

**VITAL and HEALTH STATISTICS**  
ANALYTICAL STUDIES

# Infant Mortality Problems in Norway

Analysis of long-term trends in stillbirth, infant, and perinatal mortality in Norway; role of various risk factors; development of vital statistics system and of maternal and child health programs; and description of demographic and socioeconomic characteristics of Norway.

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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. Of particular interest is the fact that the United States is not alone in experiencing an important change in the infant mortality trend. For a number of countries, infant mortality is no longer declining at its former pace.

Although our primary concern is with the problem of perinatal and infant mortality in the United States, it was felt that much could be learned from the experience of other developed countries with advanced medical systems. 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. Three reports evolving from these contracts appear in Series 3 of the *Vital and Health Statistics* reports:

Number 4, "Infant and Perinatal Mortality in the United States"

Number 5, "Infant and Perinatal Mortality in Scotland"

Number 6, "International Comparison of Perinatal and Infant Mortality: The United States and Six West European Countries"

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

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*IN THIS REPORT detailed statistics are provided on changes in infant and perinatal mortality rates in Norway since 1900. The analysis focuses on the sizable decreases in the late neonatal (7-27 days) and postneonatal (28 days-11 months) mortality rates, and the considerably smaller decrease in the perinatal (stillbirths and under 7 days) mortality rate. Changes in parameters of infant loss and their influence on the infant and perinatal mortality trends are discussed. Mortality among high-risk infants is analyzed. The population trend, socioeconomic situation, provisions for maternal and child welfare, medical care of infants, and vital statistics system are described in detail.*

*At the turn of the century, an average of 1 in every 10 births died either before or during delivery or in the first year of life; at present the total loss during this period is 1 in 32. The most striking feature in the rate of reduction of mortality during the last 60 years in Norway is the pronounced drop in mortality after the first week of life, and the "lag" in the downward trend of mortality in the perinatal period. Since 1901-5 late neonatal and postneonatal mortality have declined 89 percent; perinatal mortality has declined 40 percent. In spite of improvement in obstetric practice and in antenatal supervision of mothers, the decline in perinatal mortality did not occur until after 1940.*

*Immaturity is at present the biggest problem in connection with perinatal and late neonatal mortality in Norway and any future decline of any importance will depend on the prevention and control of this condition.*

#### SYMBOLS

Data not available-----	---
Category not applicable-----	...
Quantity zero-----	-
Quantity more than 0 but less than 0.05-----	0.0
Figure does not meet standards of reliability or precision-----	*

# INFANT MORTALITY PROBLEMS IN NORWAY

Julie E. Backer, Ph.D., and Øystein Aagaes, M.D.<sup>1</sup>

## GEOGRAPHIC, DEMOGRAPHIC, AND SOCIOECONOMIC BACKGROUND

### Topography and Climate

Norway forms the western and northern part of the Scandinavian peninsula and extends over more than 13 degrees of latitude or about 1,750 kilometers (1,086 miles). The country extends as far to the north as central Greenland and parts of the northern coast of Siberia; its most southerly point lies at the same latitude as the northern part of Scotland and Juneau, Alaska. The area of the country is about 324,000 square kilometers (125,000 square miles), and the average altitude is estimated at about 500 meters (1,640 feet).

The Gulf Stream gives Norway a very favorable climate in spite of its northerly position, with a mean temperature higher than that at the same latitude elsewhere. Nevertheless, marked climatic differences exist between the humid coastal districts with moderate temperatures and the interior districts which are drier and have more extreme temperatures. There are also considerable differences between the northern and southern sections of the country.

### Population Trend

From an ethnic point of view the Norwegian population is very homogeneous. Immigration from abroad has never been great and the immigrants have come mostly from the other Scandinavian countries. From olden times, small groups of Lapps and Finns have lived in the far north of

Norway, but most of these have in many ways adopted the way of life of the Norwegian population so that national natality and mortality are not noticeably influenced by these elements of the population.

According to the 1960 census, the population of Norway was 3,591,234 and the average number of inhabitants per square kilometer was 11.6 (about 30.0 per square mile). However, this figure conceals wide differences in density of population, which vary from 1.3 (3.4 per square mile) in the northern part of the country to 56 (145 per square mile) in the districts on the western side of the Oslo Fjord. About 50 percent of the population lives in the eastern part of the country and about 30 percent on the south and west coasts.

From 1900 to 1930 the population of Norway rose by 574,000 or 26 percent; from 1930 until 1960 there was an increase of 777,000 or 28 percent. The growth of population since 1930 has been mainly due to the rise in the birth rate and the great reduction in overseas emigration. For these years, the structure of the population by age and sex is shown in table 1.

During the present century the urban proportion of the population has increased from 28 to 32 percent of the total, and the percentage living in suburbs and in other agglomerations in the rural districts has risen from 8 to 25 (table 2). Thus 57 percent of the Norwegian population lived in towns or other densely populated areas in 1960.

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Table A. Percentage distribution of population by economic activity of head of household: Norway, selected years, 1930-60

Economic activity	1960	1950	1946	1930
	Percentage distribution			
All activities-----	100	100	100	100
Agriculture and forestry-----	15	22	25	30
Fishing, whaling, and sealing-----	4	6	6	7
Manufacturing industry-----	35	34	31	27
Commerce-----	10	9	8	9
Transport and communications-----	10	9	9	9
Professional services-----	13	10	10	8
Income from capital, pensions, etc., and unspecified-----	13	10	11	10

### Type and Level of Employment

The rapid development of manufacturing and service industries in recent decades has altered the pattern of population distribution by occupation. The percentage of the population dependent on agriculture, forestry, and fishing has been reduced from 37 to 19 in the last 30 years, and the group dependent on industry and professional services has increased from 35 to 48 in the same period (table A).

In 1960 among the population 15 years and older, 83 percent of the males and 24 percent of the females were gainfully occupied. Of the gainfully occupied women, 61 percent were single, 25 percent married, and 14 percent widowed or divorced. The proportion of married women gainfully employed has increased in the last 10 years from 5.4 percent in 1950 to 9.5 percent in 1960, but the degree of participation of married women in gainful employment in Norway is still rather low compared with that in other Nordic countries.

### Education

With regard to the level of education of the Norwegian population, the census of 1960 showed that 40 percent of the males and 32 percent of females at the age of 15 years or more had received various forms of supplementary education after completing 7 years of primary school. In Norway primary school has been obligatory for all children since the middle of the 19th century.

### Economic Progress

The favorable economic development in Norway during this century has resulted in a marked increase in the income level of the major part of the population. Valued at constant prices (1938)<sup>2</sup> the average private consumption per individual in 1960 was 2.5 times higher than that in 1900.

The higher level of income implies improvements in nutrition, housing, environmental sanitation, personal hygiene, and so forth—in short, a more healthful standard of living. The economic progress in this period also provided a basis for the introduction of a comprehensive system of social security and welfare, and advances in public health and medical services of different kinds.

### Legal Provisions for Maternal and Child Care

Even before the First World War it was evident that the process of industrialization had brought about radical structural changes in Norway, particularly in the towns, and that family problems were increasing. At the same time the necessity of applying the modern advances of medical and psychological knowledge to welfare and protective work was also generally accepted.

<sup>2</sup>[Ed. note: Adjustment of private per capita consumption in terms of the 1938 kroner to reflect real increases in consumption and to eliminate the effects of changes in the purchasing power of the Norwegian kroner.]



During this century much has been done to amend and modernize Norwegian child legislation and to lay a foundation for further development of practical child welfare work. The important legal enactments for family protection are the National Health Insurance Act of 1911, the Protection of Workers Act of 1936, the Children's Allowance Act of 1946, and the adjustment of taxation to favor families with children. Details of these provisions are given in Appendix I.

### Medical Care

*Physicians and midwives.*—In 1900 the country was divided into 160 medical districts, but as early as 1912, their number increased to nearly 400. Today there are 411 medical districts, each with a public health officer. The size of the medical districts varies—up to more than 1,000 square kilometers (386 square miles) in the northern part of the country. The public health officer is charged with the hygienic and prophylactic services in his district, and in many districts he is also engaged in curative medicine. However, the greater part of curative medicine is taken care of by private general practitioners and specialists.

In 1900 there were 980 physicians in Norway, or 1 per 1,920 population, and by 1962 the number had increased to 4,457 or 1 per 858 population:

Year	Number of physicians <sup>1</sup>	Population per physician <sup>2</sup>
1962-----	4,457	858
1960-----	4,260	885
1955-----	3,901	914
1950-----	3,397	977
1940-----	2,472	1,261
1930-----	1,826	1,586
1920-----	1,346	2,058
1910-----	1,266	2,051
1900-----	980	1,920

<sup>1</sup>According to the official list of physicians maintained by the Health Department. Includes physicians living abroad.

<sup>2</sup>Excludes physicians living abroad.

The physicians are very unequally distributed over the country. The great majority of doctors work in towns, suburbs, and other densely pop-

ulated districts, where increasing numbers are found in hospitals. In sparsely populated areas, particularly in the western and northern parts of the country, the requirements of the population for medical care are not always sufficiently met; in many rural districts in Norway the public health officer is the only physician available.

Physicians in Norway have a very homogeneous medical education. Most of them graduate from the Universities in Oslo and Bergen after 6½-8 years of study. Also, in the postwar years an increasing number of young physicians have graduated from foreign universities. The number of specialists in different fields of medicine is increasing. For instance, in 1924 the country had only 14 obstetricians and 7 pediatricians, but in 1962 there were 77 and 95, respectively.

In 1962 the number of midwives in Norway amounted to 1,005, most of them working in hospitals and maternity homes. Midwives get their education at the University hospitals of Oslo and Bergen. The obligatory course of training for a certificate of midwifery lasts 1 year. All of the students at the courses are graduate nurses with 3 years of training.

*Hospitals.*—Because of the sparse population in many parts of the country, hospitals in Norway used to be rather small and scattered, but progress in medicine has made centralization necessary. By 1962 about half of the general hospitals, with 70 percent of all available beds, were run by the State, a municipality, or a county. Smaller private hospitals and clinics, which are run by different social or religious organizations, usually work in close cooperation with the public hospitals.

