were the result of some accident or instrumental injury at birth; or, one in every five deaths is directly traceable to the conditions of delivery.

This should make us pause and wonder whether the average physician outside of institutions has attained the skill that he should be expected to have at the

During the year 1910 there were 3,161 deaths of infants aged 1 to 4 weeks. The number of deaths of infants aged 7 days or under was 2,329, or 73.7 per cent.; 428, or 13.5 per cent., died during the second week of life; 245, or 7.8 per cent., died during the fourth week of life. The most important cause of death during the year, or the cause of the largest number of deaths, was "premature birth." From this cause, 829 infants died during their first week of life; 44 during the second; 13 during the third, and 7 during the fourth. The cause of the next largest number of deaths was "inanition." One hundred and ninety-two deaths from this cause occurred during the first week of life; 60 during the second; 31 during the third, and 26 during the fourth. The cause of death next in numerical importance was "convulsions," 217 for the year;

TABLE 2.—DEATH OF BABIES AGED ONE MONTH AND UNDER FOR THE YEAR 1911, IN THE BOROUGH OF MANHATTAN, NEW YORK

Cause of Death	Jan-April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Totals
Congenital debility, icterus and sclerema, including prematurity, atrophy, marasmus, inanition, etc.	539	101	96	104	99	96	106	102	122	1,365
Erysipelas	19	4	3	2	1	0	0	2	1	32
Purulent infection and septicemia	9	1	1	1	0	0	0	0	0	12
Syphilis	19	4	4	8	1	0	2	3	2	47
General disease	12	5	0	2	4	4	2	1	0	30
Convulsions	25	2	5	2	7	4	7	6	5	63
Disease of the ears	1	0	1	0	0	0	0	0	0	2
Bronchitis	23	7	4	1	3	3	2	10	8	61
Pneumonia	86	19	17	6	6	11	12	19	21	197
Pulmonary congestion	1	1	0	0	0	0	0	0	0	2
Diarrhea and enteritis	56	5	13	12	24	16	17	14	6	163
Ulcer of the stomach	0	0	1	0	0	0	0	0	0	1
Hernia, intestinal obstruction	0	2	1	0	0	0	0	0	0	3
Other diseases of the intestine	43	0	1	0	0	0	0	1	0	45
Organic disease of the heart	25	0	1	0	0	0	0	0	0	26
Congenital malformation, including spina bifida	13	10	10	18	8	14	10	15	10	108
Meningitis	6	1	0	1	0	0	1	0	0	9
Embolism and thrombosis	0	0	1	0	0	0	0	0	0	6
Tetanus	5	1	0	0	0	0	0	0	0	6
Causes peculiar to early infancy, including umbilical hemorrhage, atelectasis, injury by forceps at birth, etc.	176	42	44	41	35	37	55	43	43	516
Cerebral hemorrhage	0	0	0	1	0	0	0	0	0	1
Disease of the liver	1	0	1	0	0	0	0	0	0	2
Disease of kidney and adnexa	5	0	0	1	0	0	0	0	0	6
Acute nephritis	0	1	0	0	0	1	1	0	0	3
Disease of mouth and adnexa	1	0	1	0	0	0	0	0	0	2
Diseases of the pharynx	0	0	0	0	1	0	0	0	0	1
Diseases of the skin and adnexa	0	1	0	0	0	0	0	0	0	1
Homicide by cutting or piercing instruments	0	0	0	0	0	0	0	1	0	1
Homicide by other means	1	3	1	0	0	0	3	2	0	10
Whooping-cough	0	0	2	1	0	1	0	0	0	4
Effects of heat	0	0	0	7	0	0	0	0	0	7
Acute abscess	0	0	0	0	1	1	0	0	0	2
Acute poisoning	1	0	0	0	0	0	0	0	0	1
Disease of the nervous system	0	0	0	0	0	0	1	0	0	1
Cause unknown	0	0	0	1	0	0	0	0	0	1
										2,732

present day. This is so delicate a subject that it demands a more thorough report of each birth before any conclusion can be reached.

