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VITAL and HEALTH STATISTICS

ANALYTICAL STUDIES

Infant Loss in the Netherlands

Trends in infant and perinatal mortality in the Netherlands prior to and after World War II. Analysis by age, sex, causes of death, age and parity of mother, place of delivery, season, urban and rural areas, and social factors; maternal mortality; description of maternal and child health services; general demographic and socioeconomic trends.

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FOREWORD

This report is one of a group of analytical studies designed to delineate the perinatal and infant mortality problem in the United States. While the primary concern is with the problem of perinatal and infant mortality in this country, it was felt that much could be learned from the experience of other developed countries with advanced medical systems. During the period 1950-65, infant mortality was no longer declining at its former pace in the United States and in several other countries (England and Wales, and Scotland, for example) but in the Netherlands and Sweden, the rates appear to have declined to a level which is about half of that in the United States. Despite declines in infant mortality for the United States in 1966 and 1967, the differential between this country and the Scandinavian countries remains evident.

The National Center for Health Statistics arranged with a number of investigators to prepare comprehensive reports on perinatal and infant mortality in their own countries. Contracts were negotiated with investigators in Denmark, England and Wales, the Netherlands, Norway, Scotland, and the United States. Earlier reports evolving from these contracts appear in Series 3 of *Vital and Health Statistics:*

No. 4 Infant and Perinatal Mortality in the United States
No. 5 Infant and Perinatal Mortality in Scotland
No. 6 International Comparison of Perinatal and Infant Mortality: the United States and Six West European Countries
No. 8 Infant Mortality Problems in Norway
No. 9 Infant and Perinatal Mortality in Denmark

The present report for the Netherlands is the sixth in this group of studies on perinatal and infant mortality. The methodology, findings, and conclusions are those of the investigators.

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Director
Office of Health Statistics Analysis

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IN THIS REPORT are summarized studies which have been carried on for more than a decade on infant loss in the Netherlands. The trends in infant and perinatal mortality are analyzed in the light of changing patterns of medical demography, the organization and development of health and medical services, and the general standard of living.

Infant mortality was reduced by half in each of three periods: between 1900 and 1922, between 1923 and 1939, and between 1948 and 1964. All age components of infant loss (fetal and infant mortality) have decreased more rapidly in the postwar than in the prewar years. Perinatal mortality has fallen much more slowly than postnatal mortality (1-51 weeks), drastically changing the ratio of these two components from 1 to 1 in 1927 to 3 to 1 in 1950-54 and to 5 to 1 in 1960-64. Currently, perinatal mortality accounts for more than 80 percent of infant loss.

Obstetrical care in the Netherlands has three distinctive characteristics. First, domiciliary confinement with the services of a family doctor or midwife is far more usual than institutional confinement, with only 30 percent of the births occurring in a hospital. Second, midwives give prenatal and natal care as independent practitioners. Third, a special voluntary organization provides care in the home for mother and the newborn.

A review of infant and perinatal mortality by sex, age, cause of death, social class, and other factors indicates that further reductions in infant loss in the Netherlands may be expected.

INFANT LOSS IN THE NETHERLANDS

J. H. de Haas-Posthuma, M.D., and J. H. de Haas, M.D.[1]

In this monograph are summarized the studies we have carried on for more than 15 years on infant loss in the Netherlands. Such investigations are indispensable in evaluating child health and maternal care programs and sociohygienic conditions.

Holland's[2] position with regard to infant loss is distinctive in three respects: its rates are low compared with those of other countries, the frequency of hospitalized births is low, and infant care has a relatively long tradition. Moreover, its birth rate is higher than that in neighboring countries.

For reasons to be discussed in the text, the analysis is not restricted to infant mortality, but deals more broadly with infant loss: the total of fetal and infant deaths. In order to make the analysis as meaningful as possible, the historical and postwar trends of infant loss have been viewed in the light of the changing patterns of medical demography, the organization and development of health and medical services, and the general standard of living. Social, biological, and medical factors are closely interrelated in nearly all problems of public health. Infant loss is a classic example of this interrelationship.

Although the rates of infant loss in the Netherlands are relatively low, the irreducible minimum is far from having been reached. Analyses by sex and other biological factors, social class, causes of death, and seasonal variation point in the same direction: infant loss continues to fall and will decrease further. The present rates are low when compared with the past, but not according to modern social and medical conceptions. In the atom age, wastage of infant life is an anachronism.

I. NATURE AND PROCESSING OF DATA

In analyzing the trend of infant loss in the Netherlands, it is essential to know how the basic data are collected and processed. This section, therefore, describes notification and registration procedures, the calculation of mortality rates, and the classification of causes of death.

Notification and Registration

Often overlooked is the fact that the registration of births and deaths in the Netherlands and in other European countries is the second stage in vital statistics bookkeeping; the importance of the first stage—notification—is underestimated. Registration is usually in the hands of a competent statistical office, but notification is done by people who are not always aware of the significance of accurately reporting each case and of its epidemiological implication.

From a biological point of view, there is no sharp borderline between a fetal death and a live-

[1] At the time this report was prepared, both authors were affiliated with the Department of Health Development, Netherlands Institute for Preventive Medicine, Central Organization for Applied Scientific Research in the Netherlands (TNO), Leiden.

[2] [In this report, Holland and the Netherlands are used interchangeably.—Ed.]

born child that dies soon after birth. Statistically, however, a differentiation is made according to internationally accepted definitions of fetal death (stillbirth)[3] and live birth. The greater the number of deliveries that take place in hospitals, where trained personnel care for the newborn, the sharper is the differentiation that can be made. In Holland, where about 70 percent of all deliveries are in the home, many doctors and midwives working outside of hospitals have not been trained to adhere strictly to the international definitions.

Live births.—Notification of births within 3 days after delivery is compulsory and must be done by someone who was present at the delivery. It is usually the father who reports the birth at the town hall. There is no *medical* notification of live births in the Netherlands. The registrar asks the father or his representative for the following information: date of birth, religion, nationality, name of physician or midwife attending the delivery, name of hospital (if any), whether single or multiple birth, parity (both including and excluding births in previous marriages), date of present marriage, legitimate or illegitimate child, and age and occupation of father and mother. In cases where there had previously been a fetal death or the death of a child before birth notification, parity is often understated. If the women had been transported to the hospital during labor, the questions relating to place of birth (hospital or home delivery) and to attendant (doctor or midwife) may be answered incorrectly. Medical data, such as birth weight, type of delivery, complications of pregnancy, etc., are not asked for, inasmuch as the person giving the information is most often a layman. Information, therefore, is not available on the distribution by birth weight of the newborn as a group.

Notification of live births may take place under the following circumstances:

Alive at time of notification: Reporting of these "ordinary" births is complete. The local registrar sends each birth certificate to the Central Bureau of Statistics.

Dead before notification (faux mort-nés): In submitting the death certificate signed by the doctor, the father indirectly gives notice of the birth of the child. Through this certificate, the cause of death, birth weight, and duration of gestation are known, but not the complications during pregnancy and labor. Some doctors, continuing the practices of years past and misinterpreting the international definitions of live birth and fetal death, consider liveborn infants with gestations of less than 28 weeks who die soon after birth to be "nonviable." In such cases, these deaths are not certified by the physician, and as a consequence are not reported as live births by the parents.

Stillbirths (vrais mort-nés).—The father or his representative gives notice of a stillbirth by submitting a death certificate filled out by a doctor. This certificate contains questions on cause of death, duration of gestation, and complications during pregnancy and labor, but not on birth weight.

Three difficulties arise in the reporting of stillbirths:

1. In borderline cases with respect to duration of gestation (those of 26 to 28 weeks' duration), doctors tend to consider a stillbirth as an early fetal death in order to save parents the trouble and costs of a funeral. This leads to a slight understatement of stillbirth and of perinatal mortality.
2. For religious reasons, a stillbirth occurring during the last period of labor may be considered to be a live birth, in order that the child may be baptized. This practice leads to a slight underregistration of stillbirths but does not affect perinatal mortality, inasmuch as these children are recorded as having died in the first week of life.
3. If liveborn infants of more than 28 weeks' gestation die very soon after birth and, for some reason or other, are reported as stillbirths, overregistration of still-

[3] [The World Health Organization recommends use of the term "fetal death" for all pregnancy terminations which show no evidence of life after complete expulsion or extraction from the mother; in European vital statistics the term "stillbirth" is used to denote such terminations at 28 weeks or more of gestation.—Ed.]

births occurs. This does not affect perinatal mortality, but does reduce first-week mortality.

The net effect of these three factors very likely is a slight undernotification and underregistration of stillbirths and of perinatal mortality. Moreover, since 1950 the official definition of stillbirth has changed from 26 to 28 weeks of gestation. This change has resulted in a slight decrease in the stillbirth rate (0.4 per 1,000 births) compared with preceding years.

Deaths.—The doctor is legally obliged to fill out the death certificate, which is sent to the Central Bureau of Statistics by the local registrar. Without a death certificate, the deceased cannot be buried. Special data are required if a child dies in the first week of life: duration of gestation, and weight and length at birth. Children dying in the first week are the only ones for whom birth weight and period of gestation must be reported, but unfortunately, the number of "unknowns" is high.

Mortality in first week: This component of perinatal and of infant mortality must be considered separately, as notification of first-week mortality is not complete and registration has been incomplete until recently.

As already mentioned, there is no notification of birth and death when the doctor considers as "nonviable" a child of 28 weeks or less gestation who dies within 3 days (the time allowed for giving notice of the birth of a child). This undernotification leads to underregistration and to an estimated lowering of first-week mortality (and infant mortality) by 1 to 1.5 per 1,000 births.

The notification of a death during the first hours of life as a stillbirth (and, conversely, notification of a stillbirth as a first-week death) results in a net underregistration of first-week mortality, estimated to be less than 0.5 per 1,000.

Prior to 1964, notified cases of first-week mortality for infants with gestations of less than 28 weeks were not registered by the Central Bureau of Statistics. Recently, data for the period 1950-63 have been revised to include such cases, resulting in an increase of 1.5 per 1,000 in first-week, perinatal, and infant mortality.

Altogether, the limitations of the data discussed above reduced first-week and infant mortality by 3 to 3.5 per 1,000 births. Underreporting may still be responsible for understating the rate by 1.5 to 2 per 1,000. In 1963-64, first-week mortality was 10.2 per 1,000 and infant mortality 15.3 per 1,000, according to official statistics. Computed on the basis of countries in which notification and registration are presumed to be complete, the Dutch rates would be 12 and 17 per 1,000, respectively.

When international comparisons are made of stillbirth, and of first-week, perinatal, and infant mortality, it is assumed that detailed information on the methods of notification and of registration by the municipal, provincial, or central bureaus of statistics is available. Each stage of the procedure should be examined at the particular locale and evaluated periodically.

Mortality after first week: The problems which arise in the notification and registration of first-week mortality do not exist with respect to mortality after the first week, when notification is compulsory and complete. Subdivisions by sex and age, season, and cause of death have been possible from 1953 onward because of data put at our disposal by the Central Bureau of Statistics.

International comparisons of postnatal mortality (1-51 weeks of age) do not present any difficulties. However, infant mortality as a whole, which includes first-week mortality as its main component, is not comparable without qualification.

Calculation of Rates

Not only is it necessary to know the methods of notification and registration, but also the basis on which rates are computed. In Holland the calculation of the various components of perinatal and infant mortality is shown on page 4.

In the tables and charts which give first-day mortality, the numerator relates to deaths in the first calendar day and not in the first 24 hours of life. Inasmuch as a far larger number of children die during the first than the second 12-hour period of the first day of life, the official data on first (calendar) day mortality comprise not half, but from 70 to 75 percent of the mortality in the first 24 hours. Because of this inappropriate registration of first-day mortality, data on first-week mortality include approximately the first 6½ days of life and not the first 7 days. However,

Component	Numerator	Denominator
Stillbirth	Stillbirths of 28 or more weeks of gestation	Live births and stillbirths of 28 or more weeks of gestation
First-day mortality	Deaths in first calendar day	Live births
First-week mortality	Deaths in first 7 calendar days	Live births
Perinatal mortality	Stillbirths plus deaths in first week	Live births and stillbirths of 28 or more weeks of gestation
Postnatal mortality	Deaths in 1-51 weeks of life	Live births
Infant mortality	Deaths under 1 year of age	Live births
Infant loss	Stillbirths plus deaths under 1 year	Live births and stillbirths of 28 or more weeks of gestation

the effect of this practice is to diminish first-week mortality only slightly and first-month mortality hardly at all.

Classification of Causes of Death

Causes of death in this study are generally classified according to the sixth and seventh revisions of the International Statistical Classification of Diseases, Injuries and Causes of Death (sometimes called the International Lists). Reporting, however, depends largely on the viewpoint of the doctor and on available medical facilities. The obstetrician gives primary consideration to the obstetric abnormalities, e.g., toxemia, while the pediatrician stresses the pathological condition of the child.

In Holland, during the past decade only half of the newborn dying in the perinatal period were born in a hospital; of the children born at home and dying in the first week, only one-quarter were admitted to a hospital before death. Thus, in a large proportion of perinatal deaths careful clinical observation is lacking. In 1952-53, postmortem examinations were performed in only 15 percent of perinatal deaths, which proportion may have increased to 25 percent at present.

Nearly half of the stillbirths and one-fourth of the first-week deaths occur among home deliveries attended by a general practitioner or a midwife. Taking into account the difficulties encountered even in well-equipped hospitals in determining the causes of death in newborns, whether mature or immature, data on the reported causes of perinatal mortality should be interpreted cautiously.

From a medical point of view, the Seventh Revision of the Classification as it refers to causes of stillbirth and first-week mortality is far from ideal. Students of perinatal and infant mortality are therefore eagerly looking forward to the Eighth Revision of the International Lists. After the first week of life, however, diagnosis becomes less complicated, although often far from simple without a well-performed postmortem.

International comparisons of the causes of perinatal mortality must take into account differences in the diagnostic methods and the coding procedures used in the various countries. Even in the same country, data on causes of death over several decades can be given only for main groups, but not subdivisions, because successive revisions of the International Lists make comparability

difficult or impossible for a number of causes. Nevertheless, weaknesses in the reporting and coding of causes of death should not be overemphasized in analyzing perinatal and postnatal mortality. Analysis by sex and age of the child, seasonal variation, parity and age of mother, type of delivery, obstetrical and maternity care, social factors, etc., provides considerable information on the possibility of reducing perinatal and postnatal mortality.

II. HISTORICAL TRENDS IN INFANT LOSS

Infant mortality rates for Holland since 1865 are shown in figure 1. Until 1918, the *faux mort-nés* were registered as stillbirths and not as infant deaths. Therefore, the official stillbirth rates before 1918 were too high; the change explains the sudden fall in the rate from 39 per 1,000 births in 1917 to 26 in 1918. Automatically, first-week and infant mortality rose about 10 per 1,000. This change in registration did not influence the rate of infant loss, which is the sum of stillbirth and infant mortality.

General Trend

When account is taken of the revision of registration procedures in 1918, the stillbirth rate showed virtually no change between 1900 and 1940. Therefore, the reduction in infant loss until 1940—from about 200 per 1,000 births in 1900 to nearly 110 in 1920 and to about 60 in 1938-39—resulted from the fall in infant mortality. Since 1940, however, stillbirths have contributed to the decrease in infant loss, as may be seen in figure 2. After World War II, infant loss decreased from 60 per 1,000 in 1946 to 30 in 1963, and 27 in 1965.

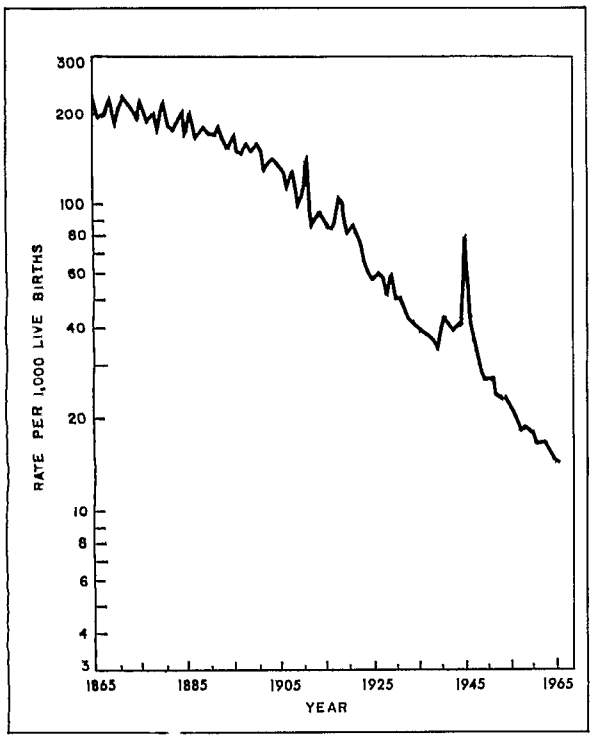

Figure 1. Infant mortality rates: Netherlands, 1865-1965.

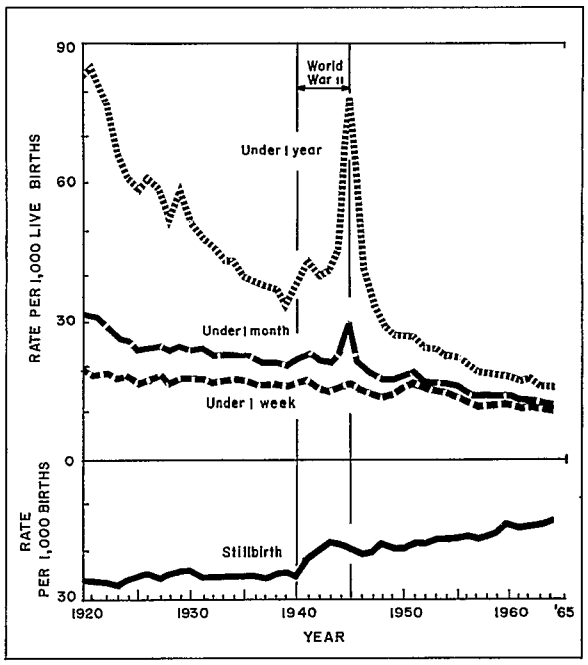

Figure 2. Infant mortality rates by age, and stillbirth rates: Netherlands, 1920-64.

Infant mortality amounted to more than 200 per 1,000 live births until 1890 and came down to about half that level by 1920. The rate dropped to 50 per 1,000 in 1930, 30 in 1948, and 15 in 1963-64. Infant mortality was halved in each of three periods: between 1900 and 1922, between 1923 and 1939, and between 1947 and 1963, with the first period covering 22 years and the other two 16 years each.

The peaks of the curves shown in figures 1 and 2 are accounted for by epidemics of gastrointestinal or respiratory diseases and by disrupted living conditions during World War II, when the infant mortality rate rose from about 35 to nearly 80 per 1,000. The hot and dry summer of 1911—notorious for severe diarrhea—had a greater impact on infant mortality than did the shortage of food, fuel, and clothing during World War I and the influenza epidemic of 1918. The rise in 1929 was caused by respiratory infections during an unusually cold winter, when heating in most houses was still primitive.

When the infant mortality rate was about 50 per 1,000 and postnatal mortality accounted for about two-thirds of infant deaths, as was the case in 1930, the main causes of death after the first week were diseases of the respiratory system, followed closely by diseases of the digestive system, and the common communicable diseases of childhood. The virtual disappearance of these three killers of infants—together with the improvement in infant care—has greatly influenced the trends of infant mortality. As a result of the sharp reduction in these causes of death, congenital malformations rose in relative importance from fifth to first place as a cause of postnatal mortality.

Age Components

Historically, stillbirth and infant mortality have been analyzed separately. Moreover, infant mortality itself is not a homogeneous category, inasmuch as its two major components differ in nature, first-week mortality being influenced by obstetrical factors and postnatal mortality by pediatric conditions. Because the *faux mort-nés* were registered as stillbirths until 1918, infant mortality could not be subdivided into its real components until that time.

Table 1 shows the birth rate, perinatal and infant mortality, and their components for each year from 1920 through 1964. Infant loss—the modern concept of wastage of infant life—may be defined in two ways: the sum of stillbirth and infant mortality or the total of perinatal and postnatal mortality.

Table A compares the relative decrease in the components of infant loss in the 16-year prewar period 1923 to 1939 with that in the 16 postwar years of 1948 to 1964. In both periods postnatal mortality (1-51 weeks) decreased much more rapidly than perinatal mortality. For each of these components, the relative reduction was greater in the postwar than in the prewar period.

Perinatal mortality.—Between 1920 and 1940 the stillbirth rate remained stable at about 25 per 1,000. Around the beginning of World War II, for some unexplained reason, the rate dropped rather sharply—as it did in a number of other countries—and remained at the level of 19 or 20 per 1,000 during the 1940's. The other component of perinatal mortality, first-week mortality, was 19.0 per 1,000 in 1920, decreased slowly during the 1920's and 1930's, and showed little change during World War II—fluctuating between 14 and 16 per 1,000. Perinatal mortality as a whole fell very gradually from its level of 45 per 1,000 in 1920, but did not drop below 32 per 1,000 through the 1940's.

While both stillbirth and first-week mortality decreased about 10 percent between 1923 and 1939,

Table A. Percent decrease for components of infant loss rates: Netherlands, 1923 to 1939 and 1948 to 1964

Component	1948 to 1964	1923 to 1939
	Percent decrease	
Infant loss	41	37
Perinatal mortality	28	11
Stillbirth	29	10
Infant mortality	49	49
Under 1 week	27	11
1-51 weeks	69	63

Table B. Perinatal and postnatal mortality rates, and ratios of perinatal to postnatal mortality rates: Netherlands, selected years, 1900-1964

Period	Perinatal mortality rate[1]	Postnatal mortality rate[2]	Ratio
1960-64	25	6	4:1
1955-59	28	7	4:1
1950-54	33	10	3:1
1935-39	41	21	2:1
1925-29	42	41	1:1
1910-14	50	75	0.7:1
1900-1904	60	120	0.5:1

[1]Rate per 1,000 births.

[2]Death rates for ages 1-51 weeks per 1,000 live births.

in the postwar years 1948-64 the reductions amounted close to 30 percent. Because the relative decrease was about the same for both components, the ratio of stillbirth to first-week mortality—4 to 3—has remained unchanged for the past 40 years. The parallel decrease for stillbirth and first-week mortality in the two periods strengthens the concept that the perinatal period is an entity from the medical point of view, even though biological factors, such as maternal age and parity, have a stronger influence on stillbirth than on first-week mortality.

Perinatal mortality has been decreasing much less rapidly than postnatal mortality since the turn of the century, or longer, drastically changing the ratio between these two components from 1/2 to 1 in 1900-1904, to 1 to 1 in 1925-29, 2 to 1 a decade later, and 4 to 1 in 1960-64 (table B). While in 1925-29 perinatal mortality accounted for half of the infant loss, currently it is responsible for more than 80 percent of the total. The problem of the wastage of infant life has become largely the problem of perinatal mortality; postnatal mortality is no longer of major importance.

Postnatal mortality.—The reduction in mortality among infants beyond the first week of life has been spectacular. In 1920, postnatal mortality was still over 60 per 1,000 live births, but in 1932 the rate was down to 30 per 1,000 and by 1939 to less than 20, a reduction of about two-thirds in 40 years. During World War II postnatal mortality increased sharply, however, to almost 63 per 1,000 in 1945. Since then the rate has dropped steadily, reaching about 10 per 1,000 in 1952 and less than 5 at present. The long-term decrease in postnatal mortality, accelerated after World War II, has been due to the sharp reduction in the death rate for diarrheal, respiratory, and other infective diseases.

In the early 1920's postnatal mortality was three times as high, and in the 1930's nearly twice

Table C. Infant, first-week, and postnatal mortality rates, and ratios of first-week to postnatal mortality rates: Netherlands, selected years, 1920-64

Period	Infant mortality	First-week mortality	Postnatal mortality[1]	Ratio
	Rate per 1,000 live births			
1960-64	16	11	6	2:1
1947-51	29	15	14	1:1
1930-34	47	17	30	0.6:1
1920-24	74	18	56	0.3:1

[1]Death rates for ages 1-51 weeks.

as high, as first-week mortality. Postnatal mortality continued to record the higher rate until shortly before 1950, when the rates were about equal; in the early 1960's first-week mortality was twice as high as postnatal mortality (table C).

Postnatal mortality may be subdivided into three age components: 7-27 days, 28 days-5 months, and 6-11 months. The rates for the first component are available since 1920 (table 1) and for the other two since 1938 (table 2). For the age group 7-27 days, the mortality decreased from 12 per 1,000 in 1920 to 6 in 1930 and to 4 in 1939. After reaching a peak of 14 per 1,000 in 1945, the rate returned to the immediate prewar level in 1947, to 2 in 1956 and to an even lower level in recent years.