In 1930 the total number of beds in general hospitals was 11,352 or 40 per 10,000 population. By 1962 the number had nearly doubled to 21,273 beds, or 59 per 10,000 population, and of these, 2,100 were reserved for obstetric or gynecologic patients. The number of beds in smaller maternity clinics rose from 383 to 881 in this same period.

The development of pediatric departments has been slow; until after the Second World War the University of Oslo had the only pediatric department in the country with 45 beds. The common practice had been for obstetricians or general practitioners, sometimes even midwives, to assume responsibility for pediatric care of infants.

However, in the past 10 or 15 years there has been considerable progress; in 1964 Norway had 10 pediatric departments with 350 beds. This means that many more newborn children are now being examined by pediatricians.

*Maternal health centers.*—A most important part of the prophylactic work among mothers and children includes medical examination of pregnant women and of their babies in maternal health centers. The first institution of this kind started in 1905 and today the total number of health centers for mothers and children amounts to about 1,400 scattered all over the country. Most of them are established by local health associations, and relatively few by the municipal authorities. Although the Government grants contributions for the establishment and operation of maternal health centers, the shortage of physicians, qualified nurses, and midwives has hampered activities in this field.

At the health centers all examinations are performed by health officers, normally assisted by qualified nurses. All examinations are free. The health of both the mother and child is controlled. The mother's blood pressure is measured, and urine and blood specimens are obtained, the latter for Wassermann tests, hemoglobin, and Rh determinations. If the pregnant woman is Rh negative, repeated blood tests for Rh are taken at intervals until birth. If Rh antibodies are shown, the woman is referred to a hospital with equipment for exchange transfusions. In health centers mothers are given instruction on proper nutrition and other aspects of child care.

In addition to the services provided at health centers, lectures on pregnancy and related health problems are given in prenatal and postnatal clinics. These instructions are particularly concerned with sex hygiene, and instructions relating to the sale and use of contraceptives. These clinics may apply for government subsidies on an equal footing with other health centers for mothers and children.

*Obstetrical management of deliveries.*—Currently, Norwegian mothers very seldom give birth to their children at home. In 1951, the first year for which information on the place of birth is available, the percentage of deliveries in institutions was 75; by 1962 it had risen to 96.

As a rule, deliveries are conducted by certified midwives without the assistance of a doctor, although in a hospital a doctor is always within a few minutes' call. In small rural maternity homes which have no doctor in regular attendance, all cases where complications may be expected are sent to a hospital. Deliveries are conducted according to rather conservative principles. Unless contraindicated on medical grounds, infants are delivered vaginally. Mothers are thoroughly supervised by midwives and labor is induced only on proper medical indications, never for the convenience of the mother, midwife, or doctor.

Only minimal inhalation anesthesia is used, most often a light divinyl ether anesthesia, for instance in breech-delivery, combined with slight, local anesthesia in the perineum. But for uncomplicated deliveries, most often analgesics are used only during the dilatation period: for instance, pethinal (demerol) and, in the case of very nervous mothers also the tranquilizer, largactil (chlorpromazine). Spinal anesthesia is never used.

The indications for cesarean section have also been rather conservative, but in recent years the scope has somewhat widened. If vaginal delivery seems to be complicated (for example, with turning of the baby, or high forceps), the obstetricians will nowadays more readily use cesarean section than before. Still only medical indications are followed, and a cesarean section is never performed for the convenience of the mother or the doctor.

In the last 10-15 years obstetricians have paid more attention to the growth of the fetus and the placental status. Hormone treatment of women with endometrial or placental insufficiency, or at least a more thorough supervision during pregnancy with prolonged periods of confinement in bed, has become more and more usual.

Fetal infection seems to have decreased. In the case of an early loss of amniotic fluid, mothers are often treated with antibiotics before delivery. For the relatively rare viral infections (herpes simplex and cytomegalic inclusion disease) or protozoan infection (toxoplasmosis), there seems at the present time to be no effective prophylactic treatment.

Iso-immunization has received special attention and there are now very few patients with this problem who are not adequately treated. In

mothers where severe iso-immunization is suspected, additional fetuses have been saved by a more active attitude toward induction of labor 3 to 4 weeks before term.

Postmaturity has been the focus of interest for obstetric-pediatric teams in recent years, and in such cases labor is now usually induced about 2 weeks after term.

### Coverage and Quality of Birth and Death Statistics

The Central Bureau of Statistics of Norway is responsible for the compilation and presentation of the official vital and health statistics. The data needed for the statistics on births and deaths come from registration documents. Information on legal and administrative procedures for notification and registration of these vital events is given in Appendix II.

Primary responsibility for the notification of a birth or stillbirth is placed on the parents. The church official in each parish who is charged with legal registration of births and deaths is required to transmit to the Central Bureau of Statistics each month nominative lists (containing name, date of birth, etc.) for all births and deaths registered during the month. In addition, public health officers are instructed to transmit to the Bureau at the end of each month certificates stating cause of death for deaths occurring within their districts. Public health officers also forward to the Bureau notifications of stillbirths and of live births dying within 24 hours of birth which have been received from midwives or doctors.

In general the system of registration of births and deaths by church officials has worked very satisfactorily. However, the parents' obligation for notification of stillbirths and of infants dying immediately after birth is not always observed, and reports from the legal registrars (church officials) do not cover all these cases. Completeness of the official registration of these births is checked by comparing reports received from the clergy with notifications of births made to the public health officer, both of which are transmitted to the Bureau for this purpose.

General mortality statistics of Norway have on the whole been very satisfactory. The situation is different, however, with regard to cause of

death. Until about 1930 the reports from the local medical authorities did not cover all deaths in the different districts. Moreover, a great difference was noted between the statistical data relating to cause of death compiled in towns and in rural districts. In towns the basic information was not only numerically more complete but also of better quality than that in rural districts, because many deaths in rural districts occurred without medical attention. More precise certification of the cause of death was required by the Medical Acts of 1927 and of 1939, and the statistical material both in towns and in rural districts has improved considerably since then.

Tabular lists of causes of death used for statistical purposes in Norway have been altered several times in the present century, namely in 1911, 1927, 1941, and 1951. The list introduced in 1927 was prepared in collaboration with experts from Denmark and Sweden and used from 1927 through 1940. It differs very little from the International Classification of Diseases (ICD) after its Fourth Revision in 1929. The Fifth Revision of the ICD (1938) was adopted in Norway and used during the years 1941-50. In 1951 it was replaced by the Sixth Revision adopted by the World Health Organization in 1948. At this time the international form for the medical certificate was also introduced as well as the procedure which specified that the certifying physician's statement of cause of death generally should be accepted for purposes of statistical tabulation of cause of death.

Improvement in the reporting of specific diagnoses has influenced the rates far more than have changes in classification rules, and thus has impaired comparability of the rates from period to period. Over the recent years it has been possible to register an increasing number of deaths among infants under definite diagnoses, thereby reducing the relative number of deaths attributed to ill-defined and unknown causes. Improvement in the basic data is largely due to the querying procedure established by the Statistical Bureau in 1951, whereby the public health officer of the district in which the death occurs is asked to procure supplementary information on all cases where the statement on the death certificate appears to be too vague or incomplete for precise statistical classification. However, in sparsely populated districts, especially in the northern part

of Norway, many deaths among newborn children still occur without medical attendance, and it is often impossible for the public health officer to get any further information on cause of death than that given by the midwife or the relatives. In these cases the statements received by the Bureau are often so incomplete that the cause of death has to be classified as ill-defined or unknown.

In 1962, 10 percent of the causes of infant death registered in the statistics were based only on examination after death, without any information on previous medical attendance, and for 3 percent of these the cause of death was unknown. Clinical examination by the medical practitioner in attendance during the last illness was the basis for 70 percent of the diagnoses registered on the death certificate and 20 percent of these diagnoses were the result of post-mortem examination.

### Fertility

During the first 35 years of this century the number of births in relation to the total population decreased 47 percent, from 28.5 in 1901-5 to 15.2 in 1931-35 (table B). This downward movement was broken only by a temporary rise in the number of births after the First World War. During the last half of the 1930's and

particularly during the first half of the 1940's the average rate increased, and in 1946-50 it was 36 percent higher than in 1931-35. Since 1950 the birth rate again has been declining, but in 1961-62 it was still 14 percent above the level of 1931-35.

Since the general birth rate per 1,000 total population may be influenced by concentrations of the population in segments other than that concerned with childbearing, births may more appropriately be related to the number of women of reproductive age, and—as most children in Norway are born in wedlock—to married women in this age group. Table C shows the development of the fertility rates for married women aged 15-44 years from 1899-1900 to 1959-62.

If comparison is made on the basis of the age-standardized rate for the whole group of married women of ages 15-44 years, the average fertility of married women of reproductive age declined by about 45 percent from 1899-1900 to 1930-31. After a temporary rise in the middle of the 1940's the downward trend of fertility among married women has continued, and during the period 1959-62 averaged 17 percent lower than 30 years before.