I have remarked that in preparing this article I wrote to every state board of health in the United States for statistics as to the mortality of infants under one month of age. The replies showed that with few exceptions no such statistics were available, and that in their statistics all boards of health disregarded this period. I received, however, detailed sets of tables with remarks on infant mortality in the first four weeks of life from the state board of health of Michigan. These statistics are of such great interest that I quote them in full. The total infant mortality in the first four weeks of life for the years 1910, 1911 and 1912, the cause and the number of deaths from each cause for the first, second, third and fourth week of life, are shown. One hundred and thirty-three causes of death are given.

then follow "enteritis," 141; "congenital debility," 123; "malnutrition," 103; "marasmus," 90; "pneumonia," 88; "organic heart trouble," 76, etc. Of important diseases requiring sanitary precautions, there were 4 deaths caused by tuberculosis; 3 by diphtheria and croup; 1 by scarlet fever; 8 by whooping-cough; 88 by pneumonia. Twenty-three deaths were from violence, and 70 infants died from injuries received during birth.

For the year 1911 there were 3,228 deaths of infants aged 4 weeks or less, 71.9 per cent., or 2,320, aged 7 days or under; 13.5 per cent., or 436, during the second week of life; 8.9 per cent. during the third week of life, and 5.7 per cent., or 185, during the fourth week of life.

For the year 1912 there were 3,262 deaths of infants aged four weeks and under; 2,389 during the first week; 425 during the second; 253 during the third, and 195 during the fourth week of life.

As in 1911, "premature births" caused the largest number of deaths, 930 in 1911, and 1,125 during 1912.

The table shows that the excessive mortality during the first week is almost entirely caused by premature birth, congenital malformation and feeble vitality. Over four-fifths of the deaths in the first week were recorded as from these causes.

"Some of the causes of infantile mortality are common to every locality, such as prematurity of birth and congenital defects. The health conditions under which the mother lives have an undoubted influence on the vitality of her progeny, and on the occurrence of premature birth. Hereditary influences, such as syphilis, or the degradation and drunkenness of parents, are also of importance. The inexperience with and neglect of their infants by mothers is a most important factor in

whole number of deaths in the first four weeks. The second week shows a mortality of 13.5 per cent. up to 8 per cent. during the third week, and 5 per cent. to 7.8 per cent. during the fourth week of life. In the main these statistics confirm the conditions causing death as shown in statistics drawn from large numbers of population, in that the causes of the greatest number of deaths are prematurity, inanition, birth injuries, respiratory diseases and diseases of the gastro-intestinal tract. It can thus be seen that for large communities the statistical showing of the causes and number of deaths at the time of life we are discussing remains constant, and the causes are, at least in America, also constant. If this is true of all localities, it would seem that measures to reduce the infant mortality might well be uniformly promulgated, and yet how this is to be

TABLE 3.—DEATH OF BABIES ONE MONTH AND UNDER ONE MONTH OF AGE FOR THE YEAR 1912. BOARD OF HEALTH OF NEW YORK, BOROUGH OF MANHATTAN