The war peak proved, in what may be considered an unintended experiment, that mortality at ages 7-27 days is much more influenced by external factors than is first-week mortality. There is therefore no justification for combining stillbirth and first-*month* mortality. Perinatal mortality should be restricted to stillbirth and first-*week* mortality.

Mortality from 28 days-5 months has generally been about twice as high as in the interval 7-27 days. The death rate for children 6-11 months of age was somewhat higher than for those 7-27 days until the mid-1950's, but since then the rates have been practically the same, although they relate to age periods of 26 weeks and 3 weeks, respectively.

Sex Differences

The stillbirth rate for females averages about 10 percent below that for males, irrespective of the level of the rate (table 3). Practically no decrease was recorded until World War II either for boys or for girls, when the sudden reduction in the stillbirth rate between 1940 and 1941 occurred for both sexes.

It has long been known that infant mortality is lower among girls than boys, the difference amounting to about 20-25 percent. The causes of infant mortality for each sex in 1929-30—midway between the two World Wars—are shown in table D. Males had a higher death rate than females for each of the major groups of causes, particularly the respiratory and digestive diseases. Although the level of infant mortality has fallen sharply since then, males have continued to experience higher rates.

Table D. Infant mortality rates and percentage distribution, by sex and cause of death: Netherlands, 1929-30

Cause of death (Third Revision—International Lists, 1920)	Both sexes	Male	Female	Both sexes	Male	Female
	Rate per 10,000 live births			Percentage distribution		
Total	548.9	614.7	479.1	100.0	100.0	100.0
Tuberculosis----------31-37	10.2	10.9	9.6	1.9	1.8	2.0
Infective diseases----------1-30,38-42	48.4	50.1	46.6	8.8	8.2	9.7
Deficiency diseases----------53,56,61	4.1	4.9	3.3	0.7	0.8	0.7
Nervous system and sense organs----70-86	39.0	44.8	32.8	7.1	7.3	6.8
Respiratory system----------97-107	103.9	116.3	90.6	18.9	18.9	18.9
Digestive system---------108-112,114-127	60.6	72.8	47.6	11.0	11.8	9.9
Congenital malformations----------159	42.6	46.2	38.8	7.8	7.5	8.1
Diseases of early infancy----113,160-162	165.0	185.3	143.5	30.1	30.1	29.9
Accidents, poisonings,and violence-165-203	3.2	3.6	2.8	0.6	0.6	0.6
Other diseases 43-52,54,55,57-60,62-69,87-96,128-158	71.9	79.8	63.5	13.1	13.0	13.3

SOURCE: Adapted from Central Bureau of Statistics, Statistiek van de sterfte, Zeist.

Table E. Perinatal, stillbirth, and infant mortality rates, by size of municipality: Netherlands, 1926-40 and 1946-63

Item	1961-63	1956-60	1951-55	1946-50	1936-40	1931-35	1926-30
Perinatal mortality	Rate per 1,000 births						
100,000+ inhabitants	24.7	26.6	29.8	31.0	37.2	39.2	41.0
20,000-99,999	25.2	26.3	30.8	32.7	40.7	42.0	43.7
Under 20,000	26.0	29.2	33.0	35.6	41.8	42.6	41.9
Stillbirth							
100,000+ inhabitants	13.8	15.4	16.5	17.9	24.1	24.6	25.4
20,000-99,999	14.4	15.3	16.8	18.9	25.4	24.4	24.5
Under 20,000	15.2	17.2	18.6	20.7	24.9	25.4	25.0
Infant mortality	Rate per 1,000 live births						
100,000+ inhabitants	16.2	17.8	22.0	27.0	28.8	34.4	41.6
20,000-99,999	16.9	18.2	24.1	30.3	36.6	43.1	54.2
Under 20,000	16.6	19.2	24.2	32.4	40.9	48.7	62.4
Under 1 week							
100,000+ inhabitants	11.0	11.4	13.5	13.1	13.1	14.6	15.6
20,000-99,999	11.0	11.1	14.3	13.8	15.3	17.6	19.2
Under 20,000	10.9	12.2	14.7	14.9	16.9	17.4	16.9
1-51 weeks							
100,000+ inhabitants	5.2	6.4	8.5	13.9	15.7	19.8	26.0
20,000-99,999	5.9	7.1	9.8	16.5	21.3	25.5	35.0
Under 20,000	5.7	7.0	9.5	17.5	24.0	31.3	45.5

Urban and Rural

At the beginning of the industrial revolution, infant mortality was higher in the cities than in rural areas. Since the end of the 19th century, however, it has been lower in urban than in rural areas. The disadvantages of urban compared with village life has been more than compensated for by the development of better hygienic measures in the cities.

Before World War II all components of infant mortality were higher in rural than in urban areas, the differences amounting to 40 percent for postnatal mortality and 10 percent for perinatal mortality (table E). However, after World War II, as infant loss decreased, the differences by size of municipality became smaller and smaller until they have practically disappeared.

Notwithstanding the fact that the proportion of hospitalized births in cities of 100,000 or more inhabitants currently is twice that in municipalities of less than 20,000 population, first-week mortality is not lower in urban than in rural areas, and the stillbirth rate is only slightly lower in urban areas. Hospitalization in itself is no assurance that perinatal mortality will be reduced.

International Comparisons

International comparisons of infant mortality are essential not only because of differences in the level of the rates between countries but also because of differences in their long-term trends. Figure 3 shows the trend of infant mortality in several western European countries since 1922. The rates have not been standardized for parity or age of mother, but these biological factors do not substantially influence the general trend. Differences in notification and registration practices

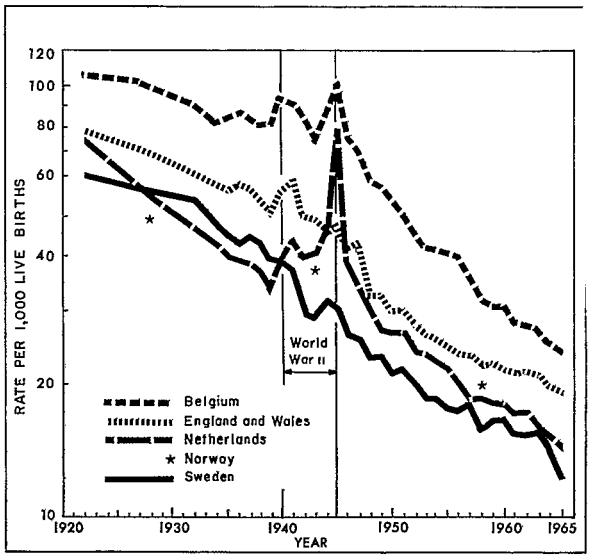

Figure 3. Infant mortality rates: selected European countries, 1922-65.

have also been left out of consideration and these differences may be important; considerable caution must therefore be exercised in making international comparisons, at least when the differences are small.

In the first half of the 1920's Norway had the lowest infant mortality rate[4]—somewhat over 50 per 1,000 live births—while in Sweden the rate was 60 per 1,000, and in the Netherlands and in England and Wales it averaged a little over 70 per 1,000. The rate in Belgium exceeded 100 per 1,000. During the second half of the 1920's, the rate for the Netherlands fell below that for Sweden. In the decade prior to World War II, the infant mortality rates in both the Netherlands and Norway came down below 40 per 1,000 for the first time, both rates averaging about 5 per 1,000 below Sweden's.

Infant mortality rates in the Netherlands and in England and Wales have been diverging since the early 1920's, except for the World War II peak in the Netherlands. The rate in England and Wales has not yet gone below 20 per 1,000, while in the Netherlands and in Sweden the rate is approximately 15 per 1,000, with that for Norway being in between. A striking disparity is found in the infant mortality rates of the Netherlands and neighboring Belgium, which countries at present do not differ much in social conditions but rather in socioeconomic development and in the level of medical care.

Table 4 gives data on the trend of infant loss and its components in a number of countries for the period 1926 to 1961. The prewar stillbirth rate—approximately 25 per 1,000—was about the same in the Netherlands, Sweden, Norway, Denmark, and Czechoslovakia. In England and Wales the stillbirth rate was higher (about 40 per 1,000), while Belgium's was in between.

Before 1940, infant mortality was higher in Sweden than in Norway or the Netherlands. Since World War II, Sweden's rates have become the lowest in the world. The prewar rates in England and Wales and the United States were from 5 to 10 years behind those for Sweden and the Netherlands, assuming that a comparison of large and small countries is valid. During the interbellum period, infant mortality in Belgium was twice as high, and in Czechoslovakia three times as high, as in the Netherlands. In nearly all countries, an accelerated downward trend occurred after World War II, as will be described later.

III. POSTWAR TRENDS IN INFANT LOSS

The downward trend of infant loss during the postwar period will be analyzed by age, sex, cause of death, social factors, and urbanization, and in the light of socioeconomic conditions and the medical care of mother and child.

AGE COMPONENTS

After reaching a peak of nearly 80 per 1,000 live births in 1945, infant mortality in the Netherlands returned to the immediate prewar level of 33 per 1,000 in 1947 and to about 27 in 1950. By 1950, the stillbirth rate was down to slightly below 20 per 1,000 and perinatal mortality to a little under 35 per 1,000.

[4]New Zealand had the best record for infant mortality until the end of World War II, but its population was very small (1.5 million).

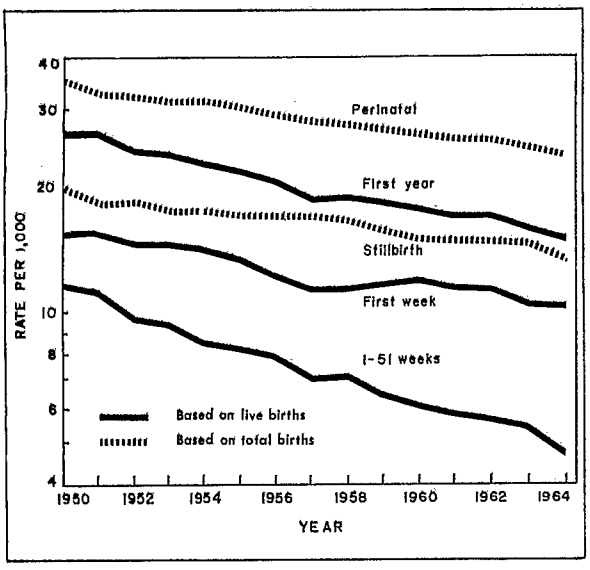

Figure 4. Perinatal and infant mortality rates by age: Netherlands, 1950-64.

The general trend of the components of infant loss between 1950 and 1964 is shown in figure 4. During this period, both the stillbirth and the infant mortality rates continued to fall, reaching 13 and 15 per 1,000, respectively, in 1964. The rate of infant loss fell to 28 per 1,000 from 46 in 1950.

The postwar trend of first-week mortality has been irregular: rising slightly in 1950 and 1951 (probably due to a change in registration procedure), decreasing from 1951 to 1957, and remaining about the level of 11.5 per 1,000 in the years 1957-62. In 1964, the rate was down to 10.1 per 1,000.

Postnatal mortality (ages 1-51 weeks) decreased to 4.7 per 1,000 in 1964, with the three components—7-27 days, 28 days-5 months, and 6-11 months—reaching all-time low levels of 1.5, 2.1, and 1.2 per 1,000, respectively.

The relative reduction in mortality for the various age components was not uniform between 1950 and 1964. The most rapid decrease—nearly 65 percent—occurred in the age group 28 days-5 months; the smallest reduction—18 percent—was recorded for ages 1-6 days. The age components under 1 calendar day and 7-27 days each recorded a reduction of 45 percent, the same as for infant mortality as a whole. Infant loss fell 39 percent and perinatal mortality, 32 percent. The continued decrease of postnatal mortality, infant mortality, and infant loss brought these rates down to less than 5, 15, and 29 per 1,000, respectively, in 1964.

Table F shows the decrease in first-week mortality between 1950-51 and 1959-61 by indi-

Table F. Mortality in the first week of life, by individual day: Netherlands, 1950-51 and 1959-61

Age	1959-61	1950-51	1959-61	1950-51	1959-61	1950-51	Change in rate
	Number of deaths		Percentage distribution		Rate per 1,000 live births		Percent
Under 1 week----	8,436	7,009	100	100	11.6	15.3	-24
Under 1 day----------	4,079	3,812	48	54	5.6	8.3	-33
1 day----------	2,109	1,296	25	18	2.9	2.8	+4
2 days----------	982	713	11	10	1.3	1.6	-19
3 days----------	565	458	7	7	0.8	1.0	-20
4 days----------	291	271	3	4	0.4	0.6	-33
5 days----------	245	243	3	3	0.3	0.5	-40
6 days----------	165	216	2	3	0.2	0.5	-60

NOTE: Based on calendar days since birth.

vidual days of age. The reduction was most marked on the first calendar day[5] of life and the last 3 days of the first week. Each day of age contributed to the decrease in first-week mortality, except the age 1 day. Although this period deserves special attention, the main efforts in reducing the death toll should be concentrated on the first hours of life, as these claim a major part of first-week mortality. According to a special survey, one-third of first-week mortality occurs in the first hour of life and two-thirds in the first 24 hours.

The components of infant loss account for varying proportions of the total. The relative importance of the components has changed because they have not decreased at the same rate. In 1964, the two components with the lowest mortality—7-27 days and 6-11 months—each constituted about 5 percent of the total infant loss and about 10 percent of infant mortality. The proportions were somewhat higher for age 28 days-5 months (8 and 14 percent, respectively). Considerably greater were the proportions at ages under 1 day and 1-51 weeks, each accounting for about 17 percent of the total infant loss and for about 32 percent of infant mortality.

Between 1950 and 1964, the proportion of stillbirths and of mortality at ages 1-6 days increased, while the proportion of deaths at 1-51 weeks (mainly 28 days-5 months) decreased. The ratio of perinatal to postnatal mortality increases as infant loss rates decrease. Currently, perinatal mortality is responsible for more than 80 percent of infant loss.

Stillbirths account for nearly 60 percent and first-week mortality for somewhat over 40 percent of perinatal mortality. About two-thirds of the stillbirths occur *before* and one-third *during* delivery. Half of the stillbirths take place before 38 weeks of gestation, the obstetrical borderline for prematurity.

[5] [In the vital statistics for the Netherlands, age at death in the first week of life is determined from calendar date of birth and of death, and not the actual length of time the child has lived. To take an extreme example, a child born at 1 a.m. on January 1 and dying at 11 p.m. on the same date (having lived 22 hours) would be counted as a death under 1 day of age, whereas a child born at 11 p.m. on January 1 and dying at 1 a.m. on January 2 (having lived only 2 hours) would be counted as a death at 1 day of age.—Ed.]

Table 5 shows the components of infant loss by sex for the years 1950-64. Except for one instance, each component records a lower rate for girls than boys. For infant mortality the female rate is lower by about 20-25 percent, for stillbirths about 5-10 percent, for first-week mortality 25-30 percent, for perinatal mortality around 15 percent, and for first-month mortality about 25 percent.

When first-week mortality is subdivided, it shows that, roughly, the rate for girls is 20 percent below that for boys under 1 day of age and 30-35 percent below at ages 1-6 days. Postnatal mortality (1-51 weeks) is approximately 15 percent lower for girls than for boys.

Generally speaking, of all the age components the subgroup 1-6 days presents the greatest sex difference, second in order being under 1 day. Stillbirths and ages 1-51 weeks show the smallest sex difference.

Girls experience the lower mortality notwithstanding, or perhaps because of, the fact that their average birth weight (3,370 grams) is 100-200 grams lower than that for boys (3,530 grams). The average birth weight of girls at present is about the same as the average for boys a generation ago.

The trends for the various age components of the mortality for girls and boys during the period 1950-64 are parallel for the two sexes. The stillbirth rate for boys in any year is about at the level reached 3 years earlier by the girls; for first-week mortality the lag is 10 years, for perinatal mortality 6 or 7 years, for postnatal mortality 3 years, and for infant mortality 6 years. It would appear, therefore, that the current rates for girls foreshadow what the total rates for the Netherlands will be in the near future.

Perinatal Mortality

Stillbirth and first-week mortality, as already noted, present associated medical problems and hence are combined as perinatal mortality, which is now the dominant component of infant loss. Perinatal mortality is closely related to prematurity and obstetric conditions and has its characteristic causes of death.

Prematurity.—Inasmuch as medical birth certificates do not exist in the Netherlands, the

exact distribution of newborn infants by birth weight and period of gestation is not available. From our studies it appears that, on the basis of birth weight, 5.5 percent of the live births are immature. According to international definition, immaturity relates to births of 2,500 grams (5½ pounds) or less. In the absence of birth weight, those with a gestation period of less than 37 weeks, or those termed "premature," may be considered immature. Within the group of immatures, 3 to 4 percent weigh less than 1,500 grams, 15 to 20 percent between 1,500 and 2,000 grams, and 75 to 80 percent between 2,000 and 2,500 grams. No data are available on the distribution by period of gestation for the Netherlands.

The incidence of low birth weight infants (2,500 grams or less) is of paramount significance in perinatal mortality; 40 percent of the stillbirths and 55 percent of the deaths in the first week are among this group. The risk of death during the first week is about 20 times as high for low birth weight infants as for those weighing over 2,500 grams at birth, the death rates being about 50 and 2 to 3 per 1,000, respectively. In general, perinatal mortality increases as weight at birth decreases. If international comparisons are made of perinatal mortality, it is necessary to know the birth weight distribution for the various countries; for example, the incidence of infants weighing 2,500 grams or less at birth is 4.5 percent in Sweden and 5.5 percent in Holland. This difference is, in part, responsible for the disparity in perinatal mortality between these two countries.

The distributions of weight at birth directly affect the average birth weight. As an approximation, the incidence of infants weighing 2,500 grams or less at birth decreases 1 percent with every increase of 100 grams in the mean birth weight. The average birth weight and the incidence of infants weighing 2,500 grams or less at birth is higher among girls than among boys. Although this difference would lead one to expect a higher perinatal mortality among girls, everywhere the contrary is true. This paradox has not been explained, unless the duration of gestation is longer for girls than for boys of equal birth weight.

Our study on birth weight in the Netherlands indicates that birth weight increases much more with parity than with age of mother. An increase in the proportion of young mothers will lower the average birth weight very little, but a shift to higher parities tends to increase the average birth weight and lower the incidence of low birth weight infants. It is known from the literature that social class and the incidence of low birth weight infants are correlated. Such data, however, are not available for Holland.

Age and parity.—In 1950, the birth rate was 23 per 1,000 population, decreasing slowly to 21 in 1963. Since 1950, the distribution of live births by age of mother and parity has been changing due to the lower age at marriage and a modest shift to lower parities (table 6). The greatest changes are the increase from 19 to 26 percent in live births to mothers under 25 years of age and the decrease from 50 to 41 percent at 30 years of age and over. The proportion in the intermediate group remains unchanged (32 percent). The increase in the group under 25 years is mainly due to the increase in mothers 20-24 years, and although the youngest age group (under 20 years) has nearly doubled in 12 years, it remains small (4 percent). At the other end of the mother's age range, the percentage of mothers 30 years of age and over decreased from 50 to 40 percent, and 35 years and over from 25 to 18 percent.

The proportion of primiparae increased from 28 to 32 percent in this period, the highest ever reached in the Netherlands. The proportion of live births of second order increased also, from 24 to 27 percent, while those of third order remained constant (17 percent). For higher order births, the proportions decreased (from 31 to 24 percent), especially among "grandes multiparae." There has been a shift to younger mothers, both in primiparae and in multiparae.

Maternal age has a greater effect on perinatal mortality than parity. To compare rates of stillbirths and perinatal mortality among countries, the distribution of total births by age of mother should be considered, but as a substitute the live births can be used (table G). The most striking feature of these data is the difference in the proportions in the youngest age group (under 20 years) in the United States and Holland. Despite the same birth rate, 15 percent of live births in the United States and 4 percent in Holland were in this group. In the next highest age group (20-24 years), the difference is still in the same direc-

Table G. Birth rates and percentage distribution of live births, by age of mother: selected countries, 1961 and 1962

Age of mother	United States 1962	Denmark 1961	United Kingdom 1962	England and Wales 1962	Scotland 1962	Sweden 1961	Norway 1962	Netherlands 1962
	Rate per 1,000 population							
Birth rate-------	22.4	16.6	18.3	18.0	20.1	13.9	17.1	20.9
	Percentage distribution							
Total-----------	100	100	100	100	100	100	100	100
Under 25 years-----	50	45	39	39	38	39	37	26
Under 20 years----------	15	11	8	8	7	10	7	4
20-24 years----------	35	34	31	31	31	29	30	22
25-34 years--------	40	45	49	49	50	48	47	56
25-29 years----------	25	29	31	31	31	29	27	32
30-34 years----------	15	16	18	18	19	19	20	24
35 years and over--	10	10	12	12	12	13	16	18
35-39 years----------	8	8	9	9	9	10	11	13
40 years and over------	2	2	3	3	3	3	5	5

SOURCE: United Nations, Demographic Yearbook, New York.

tion: 35 percent in the United States and 22 percent in Holland. In the United States half of the live births are to women under 25 years of age; in Scandinavia and the United Kingdom, about 40 percent; and in Holland, about one-fourth. Conversely, the percentages of live births in the remaining older age groups are highest in Holland. The social and medical implications of the differences in percentage distributions of live births by age of mother in different countries should not be underestimated.

Age of mother and parity, as well as socio-hygienic conditions, strongly influence both components of perinatal mortality. The stillbirth rates by age of mother and parity in 1952-53 and 1962-63 are shown in table 7. The rate increases with age of mother for all parities. In almost all age groups, primiparae have by far the highest stillbirth rates. The lowest rates are among second and third births to mothers under 30 years of age. Thus, in 1962-63, the total stillbirth rate was a little over 15 per 1,000 births; the rate ranged from less than 7 per 1,000 for second and third births to mothers under age 25, to more than 50 per 1,000 for primiparae at ages 40 and over.

Between 1952-53 and 1962-63, the stillbirth rates decreased in almost every age group and nearly all parities. The largest relative reduction was among first births, 25 percent; for second and third births the decrease was 17 percent; and for fourth and higher parities, about 5 percent. By age, the reduction in the stillbirth rate was about 20 percent for infants born to mothers under 30, and approximately 10 percent where mothers were 30 and over.

Table 7 also shows adjusted stillbirth rates, that is, the rates that would have been recorded in 1962-63 had the proportions of mothers by age and parity in those years been the same as those in 1952-53. The adjusted rate in 1962-63 was 15.7 per 1,000 compared with the crude rate of 14.4, the difference reflecting the shift during the decade in the distribution of births to mothers of lower age groups and of lower parities. In other words, 1.3 per 1,000 of the total decrease of 3.4 per 1,000 in the decade—nearly 40 percent of the total—

represented changes in the distribution of births; the influence of age of mother was stronger than that of parity.

If Holland had had the same distribution of births by age of mother as the United States or Sweden, the stillbirth rate in 1962-63 would have been 12.8 and 13.7 per 1,000, respectively, instead of 14.4 per 1,000. Adjustment for this factor reduces considerably the difference in the stillbirth rate for these three countries.

Table 8 shows the relation of first-week mortality to maternal age and parity in 1953-54 and 1962-63. The lowest rates occur among children born to mothers 25-34 years of age having their second or third child. In 1962-63, the mortality rate averaged about 11 per 1,000 live births, ranging from a little over 8 per 1,000 for second and third births to mothers at ages 25-34 to about 23 per 1,000 for first births at ages 35 and over. First-week mortality is more than 1½ times as high for parturients at ages 40 and over as for those at 25-34 years, and about 1½ times as high for sixth and higher parities as for second and third births. Under age 20, the mortality was 14 per 1,000, or about one-third above the average for all ages combined, and higher than the rate for any other group under age 40.

When the first-week mortality rates for 1962-63 are adjusted for age of mother and parity on the basis of the 1953-54 experience, they are practically the same as the crude rates, indicating that these factors do not influence first-week mortality.

Between 1953-54 and 1962-63, the relative reduction in first-week mortality was about the same in nearly all age groups and nearly all parities. The decrease in the adjusted rates by age and parity varied only from 19 to 24 percent, averaging 22 percent. While the variation in reduction by age of mother and parity for first-week mortality was much narrower than that for stillbirths, the relative reduction was much greater than that for stillbirths.

Twin births.—A special study on infant loss in twin births revealed that the frequency of twin deliveries decreased from 1.4 percent to 1.2 percent of all deliveries between 1900 and 1963. About 2.5 percent of all births are twin births, and their incidence increases with parity and more particularly with age, up to age 40.