The overall decrease in fertility may be attributed mainly to voluntary birth control by married couples. The result of this tendency has been a considerable reduction in average

Table B. Average annual number of live births, live birth rates, and percent illegitimate live births: Norway, 1901-62

Year	Average annual number of live births	Live births per 1,000 population	Percent illegitimate live births
1961-62-----	62,405	17.3	3.8
1956-60-----	63,021	17.9	3.6
1951-55-----	62,478	18.6	3.7
1946-50-----	65,886	20.6	4.9
1941-45-----	56,067	18.5	7.3
1936-40-----	45,183	15.4	6.3
1931-35-----	43,342	15.2	7.0
1926-30-----	50,087	18.0	7.0
1921-25-----	60,267	22.2	6.9
1916-20-----	63,249	24.5	7.0
1911-15-----	61,103	25.0	7.0
1906-10-----	61,978	26.4	6.6
1901-5-----	65,202	28.5	7.0

Table C. Average annual fertility rates for legitimate liveborn infants and percent change since 1899-1900, by age of mother: Norway, selected years, 1899-1962

Year	Age of mother						
	Age-standardized rate, 15-44 years <sup>1</sup>	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years
Rate per 1,000 married women of specified age							
1899-1900-----	307.6	592.6	484.6	381.9	333.4	264.4	159.3
1920-21-----	250.5	784.4	454.6	335.3	254.3	198.2	106.6
1930-31-----	170.1	693.6	373.5	237.0	163.1	114.6	60.8
1946-47-----	182.2	623.7	364.0	255.9	193.4	130.7	53.2
1959-62-----	140.6	555.0	329.6	214.8	132.8	71.2	25.6
Percent change since 1899-1900							
1920-21-----	-19	+32	-6	-12	-24	-25	-33
1930-31-----	-45	+17	-23	-38	-51	-57	-62
1959-62-----	-54	-6	-32	-44	-60	-73	-84

<sup>1</sup>Standard base population is married women 15-44 years of age from the census of 1920.

number of children born per marriage since the turn of the century. At the census of 1920 and in subsequent censuses, married women were asked to state the year of their existing marriage and the number of live births resulting from that marriage. Information obtained shows that after 20 years of marriage the ultimate family size in Norway at the census of 1950 was only about half of that attained at the beginning of this century:

Year of census	Year of marriage	Average number of children
1920-----	1900	4.79
1930-----	1910	4.08
1946-----	1926	2.61
1950-----	1930	2.48

According to results of a special analysis of family building of couples married in the period 1931-41, the average number of births after 20 years of marriage varied from 2.4 to 2.5 per

married woman. The ultimate family size in Norway has thus changed very little during the last 30 years.

### General Mortality

The rise in the general standards of living and advances in medicine and public health have greatly reduced the risk of mortality at all ages. The crude death rate per 1,000 population in 1961-62 was only 40 percent of that existing about 1900. The largest reductions have been recorded in childhood and in early adolescence (table 3). The control of tuberculosis in large measure accounts for the remarkable health progress in these age groups. Considerable decline of mortality has also occurred in middle life. Except at ages 80 years and over, the reduction of the death rates has usually been greater among females than among males.

Progress in the control of disease has greatly extended the average expectation of life at all ages. Under mortality conditions prevailing in Norway

50 years ago, the expectation of life at birth was 55 years for a boy and 58 years for a girl. By 1956-60 it had risen to 71 and 76 years, respectively. The chances of survival for a boy from birth to the age of 20 increased 16 percent and for a girl, 15 percent. The outlook for a man of 20 years to survive to the age of 70 has increased 36 percent since 1901-10, and for a woman, 39 percent.

Of notable interest is the low mortality among Norwegian women between the ages of 15 and 45; an average of 97 out of 100 women 15 years old are expected to survive the childbearing years to 45 years of age. The reduction of mortality among women 15-44 years old is partly due to the steady fall in the number of deaths attributed to complications associated with pregnancy, childbirth, and puerperium since the turn of the century. These notable achievements result largely from earlier and more adequate prenatal care, improved obstetrical techniques, and advances in the control of infections through chemotherapy and antibiotics.

## STILLBIRTH AND INFANT MORTALITY, 1900-1962

### Definition of Terms and Rates

In Norway, *live births* are defined as all infants showing signs of life at birth even if death occurs immediately after birth. *Stillbirths*<sup>3</sup> are defined as infants delivered after 28 weeks of gestation and showing no obvious sign of life. The delivery of a dead fetus whose gestation is less than 28 weeks is not entered in the birth register and hence is not included in vital statistics.

An *infant death* is defined as the death of a liveborn infant occurring before the age of 1 year. Infant deaths are subdivided into *neonatal deaths* (under 1 month in age, and from 1951, under 28 days) and *postneonatal deaths* (1-11 months, and from 1951, 28 days-11 months). Neonatal deaths are further subdivided into *early neonatal deaths*

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<sup>3</sup>[Ed. note: 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 or more weeks of gestation.]

(under 7 days in age) and *late neonatal deaths* (7-27 days in age). *Perinatal deaths* include stillbirths and early neonatal deaths.

The *stillbirth rate* is the ratio between the number of stillbirths born in a calendar year and the total number of births (live births and stillbirths) in the same year. The *perinatal mortality rate* relates the perinatal deaths to the total number of births. In calculating *infant mortality rates* for the first year of life and its subdivisions, the numerators are the number of deaths appropriate to the specified age interval which were registered in a calendar year. The denominators are the total number of live births registered in the same calendar year.

In calculating the mortality rates for the different age periods of the first year, it would have been more correct to use as the denominator the number of infants who had survived the earlier age period, i.e., those exposed to the risk of dying during the selected age period. As the number of live births is very large relative to the number of deaths, the difference between a rate calculated per 1,000 total live births and one per 1,000 infants surviving to the start of the age group in question is usually quite negligible. In this report, this last method has been used only in table G which shows infant mortality rates by age in months.

### General Trends

Table D shows the results on the stillbirth and infant mortality trends of sociomedical efforts undertaken to promote the welfare of mothers and children in Norway. As only stillbirths which occur after 28 completed weeks of gestation are registered, the figures do not cover the total reproductive wastage, but they nevertheless clearly illustrate a remarkable reduction of the risk of death. At the turn of the century, an average of 1 child of every 10 born in Norway died before or during delivery or in the first year after birth; by the 1960's the total loss during this period was about 1 in 32.

In spite of the improvement in obstetric practice and in antenatal supervision of mothers, very little change was observed in the stillbirth rate during the first decades of this century. In 1901-5 the average annual rate of stillbirths was

Table D. Average annual number of total births and live births, and average annual number of and rate for stillbirths and infant deaths: Norway, 1901-62

Year	Total births	Live births	Total loss <sup>1</sup>	Still-births	Infant deaths	Total loss rate	Still-birth rate	Infant mortality rate
	Average annual number					Rate per 1,000 total births		Rate per 1,000 live births
1961-62-----	63,246	62,405	1,953	842	1,111	30.9	13.3	17.8
1956-60-----	63,933	63,021	2,163	912	1,251	33.8	14.3	19.9
1951-55-----	63,446	62,478	2,383	968	1,415	37.6	15.3	22.6
1946-50-----	67,062	65,886	3,224	1,176	2,048	48.1	17.5	31.1
1941-45-----	57,221	56,067	3,242	1,154	2,088	56.7	20.2	37.2
1936-40-----	46,226	45,183	2,822	1,043	1,779	61.0	22.6	39.4
1931-35-----	44,448	43,342	3,052	1,106	1,946	68.7	24.9	44.9
1926-30-----	51,357	50,087	3,749	1,270	2,479	73.0	24.7	49.5
1921-25-----	61,577	60,267	4,425	1,310	3,115	71.9	21.3	51.7
1916-20-----	64,679	63,249	5,361	1,430	3,931	82.9	22.1	61.9
1911-15-----	62,493	61,103	5,415	1,390	4,025	86.6	22.2	65.9
1906-10-----	63,405	61,978	5,719	1,427	4,292	90.2	22.5	69.2
1901-5-----	66,800	65,202	6,821	1,598	5,223	102.1	23.9	80.1

<sup>1</sup> Total stillbirths and infant deaths.

23.9 per 1,000 total births; in 1931-35, 24.9; and in 1936-40, 22.6. During the following 20 years the risk of a fetal death before or during delivery was considerably reduced. In 1961-62 the still-birth rate had fallen to 13.3, 47 percent below the 1931-35 rate. The "lag" in the decline of the stillbirth rate in Norway, particularly between 1920 and 1940, is difficult to explain. In part it may have been an effect of the change in the distribution of births by parity, caused by the voluntary limitation of births; between 1921-25 and 1936-40 there was a considerable increase in the proportion of first-born children, from 26 percent to 41 percent of all births. Unfortunately, it is not possible to fully test the validity of this supposition by the available statistics.

The infant mortality rate has declined consistently from 80.1 per 1,000 live births in 1901-5 to 17.8 in 1961-62. However, the rate of reduction has varied considerably from period to period (fig. 1). Epidemics and other events of a

transient nature have now and then slowed down the previously observed rate of decrease. During World War II, for instance, when infective diseases of all kinds were widespread over the country, the improvement in infant mortality was negligible compared with that of the thirties. When the War was over, infant mortality again declined rapidly. In 1946-50 the average mortality rate was about 17 percent below that of 1941-45, and from 1946-50 to 1951-55 it decreased by 27 percent. This pronounced downward trend of mortality among infants was associated with great improvement in the social and economic situation in Norway after the War, and with medical advances, especially the introduction of chemotherapy affecting the treatment and prevention of important diseases of childhood. In the middle of the 1950's the downward trend was leveling off; lately the rate of decline has been about the same as in the pre-War years.



Figure 1. Infant mortality rates: Norway, 1901-62.