Cause of Death	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Congenital debility, icterus and sclerema, including prematurity, atrophy, marasmus, inanition, etc.	120	113	120	93	134	111	123	121	121	121	102	105	1,388
Erysipelas	1	2	4	3	0	3	3	0	0	0	1	0	19
Gangrene	0	1	0	0	0	0	0	0	0	0	0	0	1
Synpilis	6	4	6	9	4	3	3	2	3	4	8	5	57
Gonococcus infection	0	0	0	0	1	0	0	0	0	0	0	1	2
General disease, including purpura, hemorrhagica, diabetes insipidus, etc.	1	0	0	0	0	0	0	0	0	0	0	0	1
Convulsions	8	0	3	1	2	5	3	4	0	4	0	2	32
Bronchitis	13	6	8	2	4	0	2	3	3	5	5	5	56
Pneumonia	28	26	14	26	6	8	10	10	10	21	26	22	207
Influenza	1	0	0	0	0	0	0	0	0	0	0	0	2
Whooping-cough	0	0	0	0	0	0	0	0	0	0	2	0	2
Diarrhea and enteritis	4	6	13	11	11	7	14	13	14	10	4	7	114
Disease of the stomach	0	0	0	0	0	0	0	0	0	0	0	3	3
Hernia, intestinal obstruction	0	1	1	0	0	0	0	0	0	0	0	1	3
Congenital malformation, including spina bifida, congenital malformation of heart	13	11	20	3	17	12	16	11	8	17	15	13	156
Disease of the skin and adnexa	1	0	1	1	0	1	1	0	0	0	0	1	6
Disease of kidney and adnexa	0	0	0	0	0	0	0	0	0	0	0	1	1
Disease of the liver	0	0	0	0	0	0	0	1	0	0	0	0	1
Meningitis	0	0	0	0	0	0	0	0	0	0	1	0	1
Softening of the brain	0	0	0	0	0	0	0	1	0	0	0	0	1
Tetanus	3	0	0	0	0	0	0	1	0	0	0	0	4
Causes peculiar to early infancy, including umbilical hemorrhage, atelectasis, injury by forceps at birth	43	47	50	38	45	31	35	37	20	45	31	37	459
Homicide by cutting or piercing instruments	1	0	0	0	1	0	0	0	0	1	0	0	3
Homicide by other means	2	0	4	0	2	1	0	0	0	0	1	0	10
External violence	1	1	0	0	0	1	0	0	0	0	0	0	3
Accidental drowning	1	0	0	0	0	1	0	0	0	2	0	0	4
Absorption of deleterious gases	0	1	0	0	0	0	1	0	1	0	1	1	5
Acute poisoning	0	0	0	0	0	0	0	0	0	0	0	0	0
Acute abscess	0	0	3	0	0	0	0	0	0	0	0	1	4
Disease of organs of locomotion	0	0	0	0	0	0	0	0	1	0	0	0	1
Diseases of the lymphatic system	0	1	0	0	0	0	0	0	0	0	0	0	1
Cause of death not specified	0	1	0	0	0	0	0	0	0	0	0	0	1
													2,547

infantile mortality. Long hours of service of mothers among the industrial classes under improper conditions also is most serious in effect. As regards inexperience, it has been suggested that the deaths of first-born children should be separated from the general infantile mortality. Such returns would undoubtedly show that the rate of death in the first-born is higher than that in the other children; but some of the excess might be attributed to greater difficulty in parturition as well as to parental inexperience. Improper food and methods of feeding are responsible for a large amount of mortality in infants. When improper feeding is a chief factor in producing infantile mortality, a large proportion of the deaths are caused by diarrhea and digestive disturbances. Convulsions are a common result from the irritation produced by improper food."

The points of greatest interest are that the first week of life shows the greatest mortality, the number of infants dying being 71 per cent. to 73 per cent. of the

done is one of the most difficult problems to be considered at present.

The measures taken toward the prevention of prematurity must consider furthering the strength as well as the health of the mothers. If the mother is given rest, good food and quiet surroundings the child will benefit. Pinard, observing women in France who worked up to the time of their confinement and women who had rest and care for days or weeks before confinement, proved that in the latter the child was benefited and weighed more at birth. Ballantyne in his work on "Antenatal Pathology and Hygiene," has advocated the establishment of homes or retreats where mothers about to be confined might be treated by hygienic methods and aided by pertinent suggestions in order to avoid the evil consequences to the fetus from opposite conditions.

There is a tendency here in America to give more and more attention to the antenatal aspect of infant mortality by the establishment of retreats for pregnant

women on lines similar to those suggested by Ballantyne. No measures will be complete which do not also take into consideration the treatment of both parents for any constitutional disease, such as syphilis, which may be co-existent at the time of pregnancy. Good food, surroundings and teaching the duties of motherhood to those who are to see their first-born, will do much to reduce the mortality of this period.

Of deaths resulting from inanition, marasmus or infantile diarrheas, none can gainsay that these infants die not so much as a result of any form of feeding, especially artificial feeding, as on account of the widespread ignorance and even indifference in carrying out the methods of artificial feeding. I certainly believe that among the better situated, where nurses and intelligence can be placed at the disposal of even the premature infants, the results of artificial feeding are not by any means discouraging. With the infant at full term, I feel that from a sociologic point of view artificial feeding by a well-taught mother or nurse is even preferable to a wet-nurse. Wet-nursing as a rule means the death of the child of such a nurse; thus one is sacrificed who has by nature the right to the breast.