The stillbirth rate is 2½ times as high in twin births as in single births. The difference in mortality between twin and single births is greatest in the first week of life and decreases with age of the infants. In the first week the mortality of twins is six times that for single births, for perinatal mortality the ratio is 4 to 1, for postnatal mortality about 2 to 1, and for infant mortality more than 4 to 1.

While twin births account for 2.5 percent of all births, they are responsible for 5-6 percent of all stillbirths, 12 percent of first-week mortality, 8 percent of perinatal mortality, and 6 percent of postnatal mortality, 9 percent of infant mortality, and 8 percent of infant loss. The proportion of twins in perinatal mortality and infant loss is three times as high as would be expected on the basis of the number of twin births.

Because of the high first-week mortality in twin births, the ratio of stillbirths to first-week mortality is 2 to 3 for twin births compared with a ratio of 3 to 2 for single births. The high first-week mortality among twins is associated with their high prematurity rate—50 percent, against 4 percent for single live births.

Among twins in the weight groups 1,501-2,500 grams, first-week mortality apparently is lower than among single births. The explanation may be that a twin of this weight had a longer period of gestation—and therefore is more mature—than a single birth of the same birth weight. Perinatal mortality is very high (10-15 percent) among twins born to mothers under age 25 and 40 and over, and among the first born. Perinatal mortality for twins in these three groups is, respectively, six, two, and five times as high as for single births.

Since 1953, when the statistics on infant mortality for twins began, first-week and infant mortality in twins decreased at the same rate as in single births. In that year, less than one-fourth of all single deliveries and one-third of twin deliveries occurred in hospitals, while at present the percentages are 30 and 60, respectively. Perinatal mortality among twin births in home deliveries—70 per 1,000—has always been much lower than in hospital deliveries, most probably because the serious pathological cases go to the hospitals.

High-risk groups.—Under certain conditions, it can be anticipated during pregnancy that

the risk of death for the newborn will be much higher than average. If the proportion of mothers hospitalized at time of birth is low—as in the Netherlands—priority should be given to mothers in high-risk groups. Although high-risk groups are the product of factors which are biological, pathological, and social in origin, it is often impossible to evaluate the effect of each factor separately because in many cases several factors are interrelated.

(1) Biological: older age of mother, higher parity, multiple births, and prematurity.
(2) Pathological: abnormal presentations, operative intervention, unfavorable obstetrical history, and hemolytic disease.
(3) Social: low income, illegitimacy, and inadequate medical care.

The increased mortality because of biological factors has already been discussed.

The risk of death in the perinatal period is about 10 times as high for abnormal presentation, especially breech presentation, as for cephalic presentation. Operative intervention—forceps, version and extraction, cesarean section, etc.—are applied in 4-5 percent of all deliveries, the risk of death in such cases being from 5 to 10 times as high as in spontaneous deliveries with cephalic presentation. For the newborn to mothers who had had previous abortions, premature babies, or perinatal deaths, the risk of death is from two to three times as high as for the newborn to mothers without abnormalities in previous pregnancies.

The role of social factors in infant loss will be discussed in detail later on. At this point it may be said that although the rates of infant loss have reached low levels, the classical rule still prevails: unfavorable social conditions increase perinatal and postnatal mortality.

It is not possible to differentiate our data according to the quality of medico-obstetrical care. Perinatal and natal care are given to all pregnant women, even though many weaknesses exist in the way such care is given. Despite these weaknesses and notwithstanding—or possibly because of—the relatively low rate of hospitalization, no group of newborns has been found to have a very high risk of death because of inadequate care.

About one-third of all births may be considered to be in high-risk groups, and special care is needed for the welfare of both mother and infant. The mother is in need of concentrated care during pregnancy and delivery, and her infant should receive similar attention immediately after birth. Special postpartum care is needed by the newborn having anomalies which could not be predicted during pregnancy, e.g., congenital malformations and pathological conditions following difficulties in labor.

Causes of stillbirth.—The causes of stillbirth and of first-week mortality are shown separately in the International Lists, and hence are so presented here. In addition, the causes of death for the two components are combined into four broad groups to indicate the general cause-of-death pattern for perinatal mortality.

Causes of stillbirth are given in a supplementary classification in the International Lists, the so-called Y-list (Y30-Y39). Table 9 shows the trend of fetal mortality by cause for the period 1950-63.

In 1950, the leading causes of stillbirth, in order of magnitude, were diseases of the fetus and ill-defined causes, placental and cord conditions, difficulties in labor, congenital malformations, and diseases of pregnancy and childbirth, including toxemia. Because of differences in the trend by cause, the sequence in 1963 was placental and cord conditions, diseases of the fetus and ill-defined causes, diseases of pregnancy and childbirth, congenital malformations, diseases in mother, and difficulties in labor.

The death rate for difficulties in labor decreased 60 percent between 1950 and 1963—from 28 to 11 per 10,000 births. For diseases of the fetus and ill-defined causes, the rate fell from 61 to 33 per 10,000 births, or nearly 50 percent; for congenital malformations the reduction was 25 percent, and for placental and cord conditions about 20 percent. Stillbirths resulting from birth injury have become negligible, the rate having fallen from 3 to 1 per 10,000 births between 1950 and 1963. In contrast, the death rate for diseases of pregnancy and childbirth rose from 19 in 1950 to 25 in 1963, and diseases in mothers from 9 to 13. The mortality from erythroblastosis remained at the level of 6 per 10,000 throughout the period.

Data on the causes of stillbirth by sex are available since 1956 (table 9). Each of the major causes except congenital malformations shows a higher death rate among boys than girls, particularly for placental and cord conditions, difficulties in labor, and diseases of fetus and ill-defined causes. For stillbirths caused by congenital malformations, the rate in 1963 was 18 per 10,000 births among females and 12 per 10,000 among males. The excess female mortality from this cause reflects the fact that the death rate from congenital malformations of the central nervous system is 1½ times as high for girls as for boys. The latter condition accounts for 80 percent of the total mortality from congenital malformations among girls and for 70 percent among boys.

Causes of first-week mortality.—Table 10 presents first-week mortality rates by cause, sex, and age in 1953-54 and 1961-62. The figures in this table do not include infants who were born alive after a gestation period of less than 28 weeks and who died before registration because the causes of death for immatures were not reported prior to 1956.

Recent data reveal that three-fourths of the immatures are classified in the subgroup, immaturity, and one-sixth in birth injuries. Therefore, the rates for immaturity in table 10 should be raised by about 12 per 10,000 and of birth injuries by 3 per 10,000.

In 1961-62, birth injuries were by a considerable margin the leading cause of death, accounting for about 30 percent of the total first-week mortality; the majority of deaths from this cause were due to intracranial and spinal injury. Congenital malformations were responsible for about one-fifth of the total, immaturity without further qualifications for one-sixth, and postnatal asphyxia[6] for about one-eighth of the total.

Each of the three leading causes of mortality in the first week of life showed a substantial reduction between 1953-54 and 1961-62, reflecting in very large measure the experience on the calendar day of birth. Postnatal asphyxia, however, recorded an increase in mortality, both for the first day and for the remainder of the first week.

Analysis of the trend by sex indicates that in the 8-year period under review, the first-week death rate for birth injuries fell a little over one-third among both boys and girls; similarly, for immaturity without further qualification the reduction in mortality was about the same for both sexes—one-fifth. A marked sex difference, however, is evident in the trend of mortality for congenital malformations, the reduction amounting to only 9 percent for males and 28 percent for females. As a result of this disparity, males had a somewhat higher mortality from this cause than females in 1961-62, reversing the situation which existed in 1953-54. The sharper reduction among females reflected mainly the more rapid downward trend among them for congenital malformations of the central nervous system. Even so, first-week mortality from this cause among females is still about 1½ times that for males, while the death rates for congenital malformations of the circulatory system and the residual group "other congenital malformations" record higher rates among males than females, as table H shows. In contrast to the experience for congenital malformations of the central nervous system and the residual group of malformations, first-week mortality for congenital malformations of the circulatory system increased somewhat for both sexes.

It is also apparent from table 10 that the death rate for the group of conditions in the rubric "other diseases peculiar to early infancy" was reduced by more than half among both males and females. A substantial decrease was also recorded for both sexes for erythroblastosis. However, for pneumonia and influenza, including pneumonia of the newborn, the mortality increased somewhat among both boys and girls.

Causes of perinatal mortality.—Figure 5 shows the trend for the major causes of perinatal mortality—fetal deaths and first-week mortality combined—in the period 1950 to 1964. Each of these groups of causes recorded a decrease in this 14-year period: birth injuries, 36 percent; the residual group "other and ill-defined causes," 31 percent; congenital malformations, 29 percent; and erythroblastosis, 9 percent. Perinatal mortality as a whole fell 32 percent in this period. The analysis of perinatal mortality by cause suggests that further decreases may be expected.

[6] [As a cause of death, the term, "postnatal asphyxia," includes deaths in the first week of life.—Ed.]

Table H. Stillbirth and infant mortality rates for congenital malformations, by system, sex, and age: Netherlands, 1953-54 and 1961-62

System, year, and sex (Sixth and Seventh Revisions—International Lists, 1948 and 1955)	Stillbirth rate per 10,000 births	Infant mortality						
		Under 1 year	Under 1 week[1]	Under 1 day[1]	1-51 weeks	7-27 days	28 days-5 months	6-11 months
		Rate per 10,000 live births						
Congenital malformations (750-759)								
1961-62								
Male----	13.8	44.0	19.8	8.4	24.2	7.2	12.2	4.8
Female--	18.3	43.6	17.1	8.3	26.5	7.1	14.0	5.4
1953-54								
Male----	[2]14.6	49.6	21.8	10.2	27.7	7.7	14.5	5.6
Female--	[2]23.7	49.3	23.7	14.1	25.6	7.6	12.7	5.3
Congenital malformations of central nervous system and sense organs (750-753)								
1961-62								
Male----	10.0	10.3	5.2	3.4	5.1	1.0	2.6	1.5
Female--	15.2	15.7	8.0	5.5	7.8	2.1	4.0	1.7
1953-54								
Male----	[2]11.3	15.9	7.3	5.4	8.7	2.2	4.4	2.1
Female--	[2]20.0	25.3	14.5	11.3	10.8	3.2	5.5	2.1
Congenital malformations of circulatory system (754)								
1961-62								
Male----	0.4	21.8	8.5	2.1	13.3	4.0	7.0	2.2
Female--	0.4	19.3	5.2	1.3	14.1	3.2	8.1	2.8
1953-54								
Male----	[2]0.2	19.6	7.5	2.1	12.2	3.2	6.6	2.3
Female--	[2]0.3	15.5	4.8	1.2	10.7	2.6	5.6	2.6
Other congenital malformations (755-759)								
1961-62								
Male----	3.4	11.8	6.0	2.9	5.8	2.2	2.6	1.1
Female--	2.8	8.5	3.9	1.4	4.6	1.8	1.8	1.0
1953-54								
Male----	[2]3.1	13.9	7.0	2.7	6.9	2.3	3.4	1.1
Female--	[2]3.3	8.5	4.4	1.6	4.0	1.8	1.6	0.6

[1]Based on calendar days since birth.

[2]Data are for 1956-57.

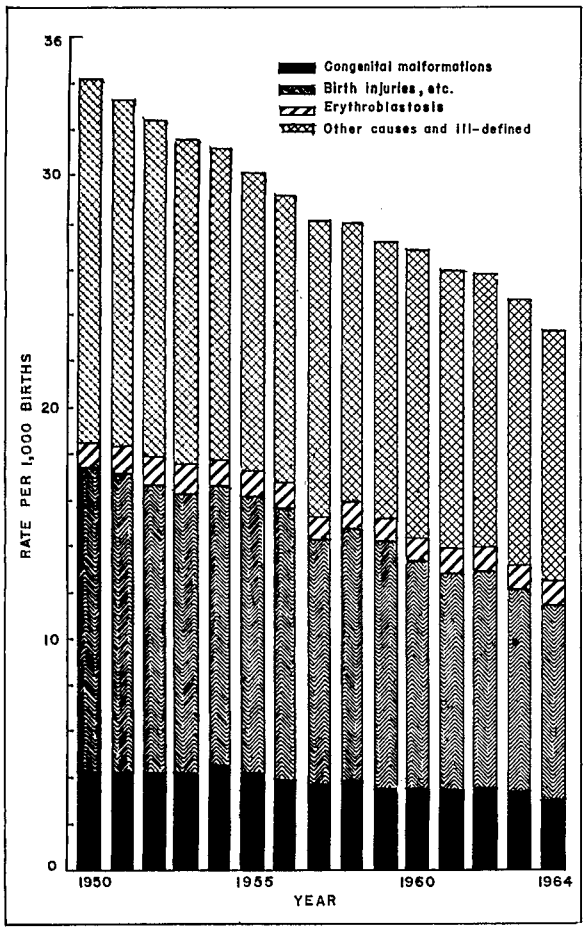

Figure 5. Perinatal mortality rates by cause: Netherlands, 1950-64.

It should be noted once again that the causes of stillbirth and first-week mortality are far from being precise. Only by careful and competent clinical observation of mother and child and by postmortem examination can more reliable causes of death be obtained.

Place of delivery.— Compared with other industrialized countries, Holland has a low proportion of hospitalized births. In Sweden, Norway, and the United States the proportion now is nearly 100 percent, in England and Wales 65 percent, in Denmark more than 50 percent, and in the Netherlands only 30 percent.

In Holland, hospitalized deliveries occur in the obstetrical departments of university and general hospitals, in midwifery schools, and in maternity homes. The standards and type of service differ from one group to another, and the quality of care varies within each group. Maternity homes take only normal deliveries while obstetrical departments of university and general hospitals accept both normal and pathological cases.

Deliveries in hospitals are attended mainly by obstetricians, but also by general practitioners and midwives. In the three midwifery schools, pupil midwives work under the supervision of an obstetrician. In maternity homes, general practitioners and midwives attend most of the deliveries. All institutional deliveries are registered as hospitalized, regardless of the types of institution and of the quality of obstetric and pediatric care.

In home deliveries, two types of maternity care must be differentiated: maternity home help and less organized forms of maternity care. Table J gives the percent distribution of home deliveries, both with and without home help, and hospital deliveries in the period 1953-64. In 1953, about one-fourth of the maternities were home deliveries with maternity home help, one-half were home deliveries without such assistance, and the remaining fourth, hospital deliveries. In 1964, each of these categories accounted for approximately one-third of the confinements. During this decade, home deliveries with maternity home help and hospital deliveries increased about 35 percent, while home deliveries without maternity home help decreased in relative frequency.

The larger the municipality, the higher the hospitalization rate and the lower the frequency of maternity home help cases, as table K indicates. In 1962, in municipalities of under 5,000 population, more than 40 percent of the mothers received maternity home help; in cities of 500,000 and over, the proportion was less than 20 percent. Hospitalized births show a reverse picture, the proportions being nearly 20 and 50 percent, respectively. In each group of municipalities, regardless of size, the sum of maternity home help and hospitalized cases was approximately two-thirds of the total.

In 1960-62 the hospitalization rate was about twice as high for stillbirths as for live births. Table L shows that between 1954-56 and 1960-62 the proportion of hospitalized births in each cate-

Table J. Percentage distribution of births, by place of delivery and use of maternity home help: Netherlands, selected years, 1953-64

Year	Total	Delivery in hospital	Delivery at home		
			Total	With maternity home help	Without maternity home help
	Percentage distribution				
1964[1]	100	31	69	37	32
1963	100	30	70	35	35
1961	100	29	71	34	37
1959	100	27	73	33	40
1957	100	26	74	31	43
1955	100	24	76	30	46
1953	100	23	77	27	50

[1]Preliminary data.

gory increased nearly 20 percent. The increase was least in municipalities of 50,000-99,999 inhabitants (almost zero for live births and 10 percent for stillbirths) and greatest in municipalities of 100,000-499,999 (about 30 percent).

At present, the hospitalization of stillbirths is about one-third higher in the largest cities than in villages; for live births the ratio is nearly 3 to 1. Even so, more than half the stillbirths in municipalities of under 20,000 population occur in hospitals.

Table L does not answer the question as to whether the high hospitalization rate of deliveries in which the risk of stillbirth is serious contributes to the prevention of stillbirths. The figures do not indicate that it does. The difference in stillbirth

Table K. Percentage distribution of births, by size of municipality, place of delivery, and maternity home help: Netherlands, 1962

Size of municipality	Total	Delivery in hospital	Delivery at home			Delivery at home with maternity home help, and in hospitals
			Total	With maternity home help	Without maternity home help	
	Percentage distribution					
Total	100	30	70	34	36	64
500,000 or more	100	49	51	18	33	67
100,000-499,999	100	37	63	31	32	68
50,000-99,999	100	31	69	36	33	67
20,000-49,999	100	30	70	34	36	64
5,000-19,999	100	22	78	40	38	62
Under 5,000	100	19	81	42	39	61

Table L. Percent of births occurring in hospitals, and perinatal mortality rates, by size of municipality: Netherlands, 1954-56 and 1960-62

Size of municipality	All births		Live births		Stillbirths		Perinatal mortality	
	1960-1962	1954-1956	1960-1962	1954-1956	1960-1962	1954-1956	1960-1962	1954-1956
	Percent of births in hospitals						Rate per 1,000 births	
Total	29	24	28	24	60	50	26.1	30.1
100,000 or more	43	38	42	38	69	60	25.7	27.9
100,000-499,999	36	27	35	27	67	53	25.6	27.9
500,000 or more	48	45	48	44	70	64	25.7	27.9
50,000-99,999	29	29	29	29	62	55	25.2	29.2
20,000-49,999	29	23	28	22	60	51	25.6	29.1
5,000-19,999	21	17	20	16	56	45	26.6	31.5
Under 5,000	18	14	17	14	53	42	27.2	32.2

rates between rural and urban areas is less than 10 percent and hardly any difference exists in first-week mortality (table E). Similarly, differences in perinatal mortality by size of municipality have nearly disappeared. To repeat, a high frequency of hospitalization is not the means, certainly not the only means, for reducing perinatal mortality. This conclusion, unorthodox as it is the world over, is supported by the data in table M. Perinatal mortality in home deliveries is very low (12 per 1,000 births in 1963) compared with hospital deliveries (53 per 1,000); part of this wide difference, of course, reflects the concentration of pathological cases in hospitals.

Deliveries with maternity home help increased 30 percent over the 7 years, making the so-called selection less and less probable. At the same time, perinatal mortality in this group decreased by 30 percent. While perinatal mortality has been decreasing among the group without maternity home help as well as the group with such assistance, the rate for the group with help

Table M. Perinatal mortality rates, by place of birth and use of maternity home help: Netherlands, selected years, 1953-63

Year	Total	Delivery in hospital	Delivery at home		
			Total	With maternity home help	Without maternity home help
	Rate per 1,000 births				
1963	25	53	12	11	13
1960	27	58	15	13	16
1958	28	59	17	15	19
1955	30	64	19	15	22
1953	32	65	22	18	24

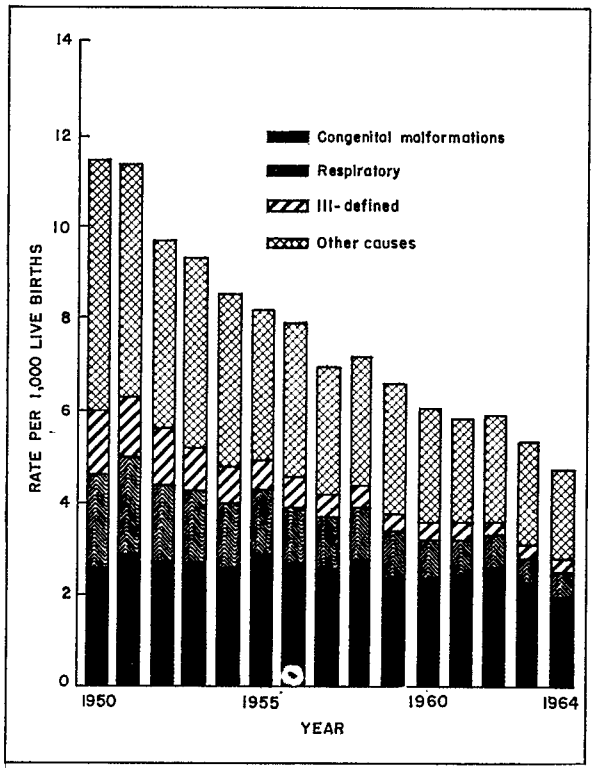

Figure 6. Postnatal mortality rates by cause: Netherlands, 1950-64.

(Postnatal period: 1-51 weeks)

remains about 25 percent lower. The difference in first-week mortality is somewhat higher than in stillbirths. The group without maternity home help includes many cases enjoying such help once or twice a day for an hour at a time (instead of the whole day) blurring the dividing line between home deliveries with and without maternity home help.

The favorable results achieved in home deliveries in the Netherlands, notwithstanding the existing weaknesses in maternity care, have encouraging implications for developing countries. Instead of pursuing the chimera of a high frequency of hospitalized births without adequate hospitals, the organization of home deliveries by midwives is a realistic goal in underprivileged regions. Without being so intended, a large-scale "experiment" on maternity policy of widespread importance has been taking place in the Netherlands.

Postnatal Mortality

Postnatal mortality (1-51 weeks), which in the past constituted a major part of infant mortality, has become only a minor part of it.

Causes of death.—Figure 6 gives a bird's-eye view of the postwar trend of mortality, by cause, at ages 1-51 weeks. As is evident from table 10, the five major causes of death in the first 7 days—birth injuries, congenital malformations, immaturity without further qualification, diseases peculiar to early infancy, and erythroblastosis— record a much lower mortality rate in the postnatal period; this is particularly true of birth injuries and immaturity.

Congenital malformations are by far the leading cause of death in each of the three age components of postnatal mortality—7-27 days, 28 days-5 months, and 6-11 months—comprising from one-third to one-half of the deaths in each group. Moreover, the death rate from this group has shown only a slight reduction between 1953-54 and 1961-62. The mortality for the residual category "ill-defined and other causes"—second in rank—was nearly halved in the 8-year period. Influenza and pneumonia, third in importance, recorded a sharp decrease in mortality, as did the group of infective and parasitic diseases. Diarrhea and enteritis and the other diseases of the digestive system, which used to take a heavy toll of infant life, have become almost negligible as causes of death. The accident death rate (chiefly sudden infant deaths) decreased about a third between 1953-54 and 1961-62.

Table 10 shows the rates for the causes of postnatal mortality by sex in the same years (1953-54 and 1961-62); table H gives details on congenital malformations, the leading cause group. The sex ratio of mortality from congenital malformations in infant mortality has not changed, being 100 in both periods. During the last decades the rates are exactly the same in males and females, each decreasing by about 10 percent. Although there do not appear to be striking sex differences in postnatal mortality from congenital malformations as a whole, when the data are examined by system, one can see that internal shifts have taken place. Mortality from congenital malformations of the central nervous system is

decreasing for both sexes in the three age groups: about 40 percent in boys and 30 percent in girls. On the other hand, mortality from congenital malformations of the circulatory system is increasing for both sexes in the age groups 7-27 days and 28 days-5 months. The rates for other congenital malformations are decreasing slightly in boys and increasing somewhat in girls.

In the three subgroups of congenital malformations (central nervous system, circulatory system, and other systems), the ratios are in favor of the boys in stillbirths, and in favor of the girls in first-week mortality only with regard to the central nervous system. Most probably the increase in mortality from congenital malformations of the circulatory system is not real, but may be due to a transfer from the ill-defined and other causes. These shifts may result from medical fashion, better diagnostics, and the growing attention which is being given to congenital malformations of the circulatory system. This does not, however, explain why the increase for congenital malformations of the circulatory system or the accompanying decrease for ill-defined and other causes has been greater for girls than boys.

The perinatal and postnatal mortality from congenital malformations may be expected to decrease as the distribution of births shifts to younger mothers and lower parities, since the incidence of congenital malformations is rather high among infants born to mothers 35 years of age or older. This factor will be overshadowed by the transfer of ill-defined and other causes to congenital malformations of the circulatory system.

This analysis of causes of death in the postnatal period by sex and age components justifies the expectation that a decrease in respiratory diseases, congenital malformations, and ill-defined and other causes will bring the rates under 4 per 1,000 in 1970: 4 for boys and 3 for girls.

Seasonal variation.—Before World War I summer peaks were a notorious feature of infant mortality. Gradually these peaks, caused by gastroenteritis, colitis, and nutritional disorders, have leveled off. However, the winter peak caused by respiratory conditions, although diminishing since the beginning of the fifties, has not yet disappeared and in some years the mortality from these diseases still flares up.

Table N presents the seasonal variation in infant loss by age in 1960-62; the average rate for each month is expressed as a percent of the average rate for the 3-year period as a whole.