### Trend by Age

Because much the same factors are associated with the death of a child during the later stages of pregnancy and in the first days after birth, it is becoming common practice to group these deaths together under the term "perinatal mortality." About 80 percent of the perinatal deaths occur before, during, or within 24 hours after birth; 20 percent occur during the rest of the first week of life; and the numerical relationship has remained unchanged during this century. However, among those children whose death occurred before, during, or shortly after the

delivery (within 24 hours) an increasing proportion have died after birth:

Year	Total	Still-births	Deaths under 24 hours of age
Percentage distribution			
1956-60-----	100	71	29
1951-55-----	100	72	28
1946-50-----	100	72	28
1941-45-----	100	74	26
1936-40-----	100	74	26
1931-35-----	100	76	24



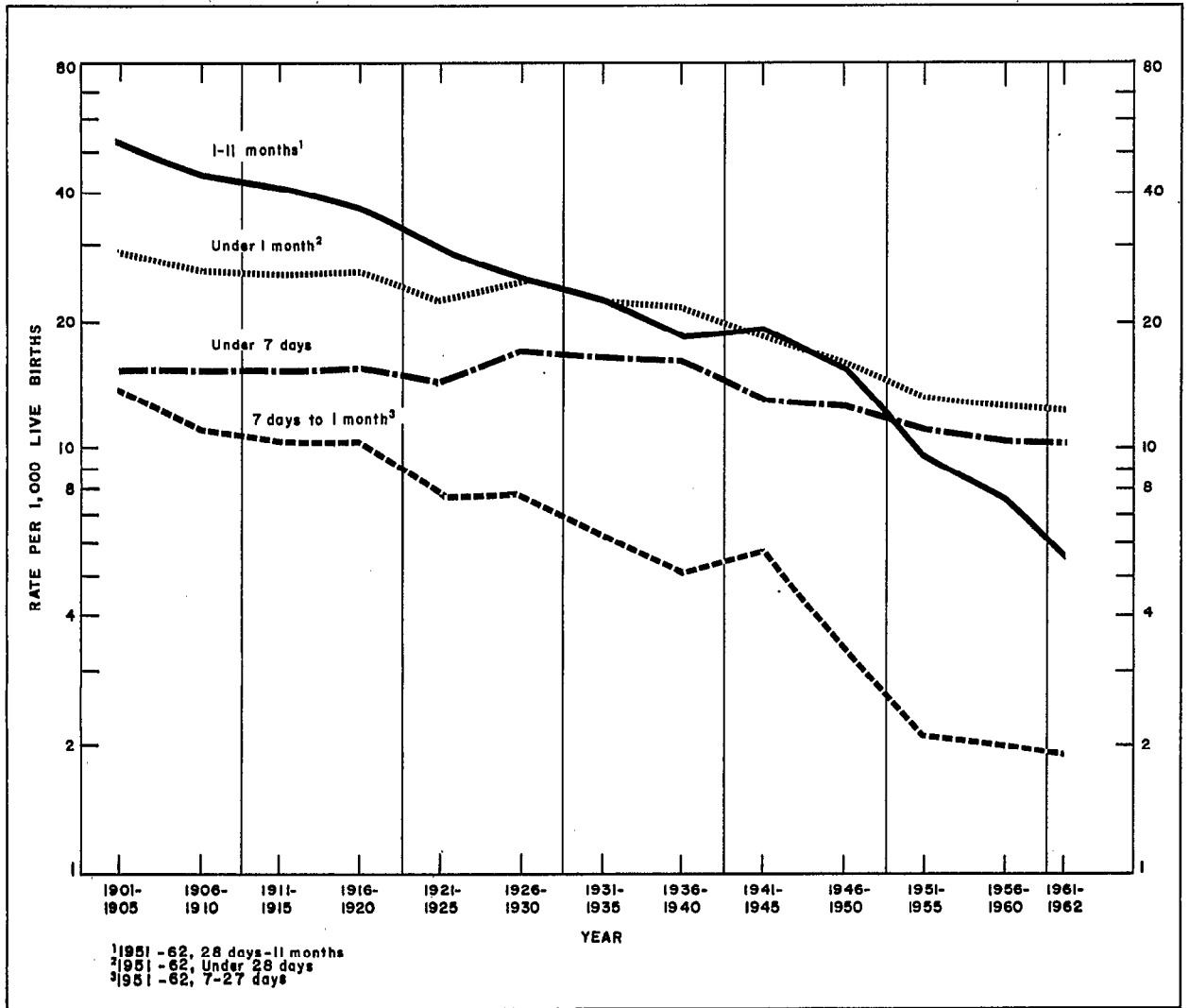


Figure 2. Infant mortality rates by age: Norway, 1901-62.

The trend of the perinatal mortality rate has been about the same as that observed for stillbirths, with very little change before 1940. In 1901-5 the perinatal mortality rate was 39 per 1,000 total births; in 1926-30, 41; and in 1936-40, 38 (table 4). During World War II this rate declined to 33 per 1,000 and the downward trend continued in the ensuing years. In 1961-62 perinatal mortality was 24 per 1,000 total births, or about 42 percent below the 1931-35 rate. In the same interval the stillbirth rate dropped 47 percent, somewhat more than the decline for the remainder of the perinatal period. In the re-

mainder the decline of the mortality in the first day after birth has "lagged" compared with mortality in the following 6 days. With better obstetrical service, more and more infants, especially the premature and nonviable who in years past would have died before or during birth, now survive until after birth.

Mortality in the late neonatal period has shown a straight-forward decline since 1900, closely resembling the characteristic pattern of the postneonatal period (fig. 2). Late neonatal mortality declined by 53 percent in the first three decades of this century, and during the same in-

terval the postneonatal mortality dropped 56 percent. Since the beginning of the 1930's the decline in mortality after the first week of life has been even more impressive. In 1961-62 late neonatal mortality was 70 percent below and postneonatal mortality was 75 percent below the comparable rates of 30 years earlier.

While mortality in the late neonatal period declined steadily from the middle of the 1920's until 1940, perinatal mortality tended to rise during this period (table 4). The disparity in the decrease in the perinatal mortality rates and those for the remaining 51 weeks of the first year reflects the fact that far greater progress has been made in controlling postnatal infections and other diseases than in dealing with the predominant causes of perinatal death.

The considerably greater decline in the mortality of infants after the first week of life compared with that of the perinatal period has resulted in essential changes in the distribution of stillbirths and infant deaths by age. The percent of deaths occurring in the perinatal period has increased from 38 around the turn of the century to 75 in 1961-62. Deaths before the end of the first week after birth have in recent years very largely outnumbered those occurring during the remaining weeks of the first year. The development of the total perinatal and infant mortality has,

therefore, in recent years depended mainly on the trend of mortality during and immediately after birth.

The reduction of fetal and early neonatal mortality has depended less on medical research than on a better control of the conditions under which conception, pregnancy, and birth take place—factors such as the rate of illegitimacy, educational level of the mother, availability of medical care, mother's nutrition during pregnancy, and so forth. Other than such external factors there are various physiological ones, including age of mother, parity, and frequency of births, which according to available statistics influence the child's chance of survival. However, the relationship between these factors and the level of the reproductive wastages still remains to be fully explained.

#### Trend by Sex and Age

On the whole, infant mortality rates for males and females have followed parallel trends in the last 30 years (table 5). Percent changes in the rates for both sexes over the periods 1901-5 to 1961-62 and 1931-35 to 1961-62 are roughly the same (table E). Table 6 shows mortality by sex in the perinatal period.

Table E. Percent change in infant mortality rates, by age and sex: Norway, 1901-5 to 1961-62, and 1931-35 to 1961-62

Year	Under 1 year		Under 7 days		7 days to 1 month <sup>1</sup>		1-11 months <sup>2</sup>	
	Male	Female	Male	Female	Male	Female	Male	Female
	Percent change							
From 1901-5 to:								
1931-35-----	-43	-46	+7	+8	-52	-55	-55	-59
1961-62-----	-77	-79	-30	-36	-86	-86	-89	-89
From 1931-35 to:								
1941-45-----	-20	-14	-24	-18	-11	-7	-19	-12
1951-55-----	-50	-49	-32	-33	-69	-65	-59	-57
1961-62-----	-60	-61	-35	-40	-70	-70	-75	-74

<sup>1</sup>1951-62, 7-27 days.

<sup>2</sup>1951-62, 28 days-11 months.

In 1960 the difference between rates for males and females was less in stillbirths than in deaths in the first week after birth. From 1901-5 to 1941-45 the stillbirth rates for males were about 20 percent higher than those for females, but during the last 15 years the stillbirth rate for males has decreased relatively more than that for females. Consequently, the difference in stillbirth rates by sex has been reduced from 21 percent in 1936-45 to 10 percent in 1956-60, and further in 1961-62 to 6 percent. The saving of male lives before and during birth is offset by an excess of male deaths in the first week after birth. When the trend of the total perinatal mortality is considered, the rates of reduction from period to period have been about the same for both sexes.

The excess mortality among male infants is greatest in the first week of life and declines with advancing age of child. As mortality for males in this early neonatal period has declined less than has that for females, the differences between infant mortality rates by sex have been increasing, particularly since World War II (table F).

Table G shows the risk of mortality for liveborn male and female infants in the different months after birth. The rates are calculated by relating number of deaths in the first, second, and so forth month after birth, to the number exposed to the risk of dying in each month. The very small number of infant deaths after the first month of life must be taken into consideration when drawing conclusions from these data. The excess mortality of males, compared with mortality of females, shows a declining tendency with advancing age. In the last months of the first year there is scarcely any difference in the risk of mortality of the two sexes.

#### Legitimacy Status

The risk of death within the first year of life for an illegitimate birth has always been much greater than that for a legitimate one (table 7). In this century, however, the proportion of illegitimate births in Norway has been so insignificant (table B) that the higher mortality of these children has had practically no influence on the

Table F. Sex ratios based on stillbirth, perinatal, and infant mortality rates by age: Norway, 1901-62

Year	Perinatal mortality	Stillbirth	Infant mortality			
			Under 1 year	Under 7 days	Under 1 month <sup>1</sup>	1-11 months <sup>2</sup>
Rate for females = 100						
1961-62-----	121	106	136	146	142	124
1956-60-----	121	110	129	139	138	116
1951-55-----	125	118	128	135	131	124
1946-50-----	125	117	132	137	134	131
1941-45-----	122	121	121	125	123	119
1936-40-----	123	121	130	127	129	130
1931-35-----	122	115	130	134	131	129
1926-30-----	127	120	128	137	131	125
1921-25-----	122	120	123	126	123	122
1916-20-----	124	117	124	133	128	122
1911-15-----	122	120	121	126	124	119
1906-10-----	122	117	121	131	128	118
1901-5-----	124	119	122	135	127	119

<sup>1</sup>1951-62, under 28 days.

<sup>2</sup>1951-62, 28 days-11 months.