The propaganda for the care of the premature and the methods for conserving its strength has not reached that point, at least in America, which would encourage us to hope for better results than we now obtain. The education of the public and the physician on this subject is still to be accomplished. As previously remarked, but few maternity institutions give this subject and even that of feeding the attention it should receive. The question of infant-feeding, the encouragement of maternal nursing, and the education of the general public in methods of feeding is a problem of to-day and much has been accomplished, although much more remains to be done. Social service, milk-stations, lectures to mothers, all will in time tend to reduce this cause of infant mortality.

I have intimated that the perfection of our methods in delivery of the infant and the wide-spread adoption of methods of asepsis in institutions and among the laity have tended to reduce mortality from this cause. At the same time when we contemplate the large number of deaths consequent on operative interference during labor, it is to be feared that there is still much to be accomplished through the instruction of the physician in this direction. I feel also that many of the deaths due to diseases of the respiratory organs could well have been prevented by attention to detail in the care of the newborn.

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**Strenuous Athletics and the Heart.**—The hypertrophied heart is more liable to acute cardiac dilatation than the normal heart. At the state university, during the past two years, there have been four cases of acute dilatation in athletes and only one in the non-athletes, although relatively few students take part in the major college sports. In case of severe fever these large hearts seem to be especially vulnerable. In the graduates from Annapolis it has been found that there are six times as many deaths from heart-disease among athletes as among non-athletes. If physical training is to be made compulsory in our schools and violent athletic contests are to be incited by crowds and publicity, a serious duty devolves on the medical profession to study the results carefully and, in case of each individual youth, to supply that balanced judgment concerning the value of various kinds of physical exercise which only those can have who follow human life from the womb to the winding-sheet.—C. R. Bardeen, M.D., *Wisconsin Med. Jour.*

## AN EPIDEMIC OF SMALL-POX IN SONORA, MEXICO

LLOYD MILLS, M.D.  
LOS ANGELES

A paper based on practical experience with small-pox and giving further striking evidence of the remarkable protective value of vaccination is never untimely. This is especially true in these days when common ignorance of the disgusting horror of the ravages of small-pox has caused so much ill-advised and even fanatical opposition to the one essential weapon against it, vaccination.

This paper is also timely in that it offers some corollaries on frequent Mexican medical abuses, the results of which may be brought forcibly to our notice in case of intervention by our country in the internal affairs of Mexico.

In October, 1912, I was in the Yaqui Valley, Sonora, engaged in making a climatic and hygienic survey of the region for a large irrigation project.

In the spring of 1912 small-pox had become epidemic in a group of towns about eighty miles to our south, but the spread had been partly limited by the habit of sleeping outdoors during the hot weather. With the cooler autumn evening the families began to herd together within their adobe huts, and because of this closer contact the epidemic renewed itself fiercely. No organized vaccination had ever been done in this region, and small-pox had always been present. No epidemic of magnitude had occurred, however, for a number of years, and the entire youth of the community offered rich virgin material for the loathsome invasion which now began. When this reached the point at which many new cases were appearing daily and deaths were frequent, a general exodus took place from these towns, spreading the disease freely in all directions, for no quarantine was attempted. After hundreds of deaths had occurred, one or two incompetent Mexican physicians in the government employ were put in charge of the situation, but did nothing to limit the contagion.

There are five pueblos in the valley lands of the Yaqui River with populations of from one to three thousand. These pueblos are named Cocorit, Bacum, Torin, Potam and Vicam. The contagion first entered the valley at the pueblo of Cocorit by means of a family which came by rail from the heart of the infected district. Before the local authorities became alarmed, about sixteen cases were scattered throughout the town, and then an incompetent French physician in the government service was placed in charge. When not intoxicated he was devising means of grafting from the town and state in collusion with the mayor and the mayor's secretary. Absurd charges were made for office rental, carriage hire and medicines. Fictitious expense accounts were created for food-supplies for whole families, and for several weeks all that was actually done toward limiting the epidemic was an infrequent visit to some of the infected homes, where spirits of camphor was given the unaffected members of the family to rub on their hands, face and clothing.

During all this time there was the freest of intercourse between the patients and all their relatives and friends, members of families with sick went freely to the church, the stores and to their usual meeting-places, and of course hygienic conditions were primitive in the extreme. Consequently the incidence of the disease rose steadily until there was a daily average of about forty