Table N. Index numbers for components of infant loss, by month of death: Netherlands, 1960-62

[1960-62=100]

Month	Stillbirth[1]	First week[1]	Perinatal[1]	Postnatal[2,3]	Infant[3]	Infant loss[3]
	Index					
January	113	103	109	125	108	108
February	100	100	100	115	106	104
March	104	98	101	111	106	107
April	101	100	101	99	103	104
May	98	97	97	90	98	100
June	100	99	100	91	97	99
July	92	100	95	79	93	92
August	100	97	99	79	91	95
September	89	100	93	90	98	95
October	96	100	98	89	95	94
November	104	103	104	112	102	101
December	104	104	104	121	105	101

[1]Based on rates.

[2]Deaths at 1-51 weeks of age.

[3]Based on number of deaths, adjusted for unequal number of days in month.

Postnatal mortality shows the widest monthly variation, with the mortality index ranging from 79 in July and August to 125 in January. On the other hand, first-week mortality records the smallest seasonal range, from 97 to 104; this reflects the insignificant role of the respiratory infections in the first 7 days of life. The seasonal range for stillbirths is somewhat broader (89-113) than it is for first-week mortality. In small part, the higher incidence of stillbirths in the first than in the second half of the year is attributable to the seasonal trend of mortality from congenital malformations of the central nervous system (de Groot, 1965). The question arises as to whether the seasonal variation in stillbirth is caused mainly by infectious diseases in the mother.

Inasmuch as both stillbirths and infant mortality show a winter peak, it is apparent that infant loss would have a peak, although it be a modest one. If preventive pediatrics should succeed in eliminating the winter peak, infant mortality and infant loss would decrease by 5 percent.

SOCIAL FACTORS

In the many years that infant mortality has been studied, attention has been paid to the differentials by social class. Infant mortality is the classical yardstick of sociohygienic conditions. This statement must again be evaluated, since the rates continue to fall and first-week mortality has become the dominant component of infant mortality.

Father's occupation.—Table 11 shows first-week, postnatal, and infant mortality rates by occupation of father in 1952-54 and 1961-62. Occupations are grouped into five social classes (I-V) ranking from high to low. Comparable data for stillbirths, and thus for perinatal mortality, are available only for 1961. The rates in the table are not adjusted for parity and age of mother, but Hoogendoorn (1959) has shown that social class differences remain practically unchanged when adjustment is made for these factors.

The table shows the classical picture: mortality is lowest in the highest social class and increases more or less progressively with decrease in social class. Farm laborers, however—a group too small to deserve much attention—do not fit into the general pattern.

In 1961-62, both first-week and postnatal mortality among children with parents in class I were about 20 percent below the averages for the country as a whole, whereas in class V the mortality rates were 10 percent above the national average. A decade earlier, the difference was smaller for first-week mortality and greater for postnatal mortality. The relative reduction in postnatal mortality in the period did not vary appreciably by occupational class.

The stillbirth rate in 1961 ranged from 10.0 per 1,000 births in social class I to 17.6 in class V, omitting consideration of farm laborers. This range is wider than that for any of the components of infant mortality. The influence of father's occupation on stillbirth and infant mortality seems unmistakable, although the effect of associated factors, such as general health of the mother, medico-obstetrical care, hospitalization, postpartum care, biological factors, etc., cannot be taken into account.

Infant mortality in social class V shows a lag of about 7 years in reaching the level attained by social class I. The lag would be even greater if the highest income group included in social class I were compared with the lowest income group in class V. The infant mortality rate for the country as a whole in 1965 achieved the same level as group I in 1961.

Illegitimacy.—Illegitimacy has never been a serious problem in Holland, compared with other European countries. The percent of illegitimate births decreased from 2.6 in 1900 to 1.3 just before World War II. In the war years the rate increased to 3.5 in 1945, reached the lowest level (1.2) in 1955, and has increased to 1.9 in 1965. In the sixties, 3.5 percent of first births and 0.7 percent of subsequent births are illegitimate. Of the illegitimate births, 70 percent are first and 30 percent are subsequent births; these percentages have not changed during the postwar period.

Thirteen percent of the live births to mothers under age 20 are illegitimate, more than 10 times the proportion among mothers at ages 20 and over. Two-thirds of all illegitimate births are to mothers under 25 years of age, nearly one-third from those under age 20, and 3 percent from

mothers under 16. The corresponding proportions for legitimate births are 25 percent, 3 percent, and 0.

According to data collected in 1957-58, the stillbirth rate for illegitimate children, after adjustment for age of mother and parity, was 15 percent higher than that for legitimates; in primiparae, the excess was 35 percent. First-week mortality was 70 percent higher and postnatal mortality 80 percent higher for illegitimate than for legitimate babies (Hoogendoorn, 1961). The risk of death for the illegitimate child now approximates that for the legitimate child in the prewar years.

Although the mothers of illegitimate children often marry afterwards, the unmarried mother usually must go to work soon after delivery. But it is not easy for her to place the child in a crèche; day nurseries are not well developed in Holland, either quantitatively or qualitatively.

Illegitimacy is much more frequent in cities than in rural areas, but the "bad" influence of the city is not as great as would appear from the figures. The unmarried pregnant girl who lives in a village or small town tends to deliver her child in the city, where she is unknown. From a human and social point of view, the status of the unmarried mother and her "natural" child is far from ideal.

URBAN AND RURAL

The historical trend of infant loss by urban and rural areas has already been described. The postwar situation will be analyzed by size of municipality and by province.

Municipalities.—Table 12 shows stillbirths, first-week, and postnatal mortality by size of municipality in two postwar periods. In 1950-52, as before World War II, the rates for all components decreased with increase of size of municipality. These differences leveled off, however, during the 1950's. In 1960-62, the stillbirth rate still showed a difference of about 10 percent between municipalities having less than 20,000 inhabitants and the three largest cities, the disparity reflecting mainly differences in age and parity of mother and of social class. First-week, postnatal, and infant mortality are no longer inversely related to size of municipality, although postnatal mortality in the largest cities is still lower than it is in towns and villages. The leveling off of the differences between urban and rural rates has occurred by the greater relative reduction in smaller than in larger municipalities.

Provinces.—The division of the Netherlands into provinces has a long tradition, although it has become somewhat blurred by industrialization, urbanization, migration, and improved transportation. There appears to be little correlation between the perinatal and infant mortality rates and the level of the birth rates by province. Differences in perinatal and postnatal mortality between provinces are related to social factors, the distribution of births by age and parity of the mother, quality and adequacy of medical and hospital care, patterns of living, degree of urbanization, etc. It is as difficult to unravel these factors in comparing different regions of the same country as it is to compare the rates of different countries.

INTERNATIONAL COMPARISONS

History has taught again and again that marked differences in infant loss between countries and between regions or ethnic groups within the same country reflect socioeconomic differences, which can be compensated for, in part, by maternal and child health activities.

Stillbirth and first-week mortality showed practically no decrease in western European countries prior to 1940. At the beginning of World War II the stillbirth rate, for some unexplained reason, dropped suddenly in these countries, and since 1950 both stillbirths and first-week mortality have fallen with virtually no interruption. In 1960-61, perinatal mortality in the Scandinavian countries, Czechoslovakia, and the Netherlands reached the level of about 25 per 1,000, compared with slightly over 30 per 1,000 in England and Wales and in Belgium (table 4).

Postnatal mortality during the 1950's decreased about two-thirds in Czechoslovakia, approximately one-third in the Scandinavian countries, England and Wales, and the Netherlands, one-half in Belgium, and one-fifth in the United States. In 1960-61 postnatal mortality was lowest in Sweden (4.4 per 1,000), followed by Holland and Denmark. In Norway, England and Wales, and the United States, postnatal mortality was about

twice as high as in Sweden; in Belgium and Czechoslovakia, notwithstanding the sharp reductions in these countries, the rates were about three times Sweden's.

Sweden also has the banner record for infant mortality and infant loss, with Holland ranking second and Norway third, according to rates unadjusted for age and parity. In the early 1960's infant mortality in these three countries was approximately 17 per 1,000 and infant loss about 30 per 1,000; in England and Wales the rates were 5 per 1,000 higher, on the average, and in the United States 8 per 1,000. In Czechoslovakia infant mortality and infant loss have been sharply reduced during the fifties, accomplishing in one decade what the northwestern European countries were able to do in one generation.

IV. MATERNAL MORTALITY

Just as infant mortality reflects the health of the child and its care, maternal mortality is a yardstick of the health of the mother and of the prenatal and natal care she receives. Inasmuch as obstetrical care and the mother's health greatly influence perinatal mortality, an analysis of infant and especially perinatal mortality must include a general description of maternal mortality.

General Trend

Before 1880, the maternal mortality rate was as high as 50 per 10,000 births and decreased to about 25 at the beginning of the 20th century. There was no reduction during the first quarter of the century and—still more noteworthy—the rate increased from 25 in 1925 to 33 per 10,000 in 1930. Shortly thereafter, however, the rate began to decrease, returning to the 1920 level in 1940. During World War II, maternal mortality did not increase much, in sharp contrast with the high peaks reached by some causes of death. Since 1945, maternal mortality has decreased steadily and, as in most other European countries, together with a reduction in perinatal mortality. Currently, the maternal mortality rate is little more than 3 per 10,000 births—a reduction of approximately four-fifths in the past 20 years (fig. 7).

Causes of Death

Although maternal mortality decreased markedly, the four broad groups of causes have not changed appreciably in relative importance; complications of pregnancy account for 20-25 percent, abortion for 5-10 percent, complications of delivery for 45-50 percent, and complications of the puerperium for nearly 25 percent of maternal mortality.

Toxemia is responsible for no less than 60 percent of the deaths from the complications of pregnancy. Since 1950, the mortality from the complications of pregnancy has been halved and that from the complications of delivery has been reduced about 60 percent. The reduction for these two causes reflects a decreased incidence of toxemia, contracted pelvis, antepartum hemorrhage, etc., and partly accounts for the decrease in perinatal mortality.

While progress has been made in reducing the death rate from complications of the puerperium, nearly one-third of the deaths from this cause—and from abortions—are due to sepsis.

Women with serious complications of pregnancy, delivery, and the puerperium are usually hospitalized. Inasmuch as 80 percent of maternal deaths occur in hospitals (where only 30 percent

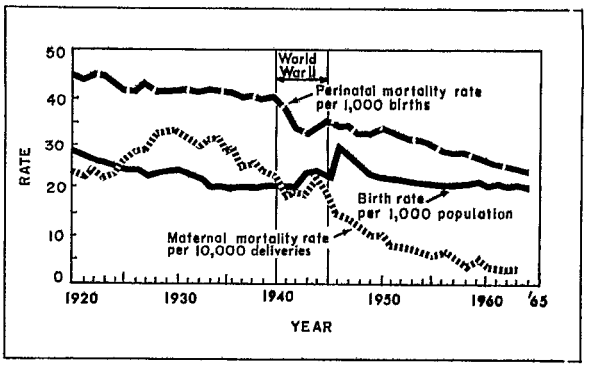

Figure 7. Birth, perinatal, and maternal mortality rates: Netherlands, 1920-64.

of all deliveries take place), maternal mortality in home deliveries is low. It is extremely low (less than 1 per 10,000 births) among mothers utilizing maternity home help services, a group which is also associated with a very low perinatal mortality.

Age of Mother

Maternal mortality varies markedly with age, as is shown in figure 8. Women at ages 20-29 record the lowest rates—2 per 10,000 births in 1960-62. Thereafter the mortality increases sharply with age, reaching 14 per 10,000 at ages 40-44. The rates at ages 45 and over have not been computed because the annual number of births to mothers at these ages is about 1,000 or less.

Inasmuch as maternal mortality is strongly influenced by the distribution of mother's age at time of birth, the rates for different regions or countries can be compared only if age-specific rates are known. Table 13 indicates that, when adjusted for age, maternal mortality is approximately the same in the Netherlands, the United States, and England and Wales, but lower in Sweden.

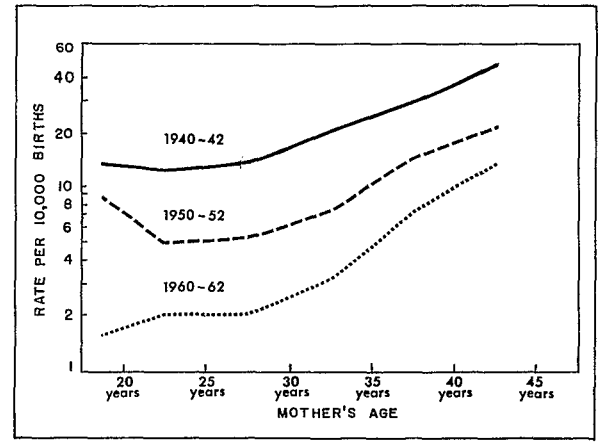

Figure 8. Maternal mortality rates by age: Netherlands, 1940-42, 1950-52, and 1960-62.

V. OUTLOOK FOR INFANT LOSS

In studying the history of infant mortality in industrialized countries, one is impressed with the periodically recurring fatalistic statement that the minimal level has been reached and further decrease is impossible. At the beginning of this century, an infant mortality rate of 100 per 1,000 live births was considered an unattainable goal. After World War I, a national rate of 50 per 1,000 seemed almost Utopian. Yet, during World War II a rate of 30 per 1,000 was attained in Sweden, and at the end of the 1950's at least three countries recorded an infant mortality of less than 20 per 1,000. By 1964, Holland had an infant mortality rate of 15 per 1,000 and an infant loss of 28 per 1,000.

It is understandable that countries with rates above 20 per 1,000 and a diminishing downward trend take comfort in the idea that the curve is beginning to follow an asymptotic course. This theory gives way, however, if the trend in more privileged countries is studied. The Netherlands belongs to this group of countries, even though this favorable situation has not resulted from evaluation and planning—at least not before 1950—but to a long tradition of basic infant care in the family, stimulated by district nurses and welfare centers and supported by basic social security measures and a rising standard of living.

As already noted in various sections of the text, an analysis of infant loss by age, sex, parity, cause of death, seasonal variation, and social class leads to the conclusion that a hard core or irreducible minimum is far from having been reached. It appears likely that the rate of the highest social class at present will be the national average in the near future, resulting from improvement in sociohygienic conditions and in medical, obstetric, and pediatric care. Nonspectacular arrangements, such as maternity home help, may not be less important than technical innovations.

Analysis of the factors mentioned above lead to the following predictions regarding infant loss and its components in the Netherlands. In 1964, the stillbirth rate was 13.4 per 1,000, first-week mortality 10.1, and postnatal mortality 4.7; hence

the perinatal rate was 23.4 per 1,000, infant mortality 14.8, and infant loss 28. It may be expected that about 1970 the stillbirth rate will be reduced to 10-11 per 1,000, first-week mortality to 8-9, and postnatal mortality to 3-4; accordingly, perinatal mortality would be 18-20, infant mortality 11-13, and infant loss 22-24 per 1,000. Account should be taken of the fact that the rate of decrease will be accelerated if the factors tending to reduce the mortality have a cumulative effect but will be slackened if there are counterbalancing trends.

During the 1970's, the rate will probably continue to decrease, bringing the infant mortality rate below 10 and infant loss below 20 per 1,000. The prediction that infant mortality and infant loss in 1970 will be about half the rates recorded 20 years earlier are neither optimistic nor pessimistic, but realistic.

VI. SUMMARY

Nature and Processing of Data

In Holland, where about 70 percent of confinements occur in the home, large numbers of doctors and midwives have not been trained to adhere strictly to the international definitions of stillbirth and live birth. There is no medical notification of live births; notification of births within 3 days after delivery is compulsory, and is usually done by the father.

Inaccuracies in notification and registration of immature babies, until about 1950, had the effect of lowering first-week and infant mortality by 3.0-3.5 per 1,000 live births. Since then, undernotification may still be responsible for lowering the rates by about 1.0-1.5 per 1,000.

Mortality Trends

Infant mortality was reduced by one-half in each of three periods: from 1900 to 1922, from 1923 to 1939, and from 1948 to 1964, the first period covering an interval of 22 years and the other two, 16 years each. The infant mortality rate was approximately 50 per 1,000 live births in 1930, 30 in 1948, 20 in 1956, and 15 per 1,000 in 1964. Infant loss in 1964 (28 per 1,000 births) was about one-fourth that in 1920.

Both before and after World War II, the decrease in postnatal and infant mortality exceeded the reduction in perinatal mortality. Each of the age components of infant loss fell more rapidly in the postwar than in the prewar period. In the early 1920's postnatal mortality was three times as high as first-week mortality, and in the 1930's nearly twice as high. Shortly before 1950 the rates were about equal, and currently first-week mortality is twice as high as postnatal mortality. The ratio between stillbirth and first-week mortality (4 to 3) has not changed in the past 40 years. In contrast, the ratio between perinatal and postnatal mortality has changed drastically, from 1 to 1 in 1927 to 3 to 1 in 1952 and 5 to 1 in 1962. The problem of wastage of infant life has become the problem of perinatal mortality.

Perinatal mortality accounts for more than 80 percent of infant loss. Stillbirth is responsible for 60 percent and first-week mortality for 40 percent of perinatal deaths. First-week mortality comprises about two-thirds of infant mortality and one-third of infant loss.

Infant mortality for girls has consistently been much lower than for boys. Before World War II all components of infant mortality were higher in rural than in urban areas, but with the decrease in mortality the differences have nearly disappeared, although hospital deliveries are twice as frequent in cities as in rural areas.

Prematurity is of paramount significance in perinatal mortality; 40 percent of stillbirths and 55 percent of first-week mortality are among prematures. During the first week of life, the risk of dying is about 20 times as high for premature infants as for infants born at term. The prematurity rate of live births in Sweden is 4.5 percent, and in Holland 5.5 percent. This difference accounts in part for the difference in perinatal mortality between the two countries.

The stillbirth rate increases with age of mother at all parities. In every age group, primiparae have by far the highest stillbirth rate. The rate is three times as high among women

over 40 as among those under 25, and about 1½ times as high at higher parities as among second and third births. Between 1952-53 and 1962-63, the stillbirth rate decreased for almost all age groups of mothers and nearly all parities, reflecting to a considerable degree the shift in distribution of births toward younger mothers and lower parities. The influence of age surpasses by far that of parity. Age and parity have a stronger influence on stillbirth than on first-week mortality.

The frequency of twin births increases with parity, and even more so with age of mother. Twin births comprise about 2.5 percent of all births. Stillbirth is 2½ times as high for twin as for single births. The ratio is 6 to 1 for first-week mortality, 4 to 1 for perinatal mortality, 2½ to 1 for postnatal mortality, and more than 4 to 1 for infant mortality. The high first-week mortality is due to the high prematurity rate—50 percent compared with 4 percent for single live births. Since 1953, when the statistics for infant mortality for twins began, the reduction of first-week and infant mortality in twins paralleled that for single births.

Under certain conditions, which may be of biological, pathological, and social origin, the risk of death for the newborn is much higher than average. These high-risk groups include children of older mothers and higher parity, twin deliveries, and prematures; all such confinements should be hospitalized.

The infant's risk of death in abnormal presentations, especially breech presentation, is about 10 times as high as in cephalic presentation. Newborn infants of mothers with a history of abortion and prematurity have two to three times the mortality of babies born to mothers without abnormalities in previous pregnancies.

About one-third of all deliveries are in the high-risk groups. Including cases in which the chances of dying are difficult to determine, a hospitalization rate of about 40 percent will meet all medical and social needs, at least if an adequate selection of the high-risk groups takes place.

The major causes of stillbirth, such as difficulties in labor, placental and cord conditions, and congenital malformations, have decreased with varying rapidity since 1950. Boys have a higher death rate than girls for each cause of stillbirth except congenital malformations.

In first-week mortality, birth injuries, immaturity, and congenital malformations are the dominant causes. Sharp decreases have occurred in the death rate for birth injuries and immaturity for both sexes, the rates for males remaining higher than for females. The excess mortality among females from congenital malformations has changed to an excess mortality among males—resulting mainly from the drastic reduction in mortality from congenital malformation of the central nervous system in females.

The causes of perinatal mortality decreased between 1950 and 1963: birth injuries by 30 percent, the residual group "other causes" by 25 percent, congenital malformations by 20 percent, and erythroblastosis by 10 percent. Perinatal mortality as a whole fell about 30 percent. Analysis by cause suggests that a further decrease in perinatal mortality may be expected.

The leading cause of postnatal mortality is congenital malformations, followed by the subgroup "other causes" and influenza and pneumonia. The rates for both subgroups have more or less halved in 13 years.

Seventy percent of confinements occur in the home—half of which obtain maternity home help service—and 30 percent in hospitals. The larger the municipality, the higher the hospitalization rate and the lower the maternity home help services. Approximately 60 percent of stillbirths occur in hospitals, or about twice the proportion of live births.

Perinatal mortality in home deliveries, particularly those with maternity home help, is very low, in part because the high-risk cases are concentrated in hospitals. Nevertheless, the favorable results in home deliveries in the Netherlands justify the conclusion that hospitalization on a large scale is not the only means for reducing perinatal mortality. This point deserves the special attention of developing countries.

Infant mortality rates still show differences by socioeconomic class. In 1961-62, the rates in class I were about 15 percent lower, and in class V 10 percent higher, than the national average.

The influence of social class on stillbirth is stronger than that for any of the age compon-

ents of infant mortality. The present rates for the higher social classes will be the national averages in the near future.

Illegitimacy has never been an important problem in the Netherlands. The risk of death of the illegitimate child at present is about what it was for legitimate children in the immediate prewar period.

Before 1940, perinatal and postnatal mortality were higher in Sweden than in Norway or in the Netherlands. Since World War II, the infant mortality rates for Sweden have been the lowest in the world. In these three countries the infant mortality rate now approximates 15-20 per 1,000 and infant loss about 30 per 1,000. In England and Wales and in the United States, the rates are higher. The favorable situation in the Netherlands reflects a long tradition of basic infant care in the family, aided by district nurses and welfare centers and supported by social security measures and a rising standard of living.

Maternal and Child Health Services

Domiciliary confinement has been far more usual than institutional confinement in the Netherlands. Hospitalized births accounted for about 20 percent of the total in 1950, 25 percent in 1956, and 30 percent in 1963. If hospitalized, mothers and babies stay an average of 10-12 days.

Midwives give prenatal and natal care as independent practitioners. About 35 percent of the babies are delivered by midwives, 45 percent by general practitioners, and 20 percent by obstetricians. The obstetrical approach still is conservative: cesarean section is performed in little more than 1 percent of deliveries, and analgesia is hardly practiced.

Prenatal and natal care are the legal right of members of the sickfunds, but hospitalization for "normal" delivery is not included. Although practically all mothers receive prenatal and natal care, only about 60 percent see their doctor or midwife six times or more during pregnancy.

To compensate for the low frequency of hospital births, a special organization (Maternity Home Help) has been founded to provide care for the mother and newborn child and to help in the household. In 1950 this organization covered one-fourth and in 1963 one-half of all home deliveries.

Infant welfare centers have grown in number from one in every 450 live births in 1930 to one in every 100 in 1960. The main activity of these centers is periodic examination of healthy infants, who have an average of 10 or 11 examinations during the first year of life. About 75 percent of the infants enjoy periodic supervision. The primary task of the infant welfare centers has shifted from the fight against infant mortality to health promotion and child development.

Future Trends

Analysis of infant loss by age, sex, cause of death, and social class indicates that by 1970 the stillbirth rate in the Netherlands will be reduced to 10-11 per 1,000, first-week mortality to 8-9, and postnatal mortality to 3-4 per 1,000. Hence, perinatal mortality will be 18-20, infant mortality 11-13, and infant loss 22-24 per 1,000. It is expected that the rates will continue to decrease during the 1970's.