Table G. Average annual infant mortality rates, by sex and age in months: Norway, 1921-30, 1931-40, and 1951-60

Age	1951-60		1931-40		1921-30	
	Male	Female	Male	Female	Male	Female
Rate per 1,000 survivors of specified sex at beginning of each age interval						
0-1 month-----	14.53	10.85	23.89	18.77	25.84	20.21
1-2 months-----	1.92	1.56	4.47	3.41	5.89	4.57
2-3 months-----	1.68	1.37	4.10	2.97	4.84	3.39
3-4 months-----	1.21	0.91	2.70	2.48	3.47	2.76
4-5 months-----	0.93	0.73	2.05	1.56	2.80	2.19
5-6 months-----	0.77	0.66	1.85	1.49	2.53	1.93
6-7 months-----	0.70	0.72	1.76	1.30	2.36	1.79
7-8 months-----	0.54	0.55	1.57	1.09	2.07	1.82
8-9 months-----	0.60	0.41	1.04	1.04	1.92	1.69
9-10 months-----	0.42	0.39	1.14	0.89	1.69	1.67
10-11 months-----	0.35	0.25	0.94	0.80	1.50	1.42
11-12 months-----	0.29	0.29	0.83	0.74	1.44	1.42

national level of infant mortality. However, a comparison of the mortality rates for the two groups of births is of considerable interest from a sociomedical point of view. The relationship between legitimacy and infant death may throw some light on the importance of the mother's

environmental conditions for the viability of her child.

Around 1900 infant mortality among illegitimate births was about 99 percent higher than that among those born in wedlock (table H). During the first two decades of this century,

Table H. Ratios of illegitimate to legitimate perinatal and infant mortality rates, by age: Norway, selected years, 1901-60

Year	Perinatal mortality	Infant mortality		
		Under 1 year	Under 1 month <sup>1</sup>	1-11 months <sup>2</sup>
Ratio of illegitimate to legitimate				
1956-60-----	188	194	213	163
1946-50-----	173	217	220	213
1936-40-----	157	184	194	172
1921-25-----	174	168	191	151
1901-5-----	183	199	194	202

<sup>1</sup>1951-60, under 28 days.

<sup>2</sup>1951-60, 28 days-11 months.

Table J. Stillbirth rates and index numbers, by birth order and age of mother: Norway, selected years, 1936-60

Year and birth order	Age of mother							
	All ages	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45-49 years
<u>1956-60</u>								
Rate per 1,000 total births								
Total-----	13.9	10.3	10.1	11.7	14.4	19.1	28.0	40.3
First-----	15.5	10.5	12.1	15.0	23.2	28.2	34.6	45.5
Second and over-----	13.1	7.5	7.0	10.1	12.3	17.6	27.2	39.8
<u>1946-50</u>								
Total-----	17.1	12.4	11.6	13.8	17.1	22.6	30.2	44.9
First-----	21.6	12.9	13.0	19.1	30.0	44.8	52.0	50.0
Second and over-----	14.5	6.5	8.8	9.7	12.9	18.2	27.8	44.4
<u>1936-40</u>								
Total-----	22.1	15.1	13.3	17.5	23.1	29.6	41.2	57.9
First-----	25.7	15.5	15.1	22.7	36.1	54.8	72.8	65.9
Second and over-----	19.5	8.0	8.7	12.3	17.1	24.4	37.8	57.5
<u>1956-60 in percent of 1936-40</u>								
Index number								
Total-----	63	68	76	67	62	65	68	69
First-----	60	68	80	66	64	51	48	69
Second and over-----	67	94	80	82	72	72	72	69

special legal and social provisions were made to improve the status of the unmarried mother. Although perinatal and infant mortality among illegitimate births was considerably reduced, the excess mortality among these children is still impressive.

#### Maternal Age and Parity

Stillbirth is lowest among mothers 20-24 years and rises steadily with increasing age of mother (table J). On the average the incidence of stillbirths is higher in the first delivery than in later deliveries, and the rising mortality of

infants of primiparae above age of 30 is quite striking. During the last 20 years the stillbirth rate of first-born infants decreased considerably in all age groups of mothers, and the reduction exceeded that observed among later births. The excess mortality before and during birth of first-born infants compared with that of infants of higher birth order has declined from 32 percent in 1936-40 to 18 percent in 1956-60. This improvement in the vitality of the first-born infant has been the main cause of the downward trend of the overall stillbirth rate.

It is apparent from table 8 that in the first month of life, mortality of first-born infants has

Table K. Percentage distribution of legitimate live births, by birth order: Norway, 1929-60

Year	All births	Birth order					
		1	2	3	4	5	6 and over
Percentage distribution							
1956-60-----	100.0	35.2	31.7	18.2	8.3	3.6	3.0
1951-55-----	100.0	37.9	30.2	16.5	8.0	3.7	3.7
1946-50-----	100.0	36.9	30.1	16.7	8.0	3.9	4.4
1941-45-----	100.0	41.1	28.1	14.4	7.2	3.9	5.3
1936-40-----	100.0	41.1	24.4	13.4	7.7	4.7	8.7
1933-35-----	100.0	34.9	22.6	14.3	9.1	6.0	13.1
1929-32-----	100.0	30.3	21.3	14.5	10.2	7.4	16.3

been higher than that of infants of birth orders 2 and 3. During the rest of the first year the first-born infant has had a lower mortality rate than children belonging to the other parity groups specified in the table.

Over one-third of legitimate births are first-born children (table K), and it is obvious that the mortality intensity of this parity group has largely influenced development of the total infant mortality, particularly in the neonatal period. Neonatal mortality has declined practically at the same rate in all parity groups from 1931-35 to 1956-60:

Birth order	Under 1 year	Under 1 month	Under 24 hours	24 hours to 1 month	1-11 months
Percent decrease					
Total--	55	44	26	53	66
1-----	52	42	31	48	67
2-----	54	43	35	49	64
3-----	55	43	19	55	65
4 or more-	52	44	16	57	59

Consequently, excess mortality of first-born in the neonatal period has remained practically unchanged in Norway since 1930.

#### Seasonal Trend

Table L shows the monthly fluctuations of the infant mortality rates. The number of deaths among infants occurring in the different months ought to have been related to the number of infants under risk of dying in the month in question, i.e., those born in the current month and in the preceding 11 months. But as this number is not known the number of deaths in each month is related to the number of live births in the same month. Although this procedure is not theoretically correct, it does afford an approximate index of the monthly variation in the risk of death at ages under 1 year. Excess mortality in winter and spring compared with infant mortality in summer and early autumn stands out very clearly in the relative numbers.

Table 9 shows the influence of month of birth on neonatal and postneonatal mortality. Infants born in the summer and autumn months have the best chance of surviving the first month after birth. However, these infants experience higher mortality in the ages 1-11 months, when they face the hazards of the cold and dark winter

Table L. Infant mortality rates and index numbers, by month of death: Norway, selected years, 1911-60

Month of death	1956-60	1951-55	1931-35	1911-15	1956-60	1951-55	1931-35	1911-15
	Infant deaths per 1,000 live births in same month				Index number			
Total---	19.9	22.6	44.9	66.3	100	100	100	100
January-----	22.1	27.1	56.9	78.6	111	120	127	119
February-----	22.0	26.3	51.1	73.6	111	116	114	111
March-----	20.1	21.4	51.0	74.4	101	95	114	112
April-----	19.2	21.5	47.9	71.8	96	95	107	109
May-----	19.3	21.5	46.1	67.9	97	95	103	103
June-----	19.0	20.8	41.9	61.7	95	92	93	93
July-----	19.0	18.8	40.6	64.9	95	83	90	98
August-----	16.9	18.3	35.9	60.7	85	81	80	92
September-----	16.8	18.6	30.8	47.9	84	82	69	72
October-----	19.6	24.9	41.8	59.3	98	110	93	90
November-----	21.8	27.9	45.3	64.8	110	124	101	98
December-----	23.1	26.5	48.0	69.1	116	117	107	104

Table M. Stillbirth rates and index numbers, by month of birth: Norway, selected years, 1911-60

Month of birth	1956-60	1951-55	1931-35	1911-15	1956-60	1951-55	1931-35	1911-15
	Rate per 1,000 total births in specified month				Index number			
Total---	14.3	15.3	24.9	22.2	100	100	100	100
January-----	14.8	16.2	25.7	22.9	103	106	103	103
February-----	15.3	16.7	27.0	22.2	107	109	108	100
March-----	13.7	16.9	24.9	23.3	96	111	100	105
April-----	13.4	14.0	26.2	23.1	94	92	105	104
May-----	14.0	16.1	22.9	21.6	98	105	92	97
June-----	13.7	15.0	23.6	19.2	96	98	95	87
July-----	13.7	14.2	22.9	21.0	96	93	92	95
August-----	15.5	15.8	26.0	22.7	108	103	104	102
September-----	14.0	14.0	23.6	21.0	101	92	95	95
October-----	14.1	14.5	25.6	23.0	99	95	103	104
November-----	13.7	14.3	24.3	25.8	96	94	98	116
December-----	15.1	15.1	26.2	21.4	106	99	105	96

months (fig. 3). On the other hand, infants born during the winter and spring are exposed to greater risk in the first month of life than infants born during the summer and autumn months, but have lower mortality later in the postneonatal period.

The occurrence of stillbirths is also highest in the winter and spring months (table M) and lowest during summer and autumn, but these seasonal variations are less marked than those in neonatal mortality.

### Urban-Rural Differences

Both in rural districts and in towns the general trend of infant mortality has been consistently downward since the turn of the century (table 10), but the pace of movement since 1901-5 has not been the same:

Area	Peri-natal mor-tal-ity	Infant mortality		
		Under 1 year	Under 1 month <sup>1</sup>	1-11 months <sup>2</sup>
<u>1911-15</u>		Percent change since 1901-5		
Rural districts-	-5	-17	-12	-19
Towns-----	-5	-18	-10	-22
<u>1931-35</u>				
Rural districts-	+6	-38	-19	-50
Towns-----	+6	-53	-25	-66
<u>1961-62</u>				
Rural districts-	-37	-74	-44	-87
Towns-----	-48	-83	-62	-93

<sup>1</sup>1951-62, under 28 days.

<sup>2</sup>1951-62, 28 days-11 months.

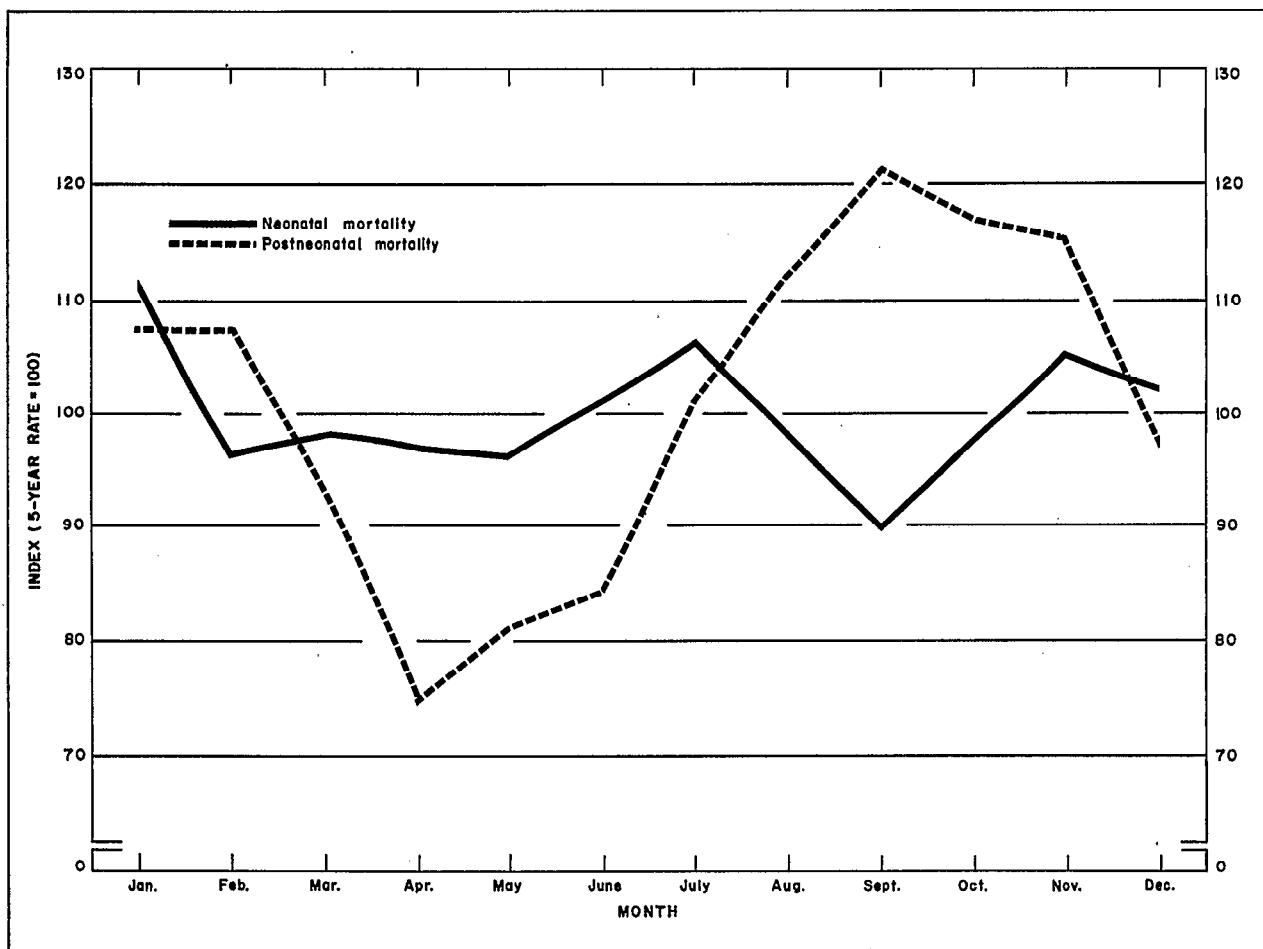


Figure 3. Indexes of neonatal and postneonatal mortality rates by month of birth: Norway, 1955-59.



Table N. Ratios of town to rural district perinatal and infant mortality rates, by age:  
Norway, 1901-62

Year	Perinatal mortality	Infant mortality		
		Under 1 year	Under 1 month <sup>1</sup>	1-11 months <sup>2</sup>
Rate for rural districts = 100				
1961-62-----	100	96	98	91
1956-60-----	97	92	104	74
1951-55-----	97	86	97	73
1946-50-----	104	94	105	83
1941-45-----	103	91	101	81
1936-40-----	108	97	101	93
1931-35-----	113	111	109	112
1926-30-----	122	112	106	118
1921-25-----	107	118	107	126
1916-20-----	118	127	114	137
1911-15-----	113	144	121	160
1906-10-----	108	142	117	159
1901-5-----	113	147	118	165

<sup>1</sup>1951-62, under 28 days.

<sup>2</sup>1951-62, 28 days-11 months.

Since 1915 the infant mortality rate has declined much faster in towns than in rural districts. The excess infant mortality in towns compared with rural districts, which was 44 percent in 1911-15, was reduced to 11 percent in 1931-35 (table N). In the following years the total infant mortality rate was on the average lower in towns than in rural districts. However, in recent years the difference between the rates has been quite insignificant.

Infant mortality rates in towns and rural districts differ most in the postneonatal period when deaths occurring among infants are mainly related to environmental factors, and much less in the neonatal period when mortality is chiefly due to fetal conditions connected with pregnancy and confinement. Despite improvements in obstetric practice and in antenatal supervision of mothers since 1900, there was only a slight fall in the

perinatal mortality rates in both towns and rural districts during the first two decades of this century and an increase in the rates in the 1920's, particularly in towns.

According to statistics available for 1956-60 there are comparatively small geographical variations in mortality before, during, and immediately after birth, but quite considerable ones among infants 1-11 months of age. Post-neonatal mortality is particularly high in the northern and also in the southern part of the country. The two principal towns, Oslo and Bergen, have the most favorable postneonatal mortality rates in Norway. These two cities also have low mortality in the perinatal and the neonatal periods, but the mortality in these age groups does not differ as much from the national average as that *after* the first month of life.

## Cause of Death

In Norway causes of death are reported only for deaths among liveborn infants, and not for stillbirths. Until 1950 causes of death among children in the first year after birth were tabulated by sex, but without subdivisions for age at death. Beginning with 1951, however, statistics on causes of death have been available separately for the neonatal and the postneonatal periods.

Throughout the first decades of this century the reporting of causes of death, particularly for early infancy, did not cover all deaths registered by the clergy. Because of both inadequate reporting and poor diagnosis, calculation of mortality rates from different diseases in the first period of life are of limited value. However, average mortality rates for all diseases and conditions peculiar to early infancy may give an approximate picture of the trend for 1899-1935. Table O presents for 1899-1935 mortality attributed to congenital malformations and other diseases peculiar to early infancy, and to postnatal infections and other diseases closely related to economic and social conditions. The most significant feature of infant mortality in this period is the remarkable drop in mortality of all kinds of infections in striking contrast to

the rather slow decline of mortality from congenital malformations and diseases peculiar to early infancy.

By the Medical Acts of 1927 and 1939 more precise rules were provided for certification of the causes of death, and different measures were taken by the National Health Service and the Central Bureau of Statistics to improve statistics on causes of death and make them more useful from a sociomedical point of view.

Table I1 shows the mortality trend during the last 30 years for the main causes of infant death. As was mentioned earlier, three different lists of classification have been used in Norway during this period, but still it has been possible to establish fairly comparable broad groups of causes. From 1931-35 to 1961-62, the total mortality from diseases assigned to congenital malformations and to other diseases and conditions peculiar to early infancy declined about 40 percent from 199.3 to 124.8 per 10,000 live births. Within this broad cause group, there has been a marked increase in the mortality due to well-defined causes, and a sharp decline in the mortality rate of those listed as unspecified or unknown. The main reason for this development is the improvement in the statistical material due to the increasing knowledge and diagnostic

Table O. Average annual infant mortality rates, by cause: Norway, selected years, 1899-1935

Cause of death	1931-1935	1919-1922	1909-1912	1899-1902
	Rate per 10,000 live births			
Congenital malformations and diseases peculiar to early infancy-----	199.3	222.0	221.9	245.4
Other causes of death-----	249.8	350.7	456.2	663.6
Tuberculosis-----	10.1	20.2	29.1	51.5
Common infective diseases-----	14.5	33.7	57.0	66.5
Pneumonia and influenza-----	76.9	135.0	132.8	190.6
Diarrhea and enteritis-----	19.5	46.4	93.1	176.2
Other diseases-----	125.8	112.2	141.6	175.9
Accidents-----	3.0	3.2	2.6	2.9

skill of physicians and to the intensive querying procedure practiced by the Central Bureau of Statistics in recent years.

In addition, the increase in the mortality rates for congenital malformations and birth injuries is also due in part to changes in the classification rules adopted in Norway in 1941 and 1951. Since 1941 infant deaths from cerebral hemorrhage have been classified under birth injuries, whereas previously these deaths had been registered under the general group vascular lesions affecting the central nervous system. Also, according to the rules adopted in Norway in 1951, most cases of death from heart disease have been classified under congenital malformations of circulatory system. Previously these deaths had been classified to the general group diseases of the circulatory system. The effect of these classification changes on the size of the mortality rates for congenital malformations and for birth injuries is, however, of minor importance compared with the general improvement in the statistical material.

Of the diseases related to environmental factors, pneumonia and influenza have caused most deaths among infants in Norway. In the first 50 years of this century between 20 and 25 percent of all infant deaths were assigned to these diseases. In the last decade the proportion has been somewhat reduced, but deaths from pneumonia and influenza still amount to about half of all registered infant deaths from infections and other diseases caused by environment.