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DETAILED TABLES

Table 1. Birth rates and infant loss rates by age: Netherlands, 1920-64

Year	Birth	Still-birth	Perinatal mortality[1]	Infant mortality				Infant loss (selected years)
				Under 1 year[1]	Under 1 week[1]	Under 28 days[1]	1-51 weeks	
	Rate per 1,000 population	Rate per 1,000 births		Rate per 1,000 live births				Rate per 1,000 births
1964	20.7	13.4	23.4	14.8	10.1	11.6	4.7	28.0
1963	20.9	14.3	24.5	15.8	10.4	12.0	5.4	29.9
1962	20.9	14.6	25.7	17.0	11.3	12.8	5.7	31.3
1961	21.3	14.8	25.9	17.0	11.3	12.8	5.8	31.6
1960	20.8	14.9	26.6	17.9	11.9	13.5	6.0	32.6
1959	21.4	15.7	27.1	18.1	11.6	13.3	6.5	---
1958	21.2	16.7	28.0	18.5	11.4	13.3	7.1	35.0
1957	21.2	16.9	28.1	18.4	11.4	13.1	7.0	---
1956	21.3	16.9	29.0	20.2	12.3	14.2	7.9	36.8
1955	21.3	17.0	30.2	21.6	13.4	15.6	8.2	---
1954	21.5	17.4	31.2	22.6	14.1	16.2	8.5	39.6
1953	21.7	17.5	31.5	23.7	14.3	16.5	9.4	---
1952	22.3	18.2	32.4	24.1	14.4	16.6	9.7	41.8
1951	22.2	18.3	33.4	26.7	15.4	18.4	11.3	---
1950	22.7	19.3	34.2	26.7	15.2	17.9	11.5	45.4
1949	23.7	19.3	33.0	26.6	14.0	16.8	12.6	---
1948	25.3	18.9	32.4	28.9	13.8	17.4	15.1	47.6
1947	27.8	20.1	34.2	33.1	14.4	18.5	18.7	---
1946	30.2	20.2	34.8	41.6	14.9	20.9	26.7	58.1
1945	22.6	19.2	35.0	78.7	16.1	29.8	62.6	97.3
1944	24.0	18.5	33.6	46.8	15.4	23.0	31.4	63.9
1943	23.0	18.5	32.4	41.0	14.2	20.4	26.8	---
1942	21.0	19.3	33.6	39.9	14.5	21.0	25.4	---
1941	20.3	21.3	37.5	43.4	16.6	22.7	26.8	---
1940	20.8	25.1	40.7	39.4	16.0	21.4	23.4	63.3
1939	20.6	24.8	39.9	33.8	15.5	19.8	18.3	57.6
1938	20.5	24.7	40.1	36.9	15.9	20.5	21.0	60.3
1937	19.8	25.2	40.5	38.0	15.9	20.9	22.1	---
1936	20.2	25.1	40.8	38.9	16.1	21.5	22.8	---
1935	20.2	25.1	41.6	39.9	16.9	22.5	23.0	64.1
1934	20.7	25.1	41.7	42.6	17.0	22.5	25.6	---
1933	20.8	25.1	41.5	43.4	16.8	22.4	26.6	---
1932	22.0	25.2	41.1	46.4	16.4	22.4	30.0	---
1931	22.2	25.0	41.6	49.2	17.1	23.4	32.1	---
1930	23.1	24.6	41.4	51.3	17.3	23.4	34.0	74.2
1929	22.8	24.7	41.4	59.0	17.2	24.6	41.8	---
1928	23.3	25.1	41.1	52.3	16.3	23.6	36.0	---
1927	23.1	25.9	42.9	58.6	17.4	24.8	41.2	---
1926	23.8	24.8	41.2	61.1	16.7	24.1	44.4	---
1925	24.2	25.4	41.1	58.4	16.1	23.6	42.3	82.3
1924	25.1	26.0	43.0	60.6	17.5	25.7	43.1	---
1923	26.2	27.7	44.6	66.2	17.4	26.0	48.8	---
1922	26.1	26.9	44.8	76.8	18.4	28.7	58.4	---
1921	27.7	26.3	43.7	85.3	18.0	30.8	67.3	---
1920	28.6	26.1	44.7	82.5	19.0	31.1	63.5	106.4

[1]Based on calendar days since birth.

[Ed. note: For the years 1950-64, includes liveborn infants with gestations of less than 28 weeks who died before registration]

SOURCES: Netherlands Central Bureau of Statistics, Zestig jaren statistiek in tijdreeksen (Historical series of the Netherlands), Zeist, 1959.

Netherlands Central Bureau of Statistics, Jaaroverzichten bevolking en volksgezondheid (Annual vital and health reports), The Hague.

Table 2. Infant mortality rates by age: Netherlands, 1938-64

Year	Under 1 week[1]	Under 1 day[1]	1-6 days[1]	1-51 weeks	7-27 days	28 days-5 months	6-11 months
	Rate per 1,000 live births						
1964	10.1	4.6	5.6	4.7	1.5	2.1	1.2
1963	10.4	4.8	5.5	5.4	1.6	2.4	1.4
1962	11.3	5.4	5.8	5.7	1.5	2.7	1.5
1961	11.3	5.5	5.8	5.8	1.5	2.7	1.5
1960	11.9	5.8	6.1	6.0	1.6	2.8	1.6
1959	11.6	5.4	6.1	6.5	1.7	3.1	1.7
1958	11.4	5.6	5.8	7.1	1.9	3.4	1.8
1957	11.4	5.6	5.8	7.0	1.8	3.3	1.9
1956	12.3	6.6	5.7	7.9	1.9	4.0	2.0
1955	13.4	7.4	6.1	8.2	2.1	4.1	2.0
1954	14.1	7.6	6.5	8.5	2.1	4.2	2.2
1953	14.3	8.1	6.2	9.3	2.2	4.7	2.5
1952	14.4	7.7	6.7	9.7	2.2	4.8	2.7
1951	15.4	8.3	7.1	11.3	3.0	5.4	2.9
1950	15.2	8.4	6.8	11.5	2.7	5.9	2.9
1949	14.0	7.8	6.2	12.8	2.8	6.7	3.4
1948	13.8	7.5	6.3	15.5	3.6	8.0	3.9
1947	14.4	7.6	6.8	19.1	4.2	9.8	5.2
1946	14.9	8.1	6.8	23.8	6.0	11.8	6.0
1945	16.1	8.3	7.8	63.5	13.7	34.8	15.0
1944	15.4	8.0	7.4	30.9	7.7	15.8	7.5
1943	14.2	7.9	6.3	25.9	6.3	12.8	6.9
1942	14.5	7.7	6.9	25.0	6.4	12.5	6.1
1941	16.6	8.6	7.9	27.0	6.2	12.5	8.3
1940	16.0	8.6	7.5	23.1	5.3	10.9	6.8
1939	15.5	8.9	6.5	18.2	4.3	8.9	5.0
1938	15.9	8.6	7.2	20.7	4.6	9.8	6.3

[1]Based on calendar days since birth. For the years 1950-64, includes liveborn infants with gestation of less than 28 weeks who died before registration.

Table 3. Birth rates and stillbirth, perinatal, and infant mortality rates, by sex: Netherlands, 1925-64

Year	Birth		Stillbirth		Perinatal mortality[1]		Infant mortality[1]	
	Male	Female	Male	Female	Male	Female	Male	Female
	Rate per 1,000 population		Rate per 1,000 births				Rate per 1,000 live births	
1964	10.6	10.1	13.7	13.0	25.1	21.5	16.7	12.8
1963	10.7	10.1	15.3	13.3	27.3	21.7	17.8	13.6
1962	10.7	10.2	15.4	13.7	27.9	23.3	19.0	14.9
1961	10.9	10.4	15.5	14.2	28.4	23.3	19.4	14.5
1960	10.7	10.1	15.4	14.4	28.9	24.2	20.0	15.7
1959	11.0	10.4	16.4	15.1	29.4	24.8	20.4	15.6
1958	10.9	10.3	17.5	15.9	30.1	25.6	20.5	16.4
1957	10.9	10.3	17.4	16.4	30.2	25.9	20.7	15.9
1956	10.9	10.3	17.4	16.3	31.4	26.4	22.9	17.3
1955	10.9	10.4	17.9	16.0	33.0	27.2	24.4	18.7
1954	11.1	10.4	18.1	16.6	33.7	28.6	25.0	20.0
1953	11.2	10.5	18.0	16.9	34.3	28.6	27.0	20.1
1952	11.5	10.8	19.3	17.2	35.3	29.3	26.6	21.4
1951	11.5	10.8	18.7	17.9	36.0	30.6	30.0	23.2
1950	11.7	11.0	19.7	18.8	36.8	31.4	29.8	23.3
1949	12.2	11.5	19.8	18.8	---	---	30.0	23.5
1948	13.1	12.2	19.5	18.2	---	---	32.7	25.6
1947	14.3	13.5	21.4	18.7	---	---	37.5	29.3
1946	15.6	14.6	21.3	19.0	---	---	43.5	33.5
1945	11.7	10.9	20.3	18.0	---	---	88.6	70.0
1944	12.4	11.6	19.2	17.8	---	---	51.5	40.8
1943	11.9	11.1	19.7	17.2	---	---	44.1	35.8
1942	10.9	10.1	19.9	18.7	---	---	44.4	34.2
1941	10.5	9.8	22.2	20.3	---	---	49.4	37.3
1940	10.7	10.1	26.6	23.5	---	---	44.0	34.1
1939	10.6	10.0	26.2	23.3	---	---	37.6	29.6
1938	10.6	10.0	26.7	22.6	---	---	41.2	31.6
1937	10.2	9.6	26.4	23.8	---	---	43.0	32.9
1936	10.4	9.8	26.4	23.7	---	---	43.2	34.2
1935	10.4	9.8	26.3	23.8	---	---	45.2	34.4
1934	10.6	10.0	26.3	23.8	---	---	47.5	37.3
1933	10.7	10.1	27.0	23.1	---	---	49.5	37.9
1932	11.3	10.7	26.7	23.6	---	---	52.3	39.9
1931	11.5	10.7	26.4	23.5	---	---	56.1	42.6
1930	11.9	10.2	25.7	23.4	---	---	56.6	44.8
1929	11.7	11.1	26.3	23.0	---	---	66.5	51.1
1928	12.0	11.4	26.9	23.3	---	---	59.5	44.8
1927	11.9	11.2	27.6	24.2	---	---	66.4	50.6
1926	12.2	11.5	26.3	23.3	---	---	68.3	53.5
1925	12.5	11.8	27.8	22.9	---	---	66.0	50.3

[1]For the years 1950-64, includes liveborn infants with gestations of less than 28 weeks who died before registration.

Table 4. Infant loss rates by age: selected countries, 1926-61

Infant loss component and country	1960-1961	1957-1959	1954-1956	1951-1953	1946-1950	1941-1945	1936-1940	1931-1935	1926-1930
Stillbirth	Rate per 1,000 births								
Netherlands	14.8	16.4	17.1	18.0	20	20	25	25	2[illegible]
Sweden	13.2	15.3	16.8	18.5	20	23	28	27	2[illegible]
Norway	13.4	14.0	14.8	15.6	18	20	23	25	2[illegible]
Denmark	12.4	15.1	16.2	18.3	18	21	25[1]		[2]2[illegible]
England and Wales	19.4	21.6	23.2	22.7	24	33	38	41	40
Belgium	14.9	15.8	17.6	20.5	25	25	30	32	3[illegible]
Czechoslovakia	12.4	13.5	13.8	16.2	16	19	23	23	2[illegible]
United States	12.4	11.9	12.5	13.8	16	19	---	---	---
Perinatal mortality									
Netherlands[3]	26.2	27.7	30.1	32.4	33	34	40	41	42
Sweden	24.9	26.3	28.3	31.2	34	39	47	46	44
Norway	23.4	24.4	25.1	26.9	31	33	39	41	42
Denmark	26.7	29.1	33.4	34.4	---	---	---	---	---
England and Wales	32.4	35.1	37.4	37.5	40	52	60	63	62
Belgium[4]	30.9	32.3	35.6	39.9	46	44	49	51	51
Czechoslovakia	24.3	25.6	28.3	34.6	---	---	---	---	---
United States	29.0	28.8	29.4	31.1	35	39	---	---	---
Infant mortality	Rate per 1,000 live births								
Netherlands[3]	17.4	18.3	21.5	24.8	40	50	37	45	56
Sweden	16.2	16.8	17.8	20.1	24	31	42	50	58
Norway	18.4	19.7	21.1	23.8	31	37	39	45	50
Denmark	21.6	22.8	25.7	28.3	38	48	66[1]		[2]82
England and Wales	21.7	22.6	24.7	28.0	36	50	55	62	68
Belgium	29.6	32.5	40.5	45.6	64	88	86	89	102
Czechoslovakia	24.6	31.3	36.2	58.5	100	105	110	130	150
United States	25.6	26.6	26.3	28.2	32	40	51	60	68
Under 1 week									
Netherlands[3,5]	11.6	11.5	13.3	14.7	14	15	16	17	17
Sweden[5]	11.8	11.2	11.7	12.9	14	16	19	19	18
Norway	10.1	10.6	10.4	11.4	13	13	16	16	17
Denmark[5]	14.2	13.8	15.5	16.3	---	---	---	---	---
England and Wales	13.3	13.8	14.6	15.1	16	19	22	22	22
Belgium[4]	16.3	16.8	18.2	19.8	21	19	20	18	18
Czechoslovakia	11.9	12.1	14.5	18.4	---	---	---	---	---
United States	16.6	16.9	16.8	17.3	19	20	24	26	28
1-51 weeks									
Netherlands	5.8	6.8	8.2	10.1	16	35	21	28	39
Sweden	4.4	5.6	6.1	7.2	10	15	23	31	49
Norway	8.3	9.1	10.7	12.4	18	24	23	29	33
Denmark	7.4	9.0	10.2	12.0	---	---	---	---	---
England and Wales	8.4	8.8	10.1	12.9	20	31	33	40	46
Belgium	13.3	15.7	22.4	25.8	43	69	66	71	84
Czechoslovakia	12.8	19.2	21.7	40.1	---	---	---	---	---
United States	9.0	9.7	9.5	11.0	13	20	27	34	40
Infant loss	Rate per 1,000 births								
Netherlands	32	35	39	43	60	70	62	70	81
Sweden	29	32	35	39	44	54	70	77	84
Norway	32	34	36	39	49	57	62	70	75
Denmark	34	38	44	47	56	68	91[1]		[2]106
England and Wales	41	44	48	51	60	83	93	103	108
Belgium	44	48	58	66	89	113	116	121	136
Czechoslovakia	37	45	50	75	116	124	133	153	173
United States	36	39	39	42	48	59	---	---	---

[1]1931-40.

[2]1921-30.

[3]Includes liveborn infants with gestation of less than 28 weeks who died before registration.

[4]Before 1951—deaths under 5 days; 1951-55—deaths under 7 days estimated from deaths under 5 days and deaths under 10 days; 1956-61—deaths under 7 days.

[5]Based on calendar days since birth.

SOURCES: United Nations, Demographic Yearbook, New York.

World Health Organization, Epidemiological and Vital Statistics Reports, Geneva.

National statistical publications.

Table 5. Infant loss rates, by sex and age: Netherlands, 1950-64

[Includes liveborn infants with gestations of less than 28 weeks who died before registration]

Sex and year	Still-birth	Under 1 week[1]	Under 1 day[1]	1-6 days[1]	1-51 weeks	7-27 days	28 days-5 months	6-11 months	Infant loss
Male	Rate per 1,000 births	Rate per 1,000 live births							Rate per 1,000 births
1964	13.7	11.6	5.1	6.5	5.2	1.8	2.2	1.2	30
1963	15.3	12.2	5.6	6.6	5.6	1.7	2.5	1.4	33
1962	15.4	12.8	6.0	6.8	6.2	1.7	2.8	1.8	34
1961	15.5	13.2	6.1	7.0	6.3	1.7	3.0	1.7	35
1960	15.4	13.7	6.6	7.2	6.3	1.7	3.0	1.6	35
1959	16.4	13.2	6.0	7.2	7.2	2.0	3.4	1.8	37
1958	17.5	12.9	6.2	6.7	7.7	2.1	3.6	1.9	38
1957	17.4	13.0	6.2	6.8	7.7	2.0	3.6	2.2	38
1956	17.4	14.2	7.4	6.8	8.8	2.1	4.5	2.2	40
1955	17.9	15.4	7.9	7.4	9.0	2.5	4.5	2.0	42
1954	18.1	15.9	8.5	7.4	9.1	2.2	4.6	2.3	43
1953	18.0	16.6	9.1	7.5	10.4	2.5	5.1	2.7	45
1952	19.3	16.3	8.5	7.8	10.3	2.4	---	---	45
1951	18.7	17.7	9.3	8.4	12.3	3.1	---	---	48
1950	19.7	17.5	9.4	8.1	12.3	2.9	---	---	48
Female									
1964	13.0	8.7	4.1	4.6	4.2	1.1	1.9	1.1	26
1963	13.3	8.5	4.1	4.4	5.1	1.5	2.2	1.4	27
1962	13.7	9.7	4.8	4.8	5.2	1.4	2.6	1.3	28
1961	14.2	9.3	4.9	4.4	5.2	1.4	2.4	1.4	29
1960	14.4	9.9	5.0	4.9	5.8	1.5	2.6	1.7	30
1959	15.1	9.8	4.8	5.0	5.8	1.5	2.8	1.6	31
1958	15.9	9.9	5.0	4.9	6.6	1.7	3.2	1.7	32
1957	16.4	9.7	5.0	4.6	6.2	1.5	3.0	1.7	32
1956	16.3	10.3	5.7	4.6	7.0	1.7	3.6	1.7	33
1955	16.0	11.4	6.8	4.6	7.4	1.8	3.7	2.0	35
1954	16.6	12.1	6.6	5.5	7.9	1.9	3.9	2.1	36
1953	16.9	11.9	7.1	4.8	8.1	1.7	4.2	2.3	37
1952	17.2	12.3	6.8	5.5	9.1	2.1	---	---	39
1951	17.9	13.0	7.2	5.8	10.2	2.8	---	---	41
1950	18.8	12.8	7.3	5.5	10.5	2.4	---	---	42

[1]Based on calendar days since birth.

Table 6. Percentage distribution of live births, by age of mother and parity: Netherlands, selected years, 1950-63

Year and age of mother	Total	Parity					
		1	2	3	4	5	6 and over
1962-63	Percentage distribution						
Total	100.0	32.3	27.3	16.9	9.5	5.4	8.6
Under 25 years	26.2	17.3	6.7	1.7	0.4	0.1	0.0
Under 20 years	3.9	3.3	0.5	0.0	0.0	0.0	-
20-24 years	22.3	14.0	6.2	1.6	0.4	0.1	0.0
25-29 years	32.4	10.8	12.2	5.9	2.2	0.8	0.5
30-34 years	23.6	3.0	6.4	6.2	3.8	2.0	2.2
35-39 years	12.9	0.9	1.7	2.6	2.4	1.8	3.5
40 years and over	4.9	0.2	0.3	0.6	0.7	0.7	2.4
1956-57							
Total	100.0	30.7	25.1	16.1	10.2	6.5	11.4
Under 25 years	20.4	13.4	5.1	1.4	0.4	0.1	0.0
Under 20 years	2.5	2.2	0.3	0.0	0.0	-	-
20-24 years	17.9	11.2	4.8	1.4	0.4	0.1	0.0
25-29 years	32.6	12.2	11.0	5.4	2.4	1.0	0.6
30-34 years	25.9	3.9	6.6	6.0	4.0	2.5	2.9
35-39 years	15.0	1.0	2.0	2.7	2.6	2.2	4.6
40 years and over	6.1	0.2	0.4	0.6	0.8	0.8	3.2
1950-51							
Total	100.0	27.8	24.1	16.9	11.0	7.0	13.2
Under 25 years	18.6	11.6	5.0	1.5	0.4	0.1	0.0
Under 20 years	2.2	1.9	0.3	0.0	0.0	-	-
20-24 years	16.4	9.7	4.8	1.5	0.4	0.1	0.0
25-29 years	31.4	10.8	10.3	5.9	2.7	1.1	0.6
30-34 years	25.4	3.8	6.0	5.8	4.1	2.6	3.1
35-39 years	17.2	1.2	2.2	2.9	2.9	2.4	5.6
40 years and over	7.3	0.3	0.5	0.8	0.9	0.9	3.9

Table 7. Stillbirth rates and percent change, by age of mother and birth order: Netherlands, 1952-53 and 1962-63

Year and age of mother	Adjusted for birth order[1]	All orders	Birth order			
			1	2 and 3	4 and 5	6 and over
	Rate per 1,000 births					
1962-63						
All ages (adjusted for mother's age[1])	15.7	15.4	16.5	11.3	17.1	25.7
All ages (total)	15.1	14.4	15.4	10.8	17.0	25.4
Under 20 years	10.4	10.2	10.8	6.3	*	-
20-24 years		10.5	12.7	6.7	8.7	*
25-29 years	11.8	11.5	15.2	8.9	12.7	16.8
30-34 years	15.2	14.8	24.3	12.4	14.4	16.2
35-39 years	22.3	21.9	38.4	18.1	20.5	24.3
40 years and over	34.5	34.2	52.3	29.1	30.0	36.9
1952-53						
All ages	17.8	17.8	20.6	13.0	17.6	27.2
Under 20 years	13.4	13.4	14.0	8.6	*	-
20-24 years	12.8	12.8	14.6	9.8	12.2	*
25-29 years	14.4	14.4	20.1	10.9	11.9	13.9
30-34 years	16.9	16.9	30.9	13.3	14.8	18.0
35-39 years	22.9	22.9	43.4	19.5	19.5	24.8
40 years and over	38.9	38.9	72.0	29.6	37.1	40.2
	Percent change					
All ages (adjusted for mother's age[1])	-12	-13	-20	-13	-3	-6
All ages (total)	-15	-19	-25	-17	-3	-7
Under 20 years	-19	-24	-23	-27	...	...
20-24 years		-18	-13	-32	-29	...
25-29 years	-18	-20	-24	-18	+7	+21
30-34 years	-10	-12	-21	-7	-3	-10
35-39 years	-3	-4	-12	-7	+5	-2
40 years and over	-11	-12	-27	-2	-19	-8

[1]Adjusted by the direct method using the distribution of total births by age of mother and birth order, Netherlands, 1952-53.

Table 8. First-week mortality rates and percent change, by age of mother and total birth order: Netherlands, 1953-54 and 1962-63

[Based on calendar days since birth]

Year and age of mother	Adjusted for live birth order[1]	All orders	Birth order			
			1	2 and 3	4 and 5	6 and over
1962-63	Rate per 1,000 live births					
All ages (adjusted for mother's age[1])	11.1	10.9	12.2	9.3	10.9	14.3
All ages (total)	11.0	10.8	12.0	9.3	11.0	14.3
Under 20 years	14.4	14.3	14.6	*	-	-
20-24 years	11.0	10.9	10.7	10.7	*	-
25-29 years	9.7	9.5	11.2	8.3	10.0	*
30-34 years	10.1	9.9	14.4	8.5	9.5	12.7
35-39 years	12.7	12.7	23.7	11.5	11.4	12.9
40 years and over	16.6	16.5	*	14.9	15.4	17.2
1953-54						
All ages	14.2	14.2	15.5	12.2	14.2	17.5
Under 20 years	18.4	18.4	17.2	*	-	-
20-24 years	13.7	13.7	13.9	13.4	*	-
25-29 years	12.4	12.4	13.6	10.8	14.9	*
30-34 years	13.1	13.1	18.4	10.9	13.3	15.1
35-39 years	16.4	16.4	32.0	15.7	13.4	17.0
40 years and over	21.8	21.8	*	23.3	18.5	21.2
	Percent change					
All ages (adjusted for mother's age[1])	-22	-23	-21	-24	-23	-19
All ages (total)	-23	-24	-23	-24	-23	-19
Under 20 years	-22	-22	-15	...	...	...
20-24 years	-20	-20	-23	-20	...	...
25-29 years	-22	-23	-18	-23	-33	...
30-34 years	-23	-24	-22	-22	-29	-15
35-39 years	-23	-23	-26	-27	-15	-24
40 years and over	-24	-24	*	-36	-17	-19

[1]Adjusted by the direct method using the distribution of live births by age of mother and birth order, Netherlands, 1953-54.