The death rate from pneumonia and influenza dropped in the first 30 years of this century from 191 per 10,000 live births in 1899-1902 to 77 in 1931-35. This decline in mortality largely reflected the general improvements in medical care of infants and advances in the standard of living; no specially effective treatment of these diseases was then available in Norway. In 1938 sulfa treatment for pneumonia was introduced but was not generally applied for infants until after World War II. The introduction of penicillin in 1946 and of other antibiotics later led to sensational reductions in infant mortality from pneumonia and influenza. In 1946-50 mortality from these diseases was 60 per 10,000 live births and in 1961-62 it had fallen to 18 per 10,000, a decline of 70 percent in 15 years.

At the beginning of the century tuberculosis was an important cause of death in the first year of life. At that time, infant mortality from this cause among infants was about the same as that among young adults. From around 1900 to about 1930 mortality from all forms of tuberculosis fell about 80 percent. Throughout the following years the downward trend continued, and since 1951-55 mortality from tuberculosis among infants has been less than 1 per 10,000 live births (table P).

This favorable development was essentially due to a successful campaign against tuberculosis started about 1900 by public health agencies, the medical professions, and voluntary health organizations to prevent the spread of infection. The legal basis of this work was a special law on the control of tuberculosis adopted in 1900. The anti-tuberculosis campaign was much intensified after World War I, and the registration and control of patients and their families by the local public health service became very complete and effective. Between 1926 and 1930 tuberculin tests and BCG vaccination of children were introduced and in the course of 5 years were generally practiced all over the country. These prophylactic efforts have no doubt saved many infants from infection with tuberculosis. Since World War II, new medical advances have contributed largely to a reduction in mortality from this disease among infants. The introduction of chemotherapy has been very effective in arresting the development of tuberculosis, and especially of tuberculous meningitis, in the early stages.

Table 12 gives the morbidity rate and case fatality rate of the principal communicable diseases—diphtheria, scarlet fever, whooping cough, and measles—for all ages, and table 13 shows the decline in infant mortality for the same diseases. Among the common infective diseases, whooping cough is particularly hazardous to young infants. In fact, the death rate from whooping cough in the first year of life is greater than for the other three diseases combined. The mortality rates for the two sexes also show that in Norway attacks of whooping cough have generally been more fatal for girls than for boys. Since 1956-60, the trend is less certain because of small numbers. About 1900 the infant mortality from whooping cough was 44 per 10,000

Table P. Average annual infant mortality rates for tuberculosis, by sex: Norway, 1901-62

Year	All forms of tuberculosis			Pulmonary tuberculosis		Tuberculous meningitis		Other forms of tuberculosis	
	Both sexes	Male	Female	Male	Female	Male	Female	Male	Female
	Rate per 10,000 live births of specified sex								
1961-62-----	0.1	-	0.2	-	-	-	-	-	0.2
1956-60-----	0.1	0.0	0.1	-	0.0	-	0.0	0.0	-
1951-55-----	0.7	1.0	0.5	0.1	0.1	0.7	0.3	0.2	0.1
1946-50-----	2.0	1.8	2.4	0.6	0.3	0.8	1.2	0.4	0.9
1941-45-----	3.4	3.1	3.8	0.7	1.1	1.8	2.0	0.6	0.7
1936-40-----	6.5	6.7	6.2	0.6	0.7	5.4	4.6	0.7	0.9
1931-35-----	10.1	10.4	9.6	1.4	1.6	8.3	7.0	0.7	1.0
1926-30-----	15.7	17.6	13.9	2.4	2.1	13.0	9.4	2.2	2.4
1921-25-----	19.2	21.5	16.8	1.6	3.2	14.0	11.4	5.9	2.2
1916-20-----	21.5	22.5	20.5	3.8	4.0	16.6	14.0	2.1	2.5
1911-15-----	27.1	28.1	26.1	4.3	3.1	19.2	18.4	4.6	4.6
1906-10-----	30.6	33.2	27.9	4.7	4.4	24.0	20.0	4.5	3.5
1901-5-----	44.2	46.6	41.5	8.4	6.5	31.0	28.4	7.2	6.6

liveborn boys against 51 per 10,000 girls. After 30 years the mortality rate was reduced to about 25 percent of that at the turn of the century, and in 1961-62 it had fallen to less than 1 per 10,000. Some of the credit for this drop goes to immunization (preventive care), which has been practiced in Norway since 1951, but it is also to a large degree the result of better medical treatment.

The campaign against diphtheria has been highly successful since immunization procedures and ways of controlling the infection were introduced by the public health service. In Norway there were extensive epidemics of diphtheria after World War I, and again during World War II. In 1919-22 and in 1941-45 infant mortality from diphtheria amounted to between 6 and 7 per 10,000 live births. In the other periods, generally very few deaths from this disease have been registered among children under 1 year.

The numbers of deaths from scarlet fever and measles have also been cut spectacularly, and today it is very seldom that either of these

diseases is reported as the cause of death for children under 1 year of age. The introduction of sulfa drugs and penicillin therapy for streptococcal infections has helped to speed the decline in mortality.

In the beginning of the present century a relatively large number of infant deaths was caused by gastroenteritis which accounted for about one-fifth of deaths in this age group in 1899-1902. As a result of sociohygienic measures and, to a smaller extent, of the use of antibiotics and of intravenous fluid therapy, this disease has virtually been eliminated as a cause of death among infants in Norway.

As most of the great advances in reducing infant mortality since 1900 have been made against infections, the importance of other diseases and mortal conditions of early infancy has increased as a component of the general infant mortality rate. About 1900, approximately 27 percent of all deaths among children in the first year of life were due to congenital malformations and diseases peculiar to early infancy. In 1931-35 the

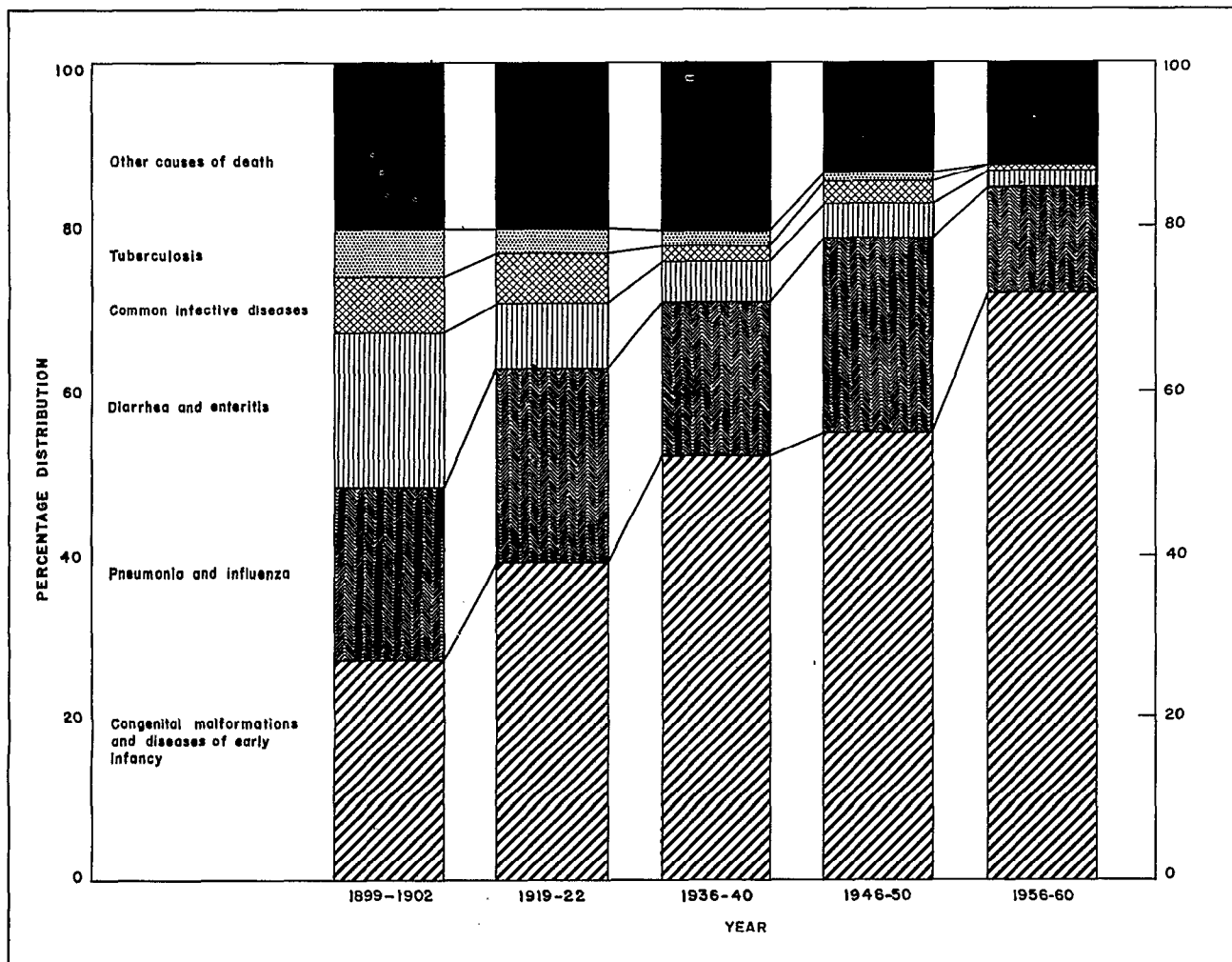


Figure 4. Percentage distribution of principal causes of infant deaths: Norway, specified years, 1899-1960.

percentage had increased to 50, in 1951-55 to 67, and in 1961-62 to 76 (fig. 4).

Table 14 presents an analysis of infant mortality in Norway for 1951-62, showing details of the causes of death in terms of the International Classification of Diseases of 1948 introduced in Norway in 1951. Although the numbers of deaths in the different groups are so small that various random factors may be reflected, the figures may give a picture of the importance of the causes of infant death in Norway at the present time.