Table 9. Stillbirth rates by cause and sex: Netherlands, 1950-63

Cause of stillbirth and sex (Sixth Revision—International Lists, 1948)	1963	1962	1961	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950
	Rate per 10,000 births													
All causes	143	146	148	149	157	167	169	169	170	174	174	182	183	193
Male	153	154	155	154	164	175	174	174	---	---	---	---	---	---
Female	133	137	142	144	151	159	164	163	---	---	---	---	---	---
Diseases and conditions of pregnancy and childbirth--Y32	25	22	22	22	21	28	29	22	21	21	16	18	15	19
Male	27	23	22	24	21	28	30	24	---	---	---	---	---	---
Female	24	21	22	20	21	27	27	19	---	---	---	---	---	---
Difficulties in labor------Y34	11	13	14	14	15	21	22	23	23	24	21	24	25	28
Male	13	15	17	15	17	24	24	25	---	---	---	---	---	---
Female	9	11	11	13	12	18	20	20	---	---	---	---	---	---
Other diseases or conditions in mother-----Y30,Y31,Y33,Y35	13	13	13	14	13	10	12	7	7	8	9	9	9	9
Male	14	13	15	14	13	10	13	8	---	---	---	---	---	---
Female	12	13	12	14	12	9	10	7	---	---	---	---	---	---
Placental and cord conditions----------Y36	38	39	37	37	43	39	37	43	40	41	41	42	45	47
Male	41	43	38	39	47	43	40	44	---	---	---	---	---	---
Female	34	35	35	36	38	36	34	41	---	---	---	---	---	---
Birth injuries----------Y37	1	1	2	1	2	3	3	2	3	3	3	3	3	3
Male	1	2	2	2	3	3	3	3	---	---	---	---	---	---
Female	1	<1	2	1	2	2	2	2	---	---	---	---	---	---
Congenital malformations of fetus----------Y38	15	16	16	16	16	21	19	19	21	22	20	21	20	20
Male	12	14	14	13	13	17	13	16	---	---	---	---	---	---
Female	18	18	19	19	20	25	25	23	---	---	---	---	---	---
Erythroblastosis---------Y39.2	6	6	6	6	6	6	6	6	6	6	6	6	6	5
Male	7	6	7	7	7	7	6	7	---	---	---	---	---	---
Female	5	7	6	5	6	5	6	5	---	---	---	---	---	---
Other diseases of fetus and ill-defined causes------Y39.0,Y39.1,Y39.3-Y39.6	33	35	38	38	41	40	42	47	50	51	57	60	62	61
Male	37	38	41	41	43	43	43	48	---	---	---	---	---	---
Female	30	33	36	36	40	38	41	46	---	---	---	---	---	---

[Ed. note: Rates by cause do not add to the total because of rounding]

Table 10. Infant mortality rates by cause, sex, and age: Netherlands, 1953-54 and 1961-62

[Excludes liveborn infants with gestations less than 28 weeks who died before registration]

Cause of death, sex, and years (Sixth and Seventh Revisions—International Lists, 1948 and 1955)	Under 1 year	Under 1 week[1]	Under 1 day[1]	1-6 days[1]	7-27 days	28 days-5 months	6-11 months
	Rate per 10,000 live birtns						
All causes							
Both sexes--1961-62--	153.8	96.4	42.8	53.6	15.2	26.9	15.3
1953-54--	216.9	127.5	66.2	61.3	21.0	44.5	23.6
Male--------1961-62--	175.5	113.0	47.7	65.3	16.6	28.8	17.1
1953-54--	243.6	146.1	73.7	72.4	23.8	48.5	25.3
Female------1961-62--	131.0	79.0	37.7	41.3	13.7	24.9	13.4
1953-54--	188.4	107.8	58.2	49.6	18.6	40.2	21.3
Infective and parasitic diseases----------001-020,045-048,053,056,057,085							
Both sexes--1961-62--	0.8	0.1	0.0	0.0	0.0	0.3	0.5
1953-54--	4.3	0.1	0.1	0.0	0.1	2.2	1.8
Male--------1961-62--	0.9	0.1	0.0	0.1	-	0.3	0.5
1953-54--	4.1	0.0	-	0.0	0.2	2.1	1.9
Female------1961-62--	0.7	-	-	-	0.1	0.2	0.4
1953-54--	4.4	0.2	0.1	0.0	0.1	2.3	1.8
Influenza and pneumonia, including pneumonia of newborn----------480-493,763							
Both sexes--1961-62--	9.6	4.1	0.9	3.2	1.2	2.4	1.9
1953-54--	16.4	3.3	0.6	2.7	2.4	7.6	3.1
Male--------1961-62--	11.1	5.1	1.1	4.0	1.5	2.5	2.0
1953-54--	17.6	3.7	0.6	3.1	3.0	7.8	3.1
Female------1961-62--	8.1	3.1	0.6	2.5	1.0	2.3	1.7
1953-54--	15.1	2.9	0.6	2.3	1.7	7.3	3.2
All other diseases of respiratory system----------470-475,500-527							
Both sexes--1961-62--	1.2	0.2	0.1	0.1	0.1	0.4	0.5
1953-54--	1.8	-	-	-	0.1	1.0	0.7
Male--------1961-62--	1.7	0.2	0.2	0.1	0.1	0.7	0.7
1953-54--	1.9	-	-	-	0.2	0.9	0.9
Female------1961-62--	0.6	0.1	0.0	0.0	0.0	0.2	0.2
1953-54--	1.7	-	-	-	0.0	1.1	0.5
Gastritis, duodenitis, enteritis, and colitis, including diarrhea of newborn----------543,571,572							
Both sexes--1961-62--	1.5	0.0	-	0.0	0.1	0.4	0.8
1953-54--	1.4	-	-	-	0.1	0.7	0.5
Male--------1961-62--	2.0	0.1	-	0.1	0.2	0.5	1.2
1953-54--	1.8	-	-	-	0.2	1.0	0.6
Female------1961-62--	0.9	-	-	-	0.0	0.4	0.5
1953-54--	1.0	-	-	-	0.0	0.5	0.5
Other diseases of digestive system----------530-542,544-570,573-587							
Both sexes--1961-62--	2.1	0.9	0.4	0.5	0.4	0.5	0.3
1953-54--	3.1	1.0	0.4	0.6	0.5	1.0	0.6
Male--------1961-62--	2.4	0.9	0.4	0.5	0.6	0.6	0 3
1953-54--	3.8	1.1	0.5	0.6	0.6	1.2	0 8
Female------1961-62--	1.9	0.9	0.3	0.6	0.2	0.5	0 2
1953-54--	2.4	0.9	0.3	0.5	0.4	0.8	0 5
Congenital malformations----------750-759							
Both sexes--1961-62--	43.8	18.5	8.4	10.1	7.1	13.1	5 1
1953-54--	49.5	22.7	12.1	10.6	7.6	13.6	5 5
Male--------1961-62--	44.0	19.8	8.4	11.4	7.2	12.2	4 8
1953-54--	49.6	21.8	10.2	11.6	7.7	14.5	5 6
Female------1961-62--	43.6	17.1	8.3	8.8	7.1	14.0	5 4
1953-54--	49.3	23.7	14.1	9.7	7.6	12.7	5 3
Birth injuries and asphyxia----------760-762							
Both sexes--1961-62--	41.1	39.5	19.3	20.2	1.4	0.2	-
1953-54--	55.5	53.1	30.7	22.4	2.0	0.3	0 1
Male--------1961-62--	50.0	47.9	21.5	26.4	1.7	0.3	-
1953-54--	67.5	65.2	36.4	28.8	1.8	0.4	0.0
Female------1961-62--	31.7	30.6	17.0	13.6	1.0	0.1	-
1953-54--	42.7	40.2	24.6	15.6	2.2	0.2	0.1
Intracranial and spinal injury at birth----------760							
Both sexes--1961-62--	19.4	18.3	6.4	11.9	1.0	0.1	-
1953-54--	22.1	20.5	7.3	13.2	1.4	0.2	0.0
Male--------1961-62--	24.8	23.4	7.4	16.0	1.3	0.1	-
1953-54--	29.2	27.3	9.2	18.1	1.5	0.3	0.0
Female------1961-62--	13.7	13.0	5.4	7.6	0.7	0.0	-
1953-54--	14.6	13.1	5.3	7.8	1.3	0.1	0.0

Table 10. Infant mortality rates by cause, sex, and age: Netherlands, 1953-54 and 1961-62—Con.

[Excludes liveborn infants with gestations less than 28 weeks who died before registration]

Cause of death, sex, and years (Sixth and Seventh Revisions—International Lists, 1948 and 1955)	Under 1 year	Under 1 week[1]	Under 1 day[1]	1-6 days[1]	7-27 days	28 days-5 months	6-11 months
	Rate per 10,000 live births						
Other birth injury----------761							
Both sexes--1961-62--	9.3	9.1	6.0	3.1	0.1	0.0	-
1953-54--	22.4	22.1	16.7	5.3	0.2	0.1	-
Male--------1961-62--	11.3	11.1	6.9	4.1	0.2	0.1	-
1953-54--	25.9	25.8	19.8	6.0	0.0	0.1	-
Female------1961-62--	7.1	7.1	5.1	2.0	0.0	-	-
1953-54--	18.5	18.1	13.4	4.7	0.4	0.0	-
Postnatal asphyxia and atelectasis----------762							
Both sexes--1961-62--	12.4	12.0	6.8	5.2	0.3	0.1	-
1953-54--	11.0	10.6	6.6	4.0	0.4	0.1	0.0
Male--------1961-62--	13.8	13.5	7.2	6.3	0.2	0.1	-
1953-54--	12.4	12.1	7.3	4.7	0.3	0.0	-
Female------1961-62--	10.9	10.5	6.5	4.0	0.3	0.0	-
1953-54--	9.6	9.0	5.9	3.1	0.5	0.1	0.0
Other infections of newborn----------765-768							
Both sexes--1961-62--	1.6	0.7	0.1	0.6	0.8	0.1	-
1953-54--	1.6	0.5	0.1	0.5	0.7	0.4	-
Male--------1961-62--	1.9	0.8	0.0	0.7	1.0	0.2	-
1953-54--	2.0	0.6	-	0.6	1.0	0.4	-
Female------1961-62--	1.2	0.6	0.1	0.5	0.6	0.0	-
1953-54--	1.2	0.5	0.1	0.3	0.5	0.3	-
Neonatal disorders arising from certain diseases of mother during pregnancy----------769							
Both sexes--1961-62--	4.1	3.8	1.9	1.8	0.2	0.1	0.0
1953-54--	3.5	3.2	1.8	1.4	0.1	0.1	0.1
Male--------1961-62--	4.8	4.5	2.5	2.1	0.1	0.2	-
1953-54--	3.3	3.2	1.9	1.3	0.0	0.0	-
Female------1961-62--	3.3	3.0	1.4	1.5	0.2	0.1	0.0
1953-54--	3.7	3.3	1.8	1.5	0.1	0.1	0.1
Hemolytic diseases of newborn (erythroblastosis)----------770							
Both sexes--1961-62--	3.9	3.6	2.0	1.6	0.2	0.1	0.1
1953-54--	6.8	5.5	2.5	3.0	0.8	0.1	0.3
Male--------1961-62--	4.6	4.1	2.1	2.0	0.3	0.0	0.1
1953-54--	8.6	6.9	3.0	4.0	1.2	0.2	0.3
Female------1961-62--	3.2	3.0	1.8	1.2	0.1	0.1	-
1953-54--	4.8	4.0	2.0	2.0	0.5	0.0	0.2
Other diseases peculiar to early infancy----771-774							
Both sexes--1961-62--	8.0	5.2	1.7	3.5	0.7	1.3	0.7
1953-54--	17.9	11.6	4.4	7.2	1.9	3.5	0.9
Male--------1961-62--	9.4	6.1	2.0	4.2	0.8	1.7	0.9
1953-54--	20.7	13.3	5.3	8.0	2.2	4.3	0.9
Female------1961-62--	6.5	4.3	1.4	2.9	0.7	1.0	0.5
1953-54--	14.9	9.8	3.5	6.3	1.6	2.7	0.8
Immaturity, unqualified----------776							
Both sexes--1961-62--	17.5	16.3	6.7	9.6	1.1	0.2	-
1953-54--	22.8	20.5	10.8	9.7	1.7	0.4	0.1
Male--------1961-62--	20.3	19.0	8.0	11.0	1.1	0.2	-
1953-54--	26.1	23.6	12.8	10.8	2.1	0.3	-
Female------1961-62--	14.6	13.5	5.3	8.2	1.0	0.1	-
1953-54--	19.3	17.2	8.7	8.5	1.4	0.5	0.1
Accidents----------E800-E962							
Both sexes--1961-62--	4.0	0.1	0.0	0.1	0.2	2.0	1.6
1953-54--	5.7	0.2	0.1	0.2	0.3	2.9	2.3
Male--------1961-62--	4.6	0.1	-	0.1	0.1	2.3	2.1
1953-54--	6.4	0.3	0.1	0.3	0.3	3.1	2.7
Female------1961-62--	3.2	0.2	0.0	0.1	0.2	1.7	1.1
1953-54--	4.9	0.1	0.0	0.1	0.3	2.6	1.9
All other causes----------Residual							
Both sexes--1961-62--	14.6	3.4	1.4	2.0	1.7	5.7	3.8
1953-54--	26.6	5.6	2.7	2.9	2.8	10.7	7.6
Male--------1961-62--	17.8	4.2	1.5	2.7	2.0	7.2	4.4
1953-54--	30.1	6.2	3.0	3.2	3.3	12.2	8.4
Female------1961-62--	11.3	2.7	1.3	1.4	1.4	4.0	3.2
1953-54--	22.9	4.9	2.3	2.6	2.2	9.0	6.7

[1]Based on calendar days since birth.

Table 11. Perinatal, stillbirth, and infant mortality rates for legitimate births, by age and father's occupation: Netherlands, selected years, 1952-62

[Excludes liveborn infants with gestations less than 28 weeks who died before registration]

Class and occupation of father	Perinatal[1]	Stillbirth	Under 1 year		Under 1 week[1]		1-51 weeks	
	1961		1961-1962	1952-1954	1961-1962	1952-1954	1961-1962	1952-1954
	Rate per 1,000 legitimate births		Rate per 1,000 legitimate live births					
Total	24.3	14.8	15.2	21.6	9.6	12.6	5.6	9.0
I. Professional and clerical	17.9	10.0	12.4	17.7	7.9	11.1	4.5	7.0
II. Managers and proprietors	21.8	13.4	14.5	19.9	8.8	11.9	5.7	8.1
III. Farmers and farm managers	26.7	16.9	15.7	23.5	10.4	14.5	5.3	8.3
IV. Farm laborers	30.5	19.9	16.9	22.7	10.9	13.9	6.0	8.9
V. Other laborers	28.1	17.6	16.9	23.4	10.5	13.3	6.4	10.2

[1]Based on calendar days since birth.

Table 12. Stillbirth, perinatal, and infant mortality rates, by size of municipality: Netherlands, 1950-52 and 1960-62

[Includes liveborn infants with gestations less than 28 weeks who died before registration]

Size of municipality	Stillbirth		Perinatal[1]		Infant mortality					
					Under 1 year		Under 1 week[1]		1-51 weeks	
	1960-1962	1950-1952	1960-1962	1950-1952	1960-1962	1950-1952	1960-1962	1950-1952	1960-1962	1950-1952
	Rate per 1,000 births				Rate per 1,000 live births					
Total	14.8	18.6	26.1	33.2	17.3	25.7	11.5	15.0	5.8	10.7
500,000-899,999	14.1	17.2	25.7	31.4	17.0	23.9	11.8	14.4	5.2	9.5
Amsterdam	14.5	17.6	26.9	31.8	17.7	24.9	12.6	14.5	5.1	10.4
Rotterdam	14.8	17.5	25.2	31.7	15.9	24.3	10.6	14.5	5.3	9.8
The Hague	12.8	16.3	24.7	30.3	17.5	22.1	12.1	14.2	5.4	7.9
20,000-259,999	14.5	17.8	25.5	32.0	17.2	25.1	11.1	14.5	6.1	10.6
100,000-259,999	14.6	17.6	25.6	32.0	17.1	25.1	11.2	14.6	5.9	10.5
50,000-99,999	13.9	17.0	25.2	31.6	17.4	25.6	11.4	14.8	6.0	10.8
20,000-49,999	14.8	18.4	25.6	32.3	17.1	24.9	10.9	14.2	6.2	10.7
Under 20,000	15.3	19.6	26.8	34.8	17.5	26.6	11.7	15.5	5.8	11.1
5,000-19,999	15.2	19.5	26.6	34.5	17.4	26.4	11.6	15.3	5.8	11.1
Under 5,000	15.5	19.8	27.2	35.3	17.8	27.0	11.9	15.9	5.9	11.1

[1]Based on calendar days since birth.

[Ed. note: There are no municipalities in the Netherlands with population between 260,000 and 600,000]

Table 13. Maternal mortality rates by age: selected countries, 1959-60

Age of mother	Sweden	United States	England and Wales	Netherlands
	Rate per 10,000 live births			
Total (adjusted)[1]	3.7	4.8	4.6	4.5
Total	3.0	3.7	3.9	4.5
Under 20 years	2.6	2.5	2.3	0.7
20-24 years	0.8	2.1	2.1	2.0
25-29 years	2.0	3.0	3.4	2.3
30-34 years	4.0	5.0	4.5	3.6
35-39 years	6.0	9.0	8.4	8.8
40-44 years	19.1	14.6	13.6	21.6

[1]Adjusted by the direct method using the live-birth distribution by age of mother, Netherlands, 1959-60.

SOURCE: World Health Organization, Epidemiological and Vital Statistics Reports, Vol. 16, No. 11, p. 642, 1963.

APPENDIX I

GENERAL DEMOGRAPHIC, SOCIOECONOMIC, AND SOCIOHYGIENIC TRENDS

The Netherlands, situated on the lower course of the Rhine and Meuse Rivers, has an area of nearly 34,000 square kilometers (about 13,000 square miles), of which one-fourth is below sea level. About 70 percent of the country is used for agriculture. A fourth of the area consists of built-up sections, uncultivated land, roads, railways, etc. Inland waters account for about 7 percent of the surface. The present density of the population varies from province to province, ranging from 125 to 1,000 per square kilometer, with an average of 365.

Population

Growth.—Figure I gives a bird's-eye view of a century of birth rates and death rates, the major components of population growth. Between 1860 and 1880 the birth rate was about 35 and the mortality 25 per 1,000. Since 1880, both the birth and the death rates have decreased gradually. The birth rate reached 30 per 1,000 in 1907, 25 in 1918, and 20 in 1935, the lowest ever registered in the Netherlands. After reaching a postwar peak of 30 per 1,000, the birth rate fell to nearly 23 in 1950 and to nearly 21 in 1964, varying by size of municipality, social class, and religious denomination.

The birth rate has been decreasing in all groups of municipalities, whatever their size. Family planning has reached the cities, towns, and villages, but until 1965 was not promoted—and may be hindered—by the Government. Since 1965, official policy is in favor of family planning. Since 1950, the birth rate in the three largest cities decreased from 18 to 16.5 per 1,000 population, in the towns of 20,000 to 250,000 inhabitants from 22 to 20.5, and in the municipalities under 20,000 from 24.5 to 23 per 1,000. The reductions have not changed the inverse relation between the birth rate and size of municipality.

The birth rate is highest in the Roman Catholic and Calvinist segments of the population (23-24 per 1,000), followed by the nonreligious groups (19.5) and the Protestants (18 per 1,000). Catholics comprise 40 percent of the population, Protestants nearly 40 percent (half of whom are Calvinists), and the nonreligious groups nearly 20 percent. While the birth rate is in general inversely proportional to income level, religious denomination appears to exert the strongest influence on marital fertility.

The crude death rate was about 20 per 1,000 population in 1890, 15 in 1905, and 10 in 1925; it rose to a

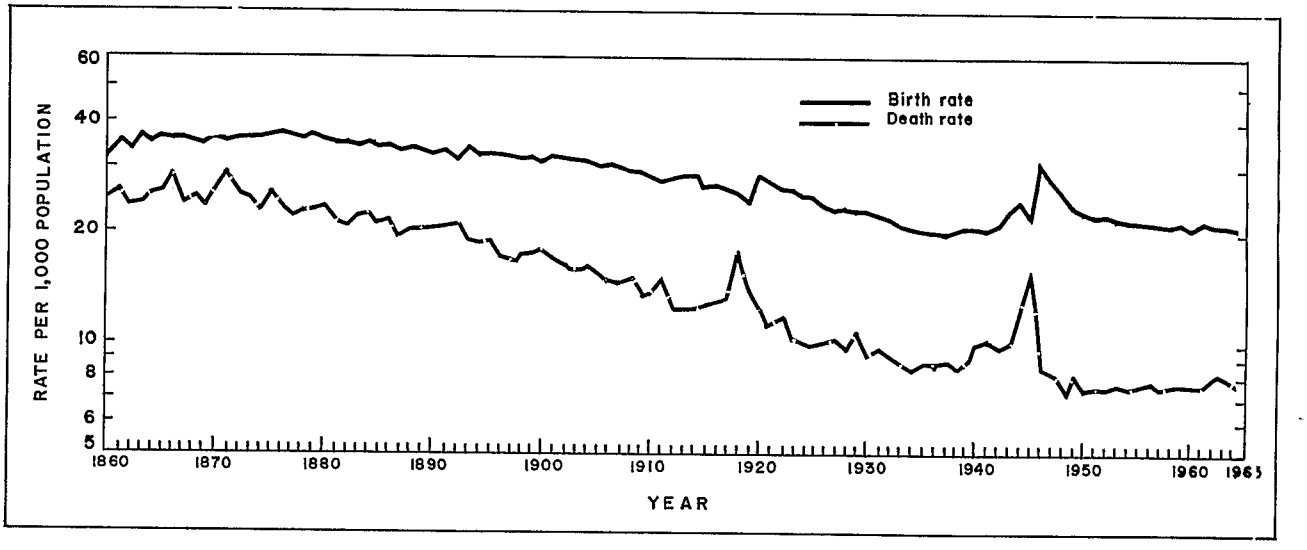

Figure I. birth and death rates: Netherlands, 1860-1964.

peak of 15 per 1,000 before the end of World War II, but by 1950 was 7.5, the lowest ever recorded. During the fifties the crude death rate remained stable. When adjusted for changes in the age composition of the population, the rate shows a downward trend, dipping to below 6 per 1,000 in recent years.

The natural increase was 10 per 1,000 population before 1880, 15 from 1900 until 1930, but decreased to 12 per 1,000 during the economic crisis and prewar years 1930-40.

Population growth was about the same as natural increase between 1920 and 1940. In the first years after World War II, population growth was smaller than natural increase, because of emigration. Since 1955, however, population growth has been the greater, as immigration (chiefly from Indonesia) has exceeded emigration.

The fertility rate per 1,000 women at ages 15-44 decreased from 145 at the turn of the century to less than 90 just before World War II, and more recently increased to about 100. Both the fertility rate and the birth rate decreased until 1940 but reversed that trend in the following decade; in the past 10 years, however, both rates have decreased slightly.

Since 1910 the population has doubled—from 6 to 12 million.

Age and sex.—In 1900, 35 percent of the population was under 15 years of age, and from 1930 to the present the proportion has been about 30 percent, with a slight decrease since 1960. The age group 15-54 years has comprised somewhat over half the population since 1900. The proportion at ages 55 and over is increasing as rapidly as that under 15 is decreasing. This shift is due mainly to the long-term reduction in the birth rate, from 32 per 1,000 in 1900 to below 20 in 1965 and 1966.

From a pediatric and educational point of view, it is noteworthy that the so-called aging of the population results in an increasing number of children having grandparents until reaching school-age or later. Two generations ago, hardly half of the population could expect to reach age 65; according to current mortality, 75 percent of the males and 85 percent of the females live to that age.

Table I shows the sex and age distribution of the population for the census years 1920 and 1960. Around 1920 the number of males exceeded the females until age 20, and in 1960 until age 30. No change, however, has occurred in the sex ratio of the population at ages

Table I. Percentage distribution of population by age and sex, and sex ratios: Netherlands, 1920 and 1960

Age	1960 census				1920 census			
	Both sexes	Male	Female	Males per 1,000 females	Both sexes	Male	Female	Males per 1,000 females
	Percentage distribution				Percentage distribution			
All ages	100.0	100.0	100.0	992	100.0	100.0	100.0	987
Under 15 years	30.7	31.6	29.8	1,050	32.6	33.3	32.0	1,030
Under 1 year	2.2	2.3	2.2	1,049	2.7	2.7	2.6	1,046
1-4 years	8.6	8.9	8.4	1,049	8.7	8.9	8.4	1,036
5-9 years	9.6	9.9	9.3	1,054	10.8	11.1	10.6	1,028
10-14 years	10.2	10.5	9.9	1,049	10.4	10.6	10.3	1,024
15-19 years	7.9	8.1	7.7	1,043	9.8	10.0	9.6	1,020
20-24 years	6.9	7.1	6.8	1,034	8.7	8.7	8.7	990
25-29 years	6.7	6.8	6.6	1,019	7.8	7.7	7.8	969
30-34 years	6.6	6.5	6.6	987	6.9	6.8	7.0	964
35-44 years	12.4	12.3	12.6	967	12.1	12.0	12.3	965
45-64 years	20.1	19.5	20.7	931	16.1	15.9	16.3	958
65 years and over	8.7	8.1	9.2	879	5.9	5.6	6.3	881

Table II. Crude and adjusted death rates, by sex, and index numbers for crude and adjusted rates, by sex: Netherlands, selected years, 1938-63

Year	Crude rates			Adjusted rates[1]			Index for crude rates			Index for adjusted rates		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
	Rate per 1,000 population						1938-39=100					
1963-----	8.0	8.9	7.1	5.9	6.8	5.0	93	102	84	70	80	61
1961-----	7.6	8.3	6.9	5.7	6.5	5.0	88	95	81	68	76	60
1959-----	7.6	8.3	6.9	5.9	6.5	5.2	88	94	82	70	77	63
1939-----	8.6	8.8	8.5	8.4	8.5	8.2	100	100	100	100	100	100
1938-----	8.5	8.7	8.4	8.4	8.5	8.2						

[1]Adjusted to age distribution of the population in 1936 using the direct method.

SOURCE: Adapted from Central Bureau of Statistics, Pocket Year Book, 1964.

65 and over. The deficit in women of marriageable age is not as pronounced as would appear from the table, inasmuch as girls generally marry men older than themselves.

Infants constituted slightly over 2.5 percent of the population in 1920, but a somewhat lower proportion in 1960, for both boys and girls. The percentage of preschool children (1-4 years) has remained at nearly 9 percent for boys and about 8.5 for girls.

Mortality

Crude and adjusted rates.—Since the turn of the century, the crude death rates for males have been halved and for females more than halved, thus widening the sex difference in mortality. Valid comparisons of mortality rates for various time periods or between countries require that the rates be adjusted for differences in the age distribution of the populations. Table II shows crude and adjusted rates since 1938, as given by the Central Bureau of Statistics. Compared with prewar rates, mortality for males has decreased 20 percent and for females about 40 percent. The widening sex difference in mortality results largely from the increasing death rates from various causes among men at the older ages while those for older women continue to fall.

Sex and age.—Mortality rates for men and women in all age groups decreased until 1950. During the past half century, a radical shift has taken place in the percent distribution of deaths by age. In 1911-12, from 35 to 40 percent of the total mortality occurred under age 20, compared with 6-8 percent in recent years. The most dramatic change in the mortality pattern has been the reduction in death rates among infants and preschool children. Infant mortality was responsible for 20-25 percent of the total mortality 50 years ago, compared with less than 5 percent in recent years; mortality among preschool children has fallen from 9 to little more than 1 percent of the total. In the census year 1920, infant deaths were five or six times the proportion they constituted of the population; in 1960, the ratio was 2 to 1.

Major causes of death.—The radical change in mortality patterns reflects the drastic fall in mortality for a number of the major causes at the younger age groups. As causes of death among children, diseases of the respiratory system diminished from giants to dwarfs, while the common infectious diseases, tuberculosis, and diseases of the gastrointestinal system have practically disappeared as causes of mortality.

Changes in the percent distribution of deaths by cause at the ages under 20 are shown in table III. The death rates for accidents, congenital malformations, and neoplasms did not decrease and therefore became *relatively* more important. Currently, congenital malformations are as dominant in infant mortality as respiratory and digestive diseases were in the past. Violence—almost entirely accidents—has become the major cause of death in this age range.

Life expectancy.—During the last half century, the decrease in mortality at all age groups, particularly in childhood, has greatly increased the expectation of life at birth. As table IV shows, the life expectancy for males increased from 51.0 years in 1900-1909 to 71.4 years in 1956-60, a gain of 20.4 years; for females, it rose from 53.4 to 74.8 years, or 21.4 years. In the late fifties, the expectation of life at birth for males increased slightly but remained constant at all subsequent ages. In the sixties, expectation of life is decreasing for males

Table III. Percentage distribution of deaths among persons under 20 years of age, by age and cause: Netherlands, selected years, 1921-63

Cause of death (Seventh Revision—International Lists, 1955)	Under 1 year			1-4 years		
	1961-1963	1951-1953[1]	1921-1923[1]	1961-1963	1951-1953[1]	1921-1923[1]
	Percentage distribution					
All causes	100.0	100.0	100.0	100.0	100.0	100.0
Tuberculosis, all forms---001-019	0.0	0.2	2.5	0.2	2.8	12.3
All other infective and parasitic diseases---020-138	0.9	3.2	7.1	4.2	18.4	18.8
Neoplasms---140-239	0.7	0.5	0.1	11.3	8.3	0.9
Diabetes mellitus---260	0.0	-	0.0	0.2	0.0	0.1
Diseases of the blood and blood-forming organs---290-299	0.1	0.1	0.2	0.5	0.5	0.3
Diseases of the nervous system and sense organs---330-398	2.9	2.0	2.3	9.2	6.2	5.3
Diseases of the circulatory system---400-468	0.3	0.2	0.3	0.9	1.4	0.7
Diseases of the respiratory system---470-527	3.4	9.0	22.4	10.2	13.5	34.7
Diseases of the digestive system---530-587	2.2	4.4	20.5	5.8	4.1	6.3
Diseases of the genitourinary system---590-637	0.1	0.1	0.4	0.8	0.8	0.9
Deliveries and complications of pregnancy, childbirth, and the puerperium---640-689	...	...	...	...	...	...
Congenital malformations---750-759	27.4	21.4	3.7	16.0	9.7	0.8
Symptoms, senility, and ill-defined conditions---780-795	3.6	6.6	20.7	3.1	5.8	9.4
All other diseases---250-254,270-289,300-326,700-749,760-776	55.8	50.0	19.3	2.7	3.5	2.0
Accidents, poisonings, and violence---E800-E999	2.6	2.3	0.5	35.0	25.0	7.5

Cause of death (Seventh Revision—International Lists, 1955)	5-14 years			15-19 years		
	1961-1963	1951-1953[1]	1921-1923[1]	1961-1963	1951-1953[1]	1921-1923[1]
	Percentage distribution					
All causes	100.0	100.0	100.0	100.0	100.0	100.0
Tuberculosis, all forms---001-019	-	3.3	29.9	0.5	6.9	55.3
All other infective and parasitic diseases---020-138	2.8	12.1	12.7	1.2	3.3	5.6
Neoplasms---140-239	17.6	12.4	2.4	17.4	14.4	2.4
Diabetes mellitus---260	0.4	0.4	0.9	0.4	1.0	1.3
Diseases of the blood and blood-forming organs---290-299	0.5	0.8	0.5	0.6	0.9	0.4
Diseases of the nervous system and sense organs---330-398	9.3	7.1	10.0	8.0	8.2	5.6
Diseases of the circulatory system---400-468	1.8	4.7	6.0	3.3	6.4	5.4
Diseases of the respiratory system---470-527	3.6	6.0	10.1	3.0	6.8	5.0
Diseases of the digestive system---530-587	3.6	3.9	7.2	2.4	5.8	4.4
Diseases of the genitourinary system---590-637	1.7	2.0	3.2	2.8	3.3	2.2
Deliveries and complications of pregnancy, childbirth, and the puerperium---640-689	-	-	-	0.2	0.5	0.4
Congenital malformations---750-759	9.6	5.1	0.6	5.9	4.1	0.4
Symptoms, senility, and ill-defined conditions---780-795	2.6	2.8	2.9	5.2	5.0	1.8
All other diseases---250-254,270-289,300-326,700-749,760-776	4.0	3.6	2.4	3.6	3.8	1.4
Accidents, poisonings, and violence---E800-E999	42.3	35.8	11.2	45.6	29.6	8.5

[1]1921-23 and 1951-53 deaths adapted to the Seventh Revision.

Table IV. Expectation of life at specified ages, by sex: Netherlands, 1890-1940 and 1947-65

Period	Male		Female	
	At birth	At 1 year of age	At birth	At 1 year of age
	Average number of years of life remaining			
1961-65----	71.1	71.4	75.9	75.9
1956-60----	71.4	71.8	74.8	75.0
1953-55----	71.0	71.8	73.9	74.3
1950-52----	70.6	71.6	72.9	73.5
1947-49----	69.4	70.8	71.5	72.4
1931-40----	65.7	67.8	67.2	68.6
1921-30----	61.9	65.3	63.5	65.8
1910-20----	55.1	60.3	57.1	61.1
1900-1909--	51.0	58.2	53.4	59.5
1890-99----	46.2	54.8	49.0	56.2

SOURCE: Central Bureau of Statistics, Pocket Year Books.

at all ages, but still increasing for women. Infant mortality was so high at the beginning of the century that the expectation of life at birth was 8 years less than that at age 1. Since 1950, this differential has diminished to less than 1 year.

Socioeconomic Development

At the beginning of this century, social security hardly existed. Unemployment and sickness created poverty. Housing for the working class was cramped and primitive. A normal working day was more than 10 hours. Wages were low; old-age pensions had not yet been dreamed of. During World War I, food shortages led to rationing. The twenties brought some prosperity, but the economic crisis of the thirties again brought widespread unemployment and misery.

Since World War II, Holland has become one of the so-called welfare states of western Europe: a certain level of social security for the great masses, relatively little unemployment, moderate wages increasing with the standard of living, no poverty as a social evil, no serious alcoholism and, last but not least, an average diet of reasonable quality and quantity.

In 1950 there was one car for every 73 inhabitants; in 1956 one in 27, and in 1964 one in 7. Motor-assisted pedal cycles (mopeds) more and more replace traditional bicycles. A network of roads and railroads covers the country.

Urbanization.—The rapid population growth in the densely inhabited Netherlands goes hand in hand with an increase in urbanization, and the Netherlands is one of the most urbanized countries in Europe. Although no city in Holland has as many as 1 million residents, the cities in the western part of the country, which together shelter 4 million people, run into each other.

In 1900, one-third of the population lived in municipalities of less than 5,000 inhabitants, but the proportion decreased to one-fifth in 1939, and to only one-eighth in 1963 (table V). In municipalities of 5,000-19,999, the proportion has remained constant at 30 percent, and in municipalities of 20,000-99,999 it has been steadily increasing.

On the other hand, in 1900 less than one-fourth of the population lived in cities of more than 100,000 inhabitants, and this proportion increased to one-third in 1960. Among municipalities, only the group of municipalities of 20,000-99,999 inhabitants has increased its share of the total population since 1950; the shortage of housing in the big cities forces people to live in neighboring towns.

In the largest cities, births are somewhat fewer than would be expected on the basis of their population, but in municipalities of under 20,000 inhabitants, the birth rate is somewhat higher than average.

Not less important than the changing distribution of the population by size of municipality has been the postwar tendency of villages and small towns to adopt an urbanized way of life. Holland is a small country. The longest distance from north to south is 300 kilometers (about 190 miles), and from east to west 150 kilometers (about 95 miles). It is becoming more and more densely populated:

1900------	150/sq. km.	390/sq. mi.
1920------	210/sq. km.	540/sq. mi.
1960------	350/sq. km.	910/sq. mi.

Because of restricted area and increasing density, the distinctions between rural and urban areas, and especially between the rural and urban way of life, diminish year by year.

Occupation.—Table VI gives the percent distribution of the working population by occupation and sex in the census years 1947 and 1960.

Between these censuses, the proportion of the working population which was self-employed decreased as employees increased. The biggest shift occurred in agriculture; the proportion so engaged dropped from 19 to 11 percent of the working population, the reduction being much more marked for females than for males. Workers in domestic service decreased while workers in industry increased. The relative number working in public utilities, trade and finance, transport and other services, and in construction rose. Only 1.5 percent of the workers are in mining.

The proportion of women in the working population decreased slightly between 1947 and 1960—from 24 to

Table V. Percentage distribution of births and population, by size of municipality: Netherlands, selected years, 1909-63

Item	Total	500,000 or more	250,000-499,999	100,000-249,999	20,000-99,999	5,000-19,999	Under 5,000
	Percentage distribution						
1963							
Births	100	15	2	10	28	32	13
Population	100	18	2	11	28	29	12
1960							
Births	100	15	2	10	28	32	13
Population	100	19	2	11	27	29	12
1955							
Births	100	16	-	10	26	32	16
Population	100	20	-	11	26	29	14
1950							
Births	100	17	-	11	25	31	16
Population	100	21	-	11	25	29	14
1939							
Births	100	13	4	4	23	33	23
Population	100	16	6	5	22	31	20
1930							
Births	100	14	4	2	22	31	27
Population	100	17	6	5	21	30	21
1920							
Births	100	15	4	2	16	33	30
Population	100	17	5	2	22	29	25
1909							
Births	100	8	12	2	13	31	34
Population	100	10	12	2	17	30	29

NOTE: 1909-30 populations are census data; 1939-63 populations are estimated.

SOURCES: Adapted from Central Bureau of Statistics, Statistiek van de loop der bevolking van Nederland (Vital statistics and migration statistics of the Netherlands), 1900-1940; and Vital and health statistics, migration and age distribution, 1940-63.

22 percent of the total. In 1947, nearly one-fourth of the agricultural workers were women; in 1960, only 10 percent. In industry, the proportion has remained constant (16 percent), consisting mainly of girls under 25 years of age. The numbers of women (including the married) in governmental, educational, and social services are increasing considerably, while those in domestic work and agriculture are diminishing.

About 7 percent of married women work, and of these only about one out of every four has at least one child under age 6. Only a negligible proportion of married women with infants work. With reference to child rearing, it is important to know that married women, especially mothers of young children, seldom work—even part time—even though they can easily get jobs. Day nurseries for infants are scarce and are utilized mainly by children of unmarried mothers.

Education.—Primary school education has been compulsory since 1900. Education beyond this level may be used as an indirect yardstick of social conditions in a country. The proportion attending postprimary schools has nearly doubled since 1947. Since 1960, 80 percent

Table VI. Percentage distribution of employed population, by occupation and sex: Netherlands, 1947 and 1960

Occupation (International Standard Industrial Classification)	Both sexes		Male		Female	
	1960	1947	1960	1947	1960	1947
	Percentage distribution					
Total	100	100	100	100	100	100
Agriculture (including fishing)	11	19	13	19	4	18
Mining	2	1	2	2	-	-
Manufacturing and industry	30	25	32	28	22	17
Construction	10	8	12	10	1	-
Public utilities	1	1	1	1	-	-
Trade and finance	16	14	14	12	24	18
Transport, storage, and communication	7	6	8	8	2	2
Other services	19	16	15	13	34	24
Domestic services	3	5	-	-	12	19
Residual[1]	2	5	3	6	-	1

[1]Mostly military.

SOURCE: Adapted from Central Bureau of Statistics, Pocket Year Book, 1964.

of the boys and the girls at age 14 received such schooling; at age 16, the proportions are 60 and 30 percent, respectively, and at age 18 they are 30 and 10 percent. Male adolescents attend secondary and vocational schools, and females mostly schools for home economics. More than 6 percent of the boys and 1.5 percent of the girls enter a university. Government expenditures on education increased from 1.6 percent of the national income in 1900 to 3.7 percent in 1940 and 6 percent in 1960.

Practically all adolescents not attending school have jobs in factories, offices, public services, or agriculture. Most of the older girls are trained in household work in their own homes and have some experience in handling babies. District nurses have for a long time been giving special courses for expectant mothers, preparing them for motherhood and baby care. About 10 percent of the girls entering the labor force choose professions like nursing, home help service, nursery teaching, etc., thus becoming better prepared to take care of children than are their contemporaries.

Housing.—In our welfare state, housing is a major social problem. Less than half of the families enjoy decent housing, nearly half have only moderately good housing, and 5-10 percent live in bad housing. One-fourth of all families live with other individuals or families. Young couples are the hardest hit by the housing shortage.

One-fourth of all families have no children at home. Of the families with children, nearly two-thirds have one or two children, nearly one-third have three to five children, and 7 percent, six or more. A separate room for the infant is the exception.

The greatest part of the population lives in houses where such necessary conveniences as central heating, a bathroom, telephone, and elevator are the exception rather than the rule. Of modern household appliances, only the vacuum cleaner and the washing machine are in general use in working-class families. Nearly all families, however, have radio and television. Almost every house has electricity and running water, but running hot water is still relatively uncommon in both homes and schools. The fluoridation of drinking water has increased in recent years. Toilets are lacking in some rural areas and satisfactory sewage systems are not yet available everywhere.

Social legislation.—The first social legislation was the Child Labor Act of 1874, which was followed by a law on compulsory primary education in 1900. Primary education has been completely free of charge since 1956.

In 1903 a law provided that workers injured by an accident during the working hours were entitled to benefits. The Sickness Benefit Act of 1913 guranteed benefits during illness of 80 percent of the wages; the benefit period was gradually increased to 1 year. The Labor Act of 1919 provided regulations to protect men and women working in industry. The Health Insurance Act of 1941 made health insurance compulsory for those with incomes under a certain level. Old-age pensions (in 1957) and pensions for widows and orphans (in 1959) became legal rights, while all workers were required

to pay premiums until age 65. It should be noted that premiums are paid for most of the social benefits.

Officially, social security "from the cradle to the grave" has been achieved, but in practice there is still much to be desired: better housing, higher pensions, democratization of the educational system, etc.

Health insurance.—As early as the second half of the 19th century, private (nonprofit) sickfund associations were founded for poor people. These organizations increased in number, so that at the outbreak of World War II half of the population were members. Indigent people received free medical care by doctors appointed on a part-time basis for that purpose by the municipalities.

General regulations concerning health insurance came into force in 1940-41. This legislation, requiring compulsory medical insurance for wage-earners with earnings below the so-called prosperity level, provided workers and their families the legal right of medical care (family doctor, hospitalization, medicines, etc.). The prosperity level has risen with the cost of living from 4,500 florins a year in 1950 to 7,000 in 1957 and to 10,000 in 1965. The premium is set by the Government as a percentage of salary (at present 5 percent), employer and employee each paying half.

This program differs from the British National Health Service in two respects: doctors are not paid by the State, but by the sickfund; and people having a salary above the so-called prosperity level (one-fourth of the population) are not automatically insured.

General Medical Care

For more than a century, doctors have been distributed throughout the country, even in the more remote areas. The family doctor is still the key person in the system of general medical care services. The basis of this system is compulsory health insurance, which includes complete curative and obstetrical care: family doctor, midwife, specialist, medicines, hospitalization, sanatorium care, and ambulance services. However, nursing care at home is not provided.

Private, nonprofit sickfund associations are the administrative link between doctors and patients. Practically all doctors are attached to the sickfunds, which cover about 70 percent of the population. The family doctor is paid a per capita fee a year—which increases with the cost of living—for all insured people on his roll, irrespective of the amount or type of care given the family. The family may choose its own doctor, but there is no financial relation between the doctor and his sickfund patient. The members of the sickfund are not free to go to a specialist or to a hospital, but must be referred by the family doctor.

The annual cost of health insurance per person was increased from 38 florins in 1951 to 100 in 1962 (about $28). During that period, hospital care accounted for one-third of the total cost, fees to the family doctor and the specialist for about 30 percent of the total, and medicines for about 15 percent. Obstetrical care took only 1 percent of the costs, maternity benefits being low—only 55 florins (about $15) per birth. The more well-to-do patients, for the most part, have individual health insurance coverage.

Preventive care is not given by the sickfunds, but is provided by voluntary organizations to infants and toddlers, by municipal school health services to the school population, and by factory health services to workers in industry. These services are practically free of charge.

The total cost of health care—whether paid by the Government, sickfunds, private organizations, or patient—amounted to 3.6 percent of the national income in 1953 and to 4.4 percent of the total in 1959. The entire sum paid for medical care is not much greater than the amount spent for smoking.

In 1950, there was one doctor for every 1,100 inhabitants; in 1962, one for every 900. The number of inhabitants per doctor varies inversely with the size of municipality, ranging from one doctor for every 2,000 population in villages to one for 600 in the larger cities. The proportion of general practitioners is decreasing while that of specialists is rising. In 1950, 41 percent of the physicians were family doctors and 26 percent specialists; in 1963, the proportions were 34 and 33 percent, respectively. This trend will undoubtedly continue in the near future. The number of inhabitants per family doctor decreased from approximately 3,000 in 1950 to 2,600 at present.

There is currently a shortage of doctors in the clinical, preventive, and research fields. Dentists are in very short supply, only one for every 5,000 population. The shortage of nurses has decreased after revision of the salary scale, but the problem is far from solved.

In 1949, hospital beds numbered slightly more than 4 per 1,000 inhabitants and since then have increased to nearly 5 per 1,000. For children under age 15, there are 3.5 beds per 1,000, and for adults 5.3 per 1,000. Eleven beds per 1,000 live births are available for infants, apart from bassinets for the newborn. Most hospitals are privately owned by religious groups. The total number of hospitals has increased only slightly in the past decade, but the number of beds has grown. About 40 percent of the hospitals have less than 100 beds, and nearly 50 percent, between 100 and 375. Nearly all the hospitals have a children's department; five cities have a children's hospital.

Preventive Care

As already noted, neither the sickfunds before 1940 nor the compulsory health insurance program inaugurated at the beginning of World War II provided preventive care or nursing at home. To fill this gap, voluntary organizations—so-called cross societies—have been founded since the turn of the century.

Cross societies.—The main activity of these societies (which have no relation to the Red Cross) has been to provide the services of district nurses, who have a double task: to give basic nursing care to seriously ill patients at home and to teach the families fundamental health practices. Health education thus was given before it became known as such and was concentrated on general hygiene, infant care, and aftercare of tuberculosis patients.

District nurses are of two types: the "general duty" nurse of cross societies in rural areas, and special nurses for infant care provided by voluntary organizations in larger cities. From the beginning, both types assisted in infant welfare centers. For 60 years, families have gladly accepted district nurses as home visitors. For more than two generations they have done nonspectacular but important work and, until recently, under difficult conditions.

No exact information is available on the number of district nurses before 1940. It appears that in 1920 there was one district nurse for every 10,000 inhabitants. By 1940 the ratio was one nurse for every 6,000, in 1957 one for 4,500, and more recently one for 3,000. The number of patients, particularly children, visited by the nurses decreased, but the field of activities has been widened and has come to include care of the aged and aftercare of patients with chronic diseases and mental disturbances.

Before World War II, the local premises of the cross societies were extremely simple, and the hundreds of new centers built since 1950 are still far from luxurious. Usually, the nurse has her living quarters over the center. Years ago, she used to live in rented rooms, but always in the community and in close contact with her "patients." The three main cross societies have the same policy, but are divided according to religion as are hospitals, schools, trade unions, etc.

Care of the older child.—Before World War II, not much special attention was given the preschool child. This did not prevent mortality among preschool children from decreasing more rapidly than infant mortality. In the 1930's, cross societies organized welfare centers for preschool children in the same way that they did infant welfare centers, but it was not until after 1950 that a reasonable number were available. Moreover, the activities of the district nurse have increasingly been directed to the preschool child.

School health services which were begun at the end of the 19th century have grown to cover the entire country. Nearly all school health officers are employed full time. The pioneer work in school health services, which included health education of the family, has probably indirectly influenced infant care. School health services are organized by municipalities and are state-endowed, just as welfare centers for infants and preschool are organized by cross societies, which are voluntary agencies subsidized by the Government.

In the past, school health services supervised primary school pupils and, since 1945, also all nursery school pupils. In the past decade, an increasing number of postprimary school students have been supervised. University health services have come into operation since World War II. Although a continuity of care from conception to young adulthood is not yet assured, each child receives more or less comprehensive care in the various stages of his development. A longitudinal followup tracing the development of the child is still far from having been reached, but is advocated by the Department of Health Development of the Netherlands Institute for Preventive Medicine.

Nutrition.—The vicious circle of malnutrition leading to lack of resistance against illness, infectious diseases, and infants succumbing to these diseases has been broken, at least in industrialized countries. No single factor has improved the health of the infant more than the adequate nutrition of mother and child.

Nutrition of the great mass of people was poor in the 19th century, and its improvement is one of the major achievements of the 20th century. Few scientific data are available. However, local surveys at the beginning of this century indicated that the average daily intake per capita was about 2,500 calories, including less than 70 grams of protein and 50 grams of fat. National data on the intake of nutrients and calories are available since 1936 and are shown in table VII. Before World War II, the average per capita intake daily was 80 grams of protein and 100 grams of fat. Soon after the war, fat consumption was lower than it had been just prior to the war, but the protein intake reached the prewar level, almost equally divided between animal and vegetable protein. Since 1948, fat consumption has been increasing steadily. The average daily caloric intake per capita has risen to almost 3,000 and as in preceding years, 11 percent is supplied by protein.

The per capita intake of milk was 500 cubic centimeters before World War II, 650 in 1948, and gradually decreased to 550 cubic centimeters in 1963. On the other hand, the consumption of cheese, meat, poultry, and eggs has increased, while fish consumption has remained constant. Hence, the ratio of animal to vegetable protein has been increasing and is in the ratio of 5 to 3.

Special surveys show that the nutrition of pregnant and nursing mothers is below the daily allowances for these groups, especially with respect to animal protein, calcium, and riboflavin—deficiencies caused mainly by inadequate milk intake.

The diet of pupils aged 13-16 years in a primary technical school was carefully studied. The average daily caloric intake within this group rose with advance in age from 3,500 to 4,000, of which 12 percent was supplied by proteins, 33 percent by fats, and 55 percent by carbohydrates. The total protein intake of adolescents averages more than 100 grams daily, of which less than half is of animal origin. The nutrition of female ado-

Table VII. Per capita daily intake of nutrients and calories: Netherlands, selected years, 1936-63

Year	Fat	Protein			Calories			
		Total	Animal	Vegetable	Number	Source		
						Protein	Fat	Carbohydrate
	Grams					Percentage distribution		
1963	135	80	51	29	2,970	11	41	48
1958	123	81	47	34	2,900	11	38	51
1953	114	79	42	37	2,800	11	37	52
1948	84	81	38	43	2,630	12	29	59
1936-38	102	81	39	42	2,730	12	34	54

SOURCE: Mulder, T., De voeding in Nederland. Voeding 20:105, 1959; 23:16, 1962; 25:604, 1964.

lescents (mothers-to-be) is poorer than that of males, because, among other things, they drink less milk—although mistakenly—to watch their weight. The daily caloric intake of the age group 8-10 years averages 2,200 for girls and nearly 2,500 for boys, the protein consumption being 60-75 grams daily, more than half consisting of animal protein.

Because surveys are lacking, it is not possible to describe the trend of nutrition among preschool children over the past half century. Most probably, the diet was far from adequate at the beginning of the century, but has gradually improved. The average daily intake in the age group 1-4 years averages 1,400-1,500 calories, 40 grams of protein—of which two-thirds is of animal origin—and 55 grams of fat. Milk consumption is half a liter per day, and the supply of vitamins and minerals is adequate.

Cod-liver oil has been given infants and preschool children since the turn of the century, but not regularly. Rickets was far from uncommon in the good old days. Since 1920, vitamin D has been given infants more regularly and rickets has disappeared. The rachitic pelvis has become a rarity.

The nutrition of infants has never been analyzed. Until World War II, breastfeeding was common, at least for the first 3 months; artificial feeding was prepared by mothers from fresh cow's milk. Pasteurization of milk has been compulsory since 1940, and bovine tuberculosis was eradicated in the 1950's. A revolution in infant feeding has occurred in the past 15 years by the sale of commercially prepared liquid infant foods which have the right formulas and are hygienically prepared.

Tuberculosis.—The trend of tuberculosis mortality in a country may be looked upon as a yardstick of the development of sociohygienic conditions. Until the end of World War I, tuberculosis took a heavy toll of life, especially among infants, as figure II shows. Between the two World Wars, however, mortality from this disease fell rapidly, as the result of a systematic fight against the disease and of improved sociohygienic conditions. Tuberculosis mortality in infants decreased from more than 200 per 100,000 in 1920 to about 35 in 1940, while a similar reduction occurred among preschool children. During World War II, the rise in mortality from the disease was less marked than one would have expected under war conditions and severe malnutrition. Since 1946, tuberculosis mortality has dropped

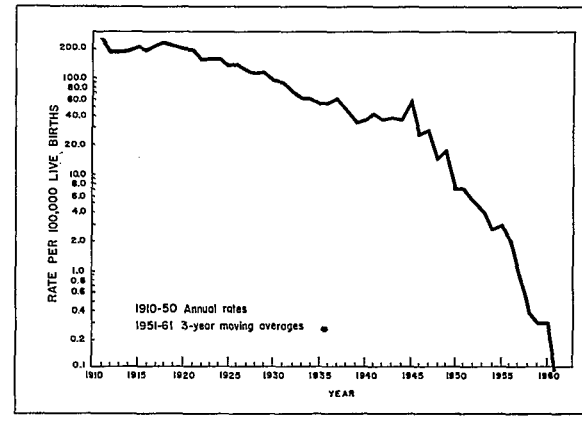

Figure II. Infant mortality rates for tuberculosis: Netherlands, 1910-61.

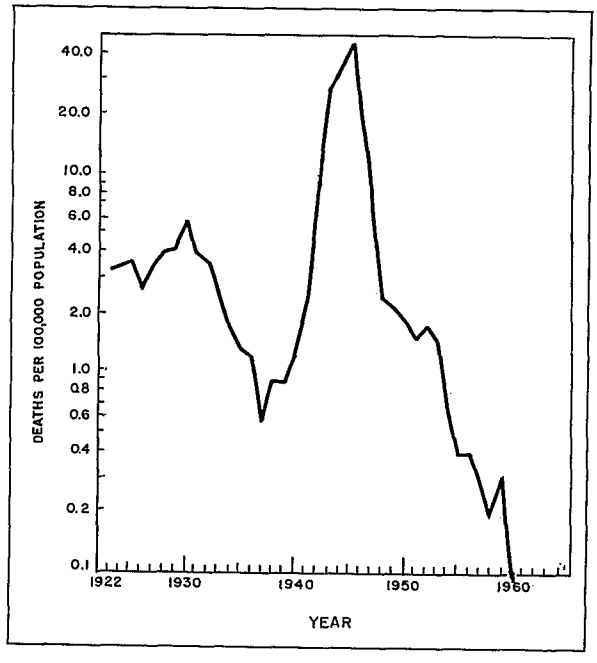

Figure III. Mortality rates for diphtheria at all ages: Netherlands, 1923-64.

precipitously (without mass BCG vaccination) and has been virtually eliminated as a cause of death. Sanitoria for tuberculous children have been closed for lack of patients.

Vaccinations.—Before World War II mass vaccinations were restricted to smallpox. The significance of smallpox vaccination in a country like Holland is more traditional than real and is not always harmless for infants.

Vaccination against diphtheria was on an individual basis prior to the war, and the reduction in morbidity and mortality from the disease without a mass vaccination program created a false security. Thousands of children fell victim to diphtheria during World War II. After the war, however, vaccination against diphtheria and whooping cough became popular. In 1952-53, routine vaccination was introduced on a voluntary basis and reached about 80 percent of the children, a measure of the health consciousness of their parents. Since 1956, both diphtheria and whooping cough have practically disappeared as causes of death (figs. III and IV).

Inasmuch as a contact by mail is made to remind the parents of every infant and preschool child to have their children vaccinated or revaccinated, and as most vaccinations are given in welfare centers free of charge, attendance at welfare centers has been stimulated by the vaccination program.

From a public health viewpoint, the downward trends for tuberculosis and the common infectious diseases of childhood are of much greater overall importance than would be expected from the control of these diseases. Their virtual eradication among children has not only decreased general mortality and morbidity but has also indirectly improved the health status of children and parents.

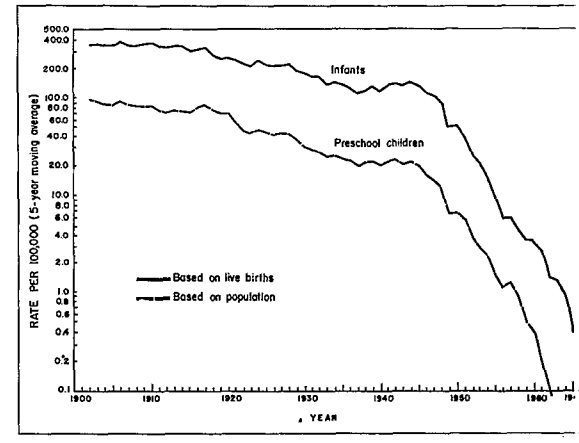

Figure IV. Mortality rates for pertussis among children under 5 years, by age: Netherlands, 1900-1965.

APPENDIX II

MATERNAL AND CHILD HEALTH SERVICES

Organization of Services

Prenatal care, infant care, and school health services began about the same time—shortly after the turn of the century—albeit independently of each other. All these activities were modest in the beginning, but together they brought health consciousness to working-class families.

Figure V shows the present maternal and child health (MCH) organization, which, in principle,. has not changed appreciably during the past 40 years. The left side of the chart shows the government public health authorities of the state, provincial, and municipal levels. The maternal and child health officer in the Office of the Chief Medical Officer of Health supervises the MCH organization, but through the provincial

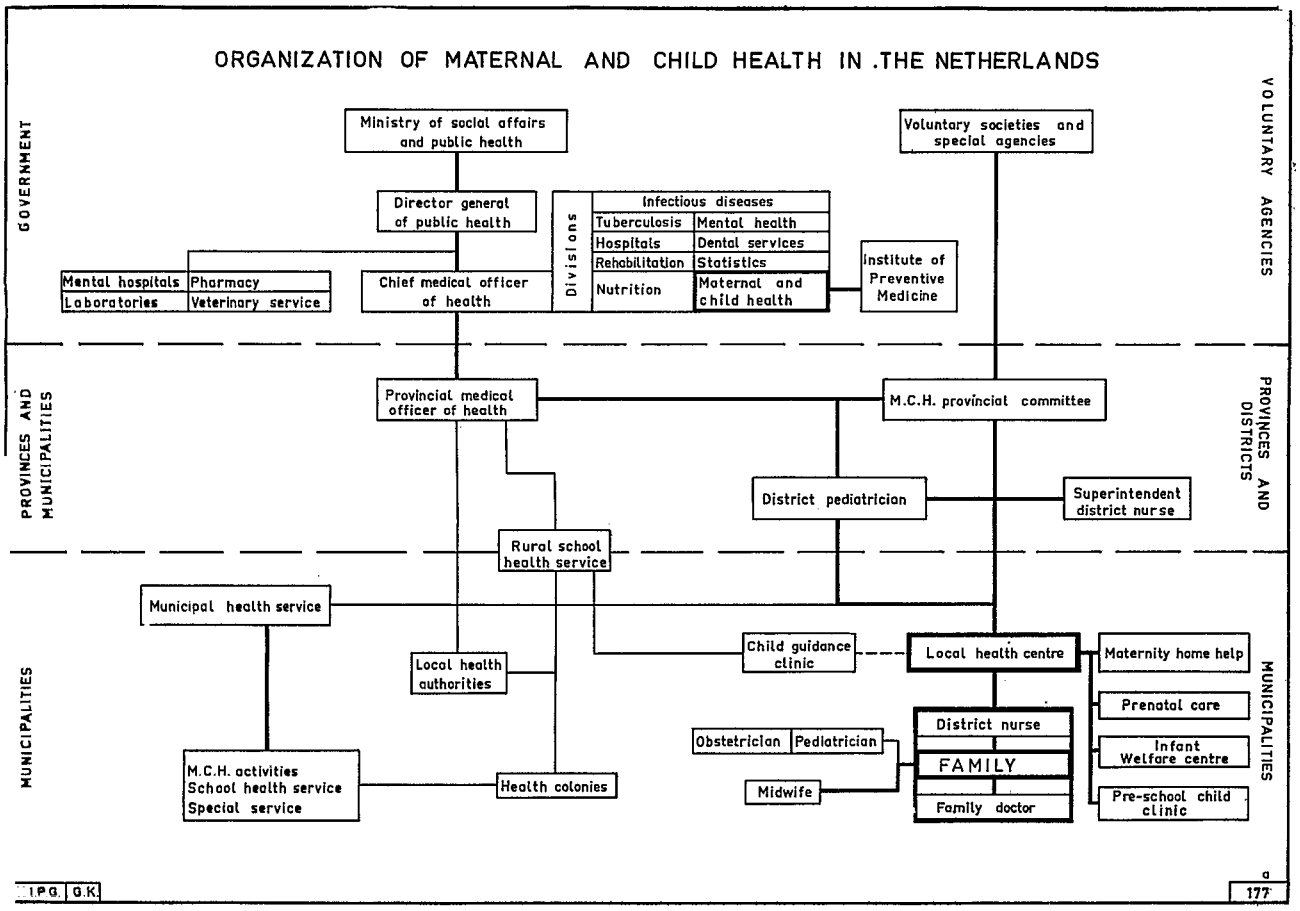

Figure V. Organization of official and voluntary maternal and child health services in the Netherlands.

medical officer of health. On the right side are shown the major national, provincial, and municipal voluntary agencies.

The family doctor and the midwife are independent, practicing a "free" profession, but both receive by far the largest part of their income from sickfunds. The district pediatrician is a provincial or district supervisor of all MCH activities except those of the family doctor, the midwife, and the hospital. The superintendent district nurse supervises the district nurses, insofar as their work in infant and toddler welfare centers is concerned, and gives courses for expectant and young mothers.

Obstetrical Care

Obstetrical care in the Netherlands has three characteristics, which historically and currently are interrelated.

(1) Domiciliary confinement is much more usual than institutional confinement.

(2) Midwives handle deliveries by themselves.

(3) A special organization provides maternity care and help in the home.

Prenatal and natal care are legal rights of members of the sickfunds. The doctor or midwife is paid by the sickfunds on a per case basis. The midwife is indirectly protected by the fact that the sickfunds do not pay the doctor for cases of normal pregnancy and delivery if a midwife practices in the district where the pregnant woman lives. Neither is the cost of hospitalization reimbursed for "normal" deliveries. In determining whether hospitalization is medically justified, the policy of the sickfunds, in accordance with the general obstetrical attitude in the past, has given greater priority to the condition of the mother than of the child. Until the mid-fifties, little consideration was given to biological factors influencing perinatal mortality, such as age and parity of the mother, twin pregnancy, unfavorable obstetrical history, and prematurity.

Prenatal care.—Prenatal care, which has been developed by both doctors and midwives since 1900, has been modernized and expanded since World War II. About 60 percent of the pregnant women see their doctor or midwife six times or more during pregnancy. The number of visits decrease with increase in parity, even though mothers of particularly high parity need extra attention during pregnancy.

Half of the pregnant women place themselves under the supervision of a doctor or a midwife before 18 weeks of gestation, the first visit usually being earlier when attended by a doctor. Nevertheless, prenatal visits show a definite concentration in the last month of pregnancy. Almost half of perinatal mortality occurs in prematures and therefore cannot be influenced by prenatal care in the last weeks of pregnancy, however frequent this may be.

Special surveys have shown that prenatal care can be improved. This can be accomplished, in part at least, by closer cooperation between midwife, family doctor, and obstetrician.

Natal care.—Traditionally, confinement has usually taken place at home. Between the two World Wars, only 10-15 percent of all deliveries occurred in hospitals, which proportion increased to 20 percent in 1950, to 25 percent in 1956, and to 30 percent in 1963. The large differences in hospitalization between rural and urban areas have remained, however, the proportions in 1950 ranging from 12 percent in the villages to about 40 percent in the large cities; in 1963 the range was from 18 to 55 percent.

In the three largest cities, half of the deliveries take place in hospitals. In small municipalities, the limited facilities for institutional confinements contribute to underhospitalization. As has already been noted, 30 to 35 percent of all births are in high-risk groups. Taking into account difficulties in diagnosis, an average hospitalization rate for births of 40 percent seems advisable for the Netherlands.

In 35 percent of *all* births, obstetrical aid is entrusted to midwives, in 45 percent to general practitioners, and in 20 percent to obstetricians. On the average, the obstetrician has 100-250 deliveries a year, the general practitioners 0-100, and the midwife 50-200. Of all *home* confinements, more than 40 percent are attended by midwives, more than 50 percent by family doctors, and about 5 percent by obstetricians. Specialists are in charge of about 60 percent of all institutional deliveries and general practitioners and midwives of about 20 percent each.

In towns, obstetrical aid in domiciliary confinements is given mainly by midwives and in rural areas mainly by doctors, the ratio of doctors to midwives being 1 to 2 in towns and 2 to 1 in rural areas.

The obstetrical approach continues to be generally conservative. In 1938, cesarean section was performed in 0.5 percent of all deliveries and in 1958 in a little more than 1 percent. Analgesia is hardly ever practiced and is not preferred by the mother. Notwithstanding the conservative attitude, the general practitioner regularly uses forceps or performs breech extraction if needed, and the midwife sometimes performs a breech extraction.

Maternity Home Help

To make up for the relatively low frequency of hospitalized confinements, an organization has been founded to provide maternity home help. A trained girl gives care to mother and child during childbirth and takes the place of the mother in the home. This unique organization has centers all over the country, and the

Table VIII. Percentage distribution of live births and stillbirths, by place of delivery and use of maternity home help: Netherlands, selected years, 1950-63

Year	Total	Deliveries in hospital	Deliveries at home	
			With maternity home help	Without maternity home help
	Percentage distribution			
1963---	100	30	35	35
1959---	100	27	33	40
1955---	100	24	30	46
1950---	100	20	19	61

nurses in charge supervise the maternity home helpers, especially the students.

The girls are trained for 15 months on how to care for the mother and child, on how to cook, wash, and do other household chores (including the care of older children at home), and are taught the basic elements of obstetrics and pathology of the newborn. The girls stay with the family 10 hours a day for 10 days. Family doctors like the assistance of maternity home helpers very much, but midwives are not so enthusiastic about them.

In 1950, this organization covered one-fourth of all home deliveries, and by 1963 the proportion had risen to one-half. As table VIII shows, the relative frequency of births in the home with maternity home help and in the hospital have increased, while home confinements without home help have been diminishing (Verbrugge, 1965).

In 1950 maternity home help was given to about 50,000 families; at present, the annual number is nearly 100,000. In this group of home deliveries, maternal mortality and perinatal mortality remain very low, despite a doubling of the number of families served.

The larger the municipality the lower the percentage of families using maternity home help, contrary to the relation of hospital confinement and size of municipality. The combined total of births in hospitals and those in the home with help has been practically constant in rural and in urban areas (around 65 percent).

Welfare Centers

Infants.—With the awakening of social consciousness in western Europe, progressive people were shocked at the high infant mortality rate. In Holland, the first infant welfare centers were started at the turn of the century, after analysis of infant mortality brought to light the great differences between social classes. In the larger cities voluntary agencies were founded to reduce the high rates. Infant welfare centers were set up in the poorest parts of the cities, sometimes combined with a milk kitchen, in imitation of the French *goutte de lait.* The nurse was the pivot of the welfare centers; in the cities she devoted herself exclusively to infant care.

Gradually, cross societies organized infant welfare centers in villages, which were conducted by a doctor with a district nurse as home visitor. The influence of the first centers on infant care was greater than could have been expected from their relatively small number. Mothers eagerly accepted the advice of the doctor and the nurse, passing their newly acquired knowledge to family members and neighbors. In time, the number of centers grew, increasing from 400 in 1930 to 1,100 in 1940. Infant care developed so rapidly in this prewar decade that the severe economic depression and widespread unemployment did not adversely influence infant mortality, which, in fact, decreased steadily in this period.

In the past, understandably, the advice given in the infant welfare centers concerning feeding, bathing, clothing, keeping the baby outdoors, and caring for sick infants was somewhat rigid. The use of clocks, scales, and exact feeding formulas was a reaction against the old-fashioned methods of infant care in the average family. Although the rigid approach has not yet disappeared, since 1950 infant care has greatly improved and milk-hygiene has reached a satisfactory level.

The growth in infant welfare centers is also shown by the fact that in 1930 there was one center for every 450 live births, in 1940 one in every 170 births, and in 1960 one in every 100. A summary of the increased attendance at the centers since 1956 is given in table IX. In 1956, two-thirds of all liveborn children visited infant welfare centers; in 1962, the proportion was three-fourths. No definite information is available on the social class of the infants not visiting the centers. Most probably, the majority are of the middle and upper social classes, which are cared for by the family doctor or a pediatrician; a small proportion are of the lower social class families reluctant to accept periodic supervision, although especially in need of it. However, even the

Table IX. Average attendance at infant welfare centers: Netherlands, 1956, 1959, and 1962

Characteristic	1962	1959	1956
Entrants per 100 live births-	74	73	66
Visits per infant----------	10	11	11
Infants per session:			
Total----------	21	22	21
First visits----------	2	2	2

SOURCE: van Wieringen, J. C., unpublished data.

poorest segment of the population are sickfund members and hence get free curative care for their infants.

The main activity of infant welfare centers includes the periodic examinations of healthy infants, which average a little over 10 in number during the first year of life. The first examination, preceded by a visit of the district nurse to the family, takes place when the baby is between 3 and 8 weeks of age, usually earlier in cities than in rural areas. Routinely at every visit the child is weighed, feeding instructions are given, its psychosomatic development is watched, and it is given a physical examination. The nurse makes home visits, especially if medical and social reasons make it necessary. Infant welfare centers also give vaccinations against diphtheria, whooping cough, tetanus (since 1953), and polio (since 1957). At the end of the first year of life, about 80 percent of the babies—the proportion varying from 60 to 100 percent in different areas—are vaccinated against these four diseases, by means of quadruple vaccines, and against smallpox. Vaccination, however, is not compulsory.

Vitamin D prophylaxis has been practiced systematically since the 1930's, by which time the use of cod-liver oil had long been common. For a generation, rickets has not been a problem in pediatrics. Obstetrics, in turn, has reaped the fruits of the prevention of rickets in the present generation of childbearing women during their childhood and adolescence.

Breastfeeding has always been encouraged by infant welfare centers. In the 1930's, two-thirds of the infants at the age of 3 months had complete or nearly complete breastfeeding; in 1950, the proportion was 60 percent; in 1960, it was 50 percent, and more recently is 45 percent or less. The popularity of breastfeeding is decreasing for a variety of reasons: mothers are no longer willing to continue until the end of the nursing period, doctors no longer advocate it with the same conviction as before, and prepared infant foods have become available in very handy form and are of good composition. Increased hospitalization of births may be another reason for the decreasing frequency of breastfeeding. It has long been known that a smaller proportion of the infants born in hospitals than those born at home are breast fed—one of the disadvantages of hospitalization.

There is a sharp, and somewhat artificial, division between preventive and curative care of the infant. The infant welfare centers are concerned only with "healthy" children and are not allowed to give any treatment. If an infant is ill, he has to be referred to the family doctor.

Infant mortality at ages 1-11 months, the period of observation in infant welfare centers, has become relatively low. The original task of the centers—reduction in infant mortality—is no longer of paramount importance, even though postnatal mortality can be reduced further, particularly in working-class families. The primary function of the centers has become health promotion. While the task of the centers has shifted, practices and approaches have not always been adapted to meet this radical change.

In the Netherlands, preventive care of mother and child has a tradition of two generations. Practically all mothers receive prenatal and natal care, and more than 80 percent of the infants have periodic supervision.

Toddlers.—The first welfare centers for toddlers were started in the larger cities about 1930—a logical continuation of the care given by infant welfare centers. In 1940, there were only 125 centers for toddlers distributed throughout the country; in 1955, they numbered about 1,000, and at present approximately 2,000. The proportion of all 1-year-olds attending these centers increased from about 45 percent in 1955 to around 60 percent in 1962.

Between 1 and 4 years of age the child is examined an average of four times, always by a doctor. The district nurse makes home visits to toddlers. The revaccination of these older children indirectly protects infants before they are vaccinated.

The rapid expansion of toddler welfare centers in the postwar period goes hand in hand with the increasing interest of mothers, nurses, and doctors in the behavior of the preschool child. These centers probably are indirectly improving infant care by making mothers aware of the problems of educating young children and by reorientation of the approach of workers in infant welfare centers to the problems of infancy. In the medical care of infants and toddlers, increasing attention is being given to the biological development of the child. However, child development is not yet the basis of child welfare work, as it should be in these advanced times.

Curative Care

Mothers and children, as members of the family, have free medical care if the father belongs to a sickfund. When the child is ill, the family doctor is called and in serious cases the child is referred to a pediatrician, and eventually to a hospital.

In general, there is no shortage of beds for children, as 3.5 beds per 1,000 children under the age of 15 are available, and some acute illnesses are disappearing. Beds for infants are usually occupied by those with chronic conditions, such as congenital malformations. The average hospital stay for children is 18 or 19 days; for mothers and their newborn, it is 10 to 12 days.

Pediatrics is an old specialty in Holland, dating from the end of the 19th century, at least in the large cities. The number of pediatricians has gradually been increasing. Just before World War II, Holland had one pediatrician for every 22,000 children under age 15; in 1950, one in 15,000; and, more recently, one in 11,000. More than 40 percent are women. Pediatricians are consultants and are not allowed to be the family doctor

for children. Although most pediatricians are more interested in curative than preventive care, they render services to welfare centers. Superspecialization is slowly developing in pediatrics. Child cardiology is advancing with cardiac surgery. The number of surgeons for children is low, and there are only a handful of experienced pediatricians specializing in newborn babies.

Cooperation between pediatricians and obstetricians is slowly developing. This is particularly necessary because pathological cases comprise a relatively large proportion of hospital deliveries.

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APPENDIX III

DEFINITIONS OF TERMS

Stillbirth.—The birth of a fetus after the 28th week of gestation which does not breathe or show any other evidence of life.

Births.—The sum of live births and stillbirths.

Infant death.—The death of a liveborn infant under 1 year of age.

Infant loss.—The sum of stillbirths and infant deaths.

Perinatal deaths.—The sum of stillbirths and deaths among liveborn infants during the first 7 calendar days of life.

Neonatal death.—The death of a liveborn infant during the first 28 calendar days of life.

Postneonatal death.—The death of a liveborn infant from 28 days through 11 months of age.

Postnatal death.—The death of a liveborn infant from 7 days through 11 months of age.

Rates

Infant loss, stillbirth, and perinatal mortality rates are expressed per 1,000 births.

Infant, neonatal, postneonatal, and postnatal mortality rates are expressed per 1,000 live births.

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