**Neonatal mortality.**—Neonatal mortality is dominated by conditions designated as congenital malformations and other diseases peculiar to

early infancy. Among these causes of death "immaturity not otherwise specified" is the most prominent.<sup>4</sup> In 1951-55 "immaturity not otherwise specified" was the underlying cause of death for almost 25 percent of all neonatal deaths, and in 1956-60 for 30 percent. However, many infants whose deaths are attributed to other defined diseases may also be immature (table 15).

<sup>4</sup> On the Norwegian birth and death certificates neither birth weight of child nor the gestation period is requested. But, generally, when "immaturity" is mentioned as cause of death, the infant had a weight of 2,500 grams or less or was born before the end of the normal period of gestation.

Table Q. Stillbirth and infant mortality rates, by age: Scandinavian countries, 1962

Country	Stillbirth rate	Infant mortality rate			
		Under 1 year	Under 1 week	1-4 weeks	5-51 weeks
	Rate per 1,000 total births	Rate per 1,000 live births			
Norway-----	13.6	17.7	10.3	1.7	5.7
Sweden-----	12.4	15.4	11.1	1.3	3.0
Denmark-----	11.9	20.1	13.2	2.1	4.8

Of all infants dying in 1951-55 during the neonatal period whose deaths were assigned to diseases of early infancy (ICD 760-776), 60 percent were assigned to immaturity and in 1956-60, 68 percent. Of deaths in the postneonatal period classified under the same category, the percent indicated as immature was 33 in 1951-55 and 36 in 1956-60. During 1956-60 for the causes of death classified other than diseases of early infancy, 13 percent of neonatal and only 2 percent of postneonatal deaths had immaturity indicated as a subsidiary or contributing cause of death. Calculated in relation to all registered deaths in the neonatal and postneonatal period in 1956-60, the proportion of immature infants amounted to 57 and 4 percent, respectively.

Since Norway has no information on the number of live births occurring before the end of the normal gestation period, it is not possible to calculate the mortality rate separately for these babies. But clinical experience shows that premature children have an enormous handicap in the first month of life compared with that of infants born at term.

On the basis of material from the municipal clinic of Oslo, the incidence of immaturity among registered births at the beginning of the century

was calculated as 7.3 percent. In the thirties this proportion had declined to 5.4 percent at the same clinic. In later years the frequency of immaturity seems to have remained stable at 5 to 6 percent. The neonatal mortality of immature children in the University Hospital in Oslo is about 15 to 20 percent.

*Postneonatal mortality.*—In the postneonatal period most of the deaths are due to pneumonia and other respiratory diseases. The average postneonatal mortality rate of these conditions has declined very much in later years, from 30.6 per 10,000 in 1951-55 to 13.9 per 10,000 in 1961-62. However, the risk of dying from pneumonia and other diseases of the respiratory system varies in this age group in the different geographical areas. It is relatively low in the eastern inland counties and very high in the northern counties and the coastal districts in the southern and western parts of the country.

Mortality due to pneumonia among infants in Norway is at present considerably higher than in Sweden and Denmark, and this fact is the main cause for the unfavorable position of the average postneonatal mortality in Norway, compared with that in the two other Scandinavian countries (table Q).

## SUMMARY

Since mortality during the first year of life is particularly sensitive to changes in social and economic conditions, it is quite natural that the socioeconomic development of this century in Norway leading to a large rise in the level of income and a marked progress in medicine, sanitation, and hygiene has brought about a great reduction in infant mortality. At the turn of the century an average of 1 in 10 registered births died either before or during delivery or in the first year after birth; at present the total loss during this period is 1 in 32.

The rate of reduction of mortality in the first year has varied considerably in the different age divisions of the first year. The most striking feature of the development during the last 60 years in Norway is the enormous fall in mortality among infants *after* the first week of life and the "lag" in the downward trend of mortality rates in the perinatal period. In spite of improvement in obstetric practice and in antenatal supervision of mothers, very little change was observed in the stillbirth rate and the early neonatal mortality rate during the first four decades of this century. However, since 1940 the risk of perinatal death has decreased considerably, even though the decrease has been markedly less than that for mortality in the late neonatal and postneonatal periods.

Usually about 80 percent of perinatal deaths occur before, during, or within 24 hours after delivery. The numerical relation between deaths which occur in close connection with delivery and those which occur during 1-6 days after delivery has remained unchanged; however, of deaths in the first group, an increasing percentage have been born alive, then die within 24 hours after birth. With better obstetric services more children, especially those premature and not viable, which in years past would have died prior to or during birth, now survive until after birth.

In the remaining part of the neonatal period, and in the age 1-11 months, there has been a straight downward trend since 1900. Late neonatal mortality declined 53 percent from 1900 to 1930, and in the same period, postneonatal mor-

tality dropped 57 percent. Since the beginning of the 1930's the improvement in mortality after the first week of life has been even more impressive. In 1961-62 the late neonatal mortality rate in Norway was 70 percent and in the group 1-11 months of age 75 percent below that of 30 years ago.

The different trends of mortality in early infancy and later in the first year of life have resulted in essential changes in the distribution of stillbirths and infant deaths over the whole first year of life. About 1900, roughly 40 percent of all these deaths occurred in the perinatal period, while in 1961-62 deaths in the perinatal period amounted to 75 percent of all registered stillbirths and infant deaths.

The fact that an illegitimate child has a higher risk of death in infancy than does a legitimate child is well-known. Special legal and social provisions have been taken to improve the status of the unmarried mother, and mortality of their children has declined considerably, but, as a rule, not so much as has mortality of legitimate infants. Excess mortality of illegitimate infants is very prominent even today, but it should be mentioned that the number of illegitimate births has always been relatively insignificant in Norway and generally has not influenced the national level of the infant mortality.

The effect of the mother's age on the viability of the child before and during delivery has been examined for legitimate births. Mothers 20-24 years old have the least risk of stillbirth. However, the rate increases rapidly with increasing age of the mother. In 1956-60 the stillbirth rate for mothers at the age of 40-44 years was roughly three times as high as the rate for those 20-24. In all age groups of mothers, the stillbirth rate was considerably higher for the first-born child than for children born later. But during the last 20 years the stillbirth rate for first-born infants has decreased relatively more than has that for later births, and excess mortality of first-born stillbirths compared with that of stillbirths of higher birth order has declined.

The increased vitality of the first-born infant explains to some extent the downward trend of overall fetal mortality in recent years.

However, in the neonatal period, mortality has declined practically at the same rate in all the parity groups; consequently excess mortality of the first-born infant in this period has remained practically unchanged in Norway since 1930.

In Norway infant mortality shows rather pronounced seasonal variations with excess mortality among infants during the winter and spring months compared with that in the summer and early autumn.

At the turn of the century infant mortality was much lower in the rural districts than in the towns, particularly in the postneonatal period. But in the course of the following 30 years excess mortality in the towns disappeared, and since the beginning of the 1930's infant mortality has been lower in the urban districts. Considering the situation in the different parts of the country there are relatively small geographical variations in the stillbirth and neonatal mortality rates. However, in the postneonatal period when deaths are mainly related to environmental factors, there are noticeable geographical differences. Postneonatal mortality is relatively high in the northern part of the country and also in the coastal counties in the south and west, compared with that in the eastern part of the country. The two principal towns, Oslo and Bergen, have the most favorable postneonatal mortality rates.

The information about cause of infant death which was available before 1930 is neither complete nor reliable; therefore, it is possible to get only a general idea of the trend of the different causes of death in the first decades of this century. After 1930 the quality of the basic material improved, due to more exact reports from the physicians and also to the intensive querying procedure of the Central Statistical Bureau which

is charged with the presentation of statistics of cause of death.

The decline of infant mortality since 1900 is largely a result of the successful campaign in Norway against infections caused by environmental factors. Tuberculosis, common infective diseases, diarrhea, and enteritis have been practically eliminated as causes of infant deaths, and mortality from pneumonia and other diseases of the respiratory organs has been considerably reduced.

As infections caused by external factors have been gradually brought under control, the hazards to the newborn child from internal factors have become of greater importance in the development of infant mortality. Among these hazards, immaturity is most frequently reported, both as a primary and as a subsidiary cause of death. Without doubt, immaturity is at present the biggest problem in connection with neonatal mortality in Norway, and any future important decline will essentially depend on what may be achieved with regard to prevention and control of this condition.

With regard to postneonatal mortality, there is undoubtedly still room for improvement. For instance, the great geographical variations of the mortality from pneumonia among infants suggest that it should be possible to bring the mortality of this disease in the northern and southwestern parts of the country to a level more equal to that already prevailing in the eastern counties. It is because of the relatively high mortality from respiratory diseases among infants that the postneonatal mortality in Norway today is nearly twice as high as that in Sweden, and also somewhat higher than that in Denmark.





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Table 1. Population by age and sex: Norway, 1900, 1930, and 1960

Sex and age	1960	1930	1900
<u>Both sexes</u>			
All ages-----	3,591,234	2,814,194	<sup>1</sup> 2,240,860
Under 5 years-----	308,225	237,743	283,062
5-9 years-----	302,774	279,242	261,618
10-14 years-----	317,154	285,144	241,428
15-19 years-----	264,198	270,287	217,324
20-29 years-----	408,035	474,288	344,600
30-39 years-----	479,789	401,218	257,711
40-49 years-----	500,981	297,912	220,192
50-59 years-----	428,951	241,340	172,696
60-69 years-----	327,421	175,519	126,671
70 years and over-----	253,706	151,501	115,558
<u>Male</u>			
All ages-----	1,789,406	1,371,919	<sup>1</sup> 1,085,691
Under 5 years-----	157,854	121,386	143,809
5-9 years-----	155,326	142,164	133,515
10-14 years-----	162,885	145,256	123,228
15-19 years-----	135,336	137,283	109,598
20-29 years-----	207,957	232,353	163,315
30-39 years-----	243,306	194,730	118,167
40-49 years-----	251,026	140,271	102,232
50-59 years-----	209,472	113,386	80,605
60-69 years-----	154,628	79,337	59,046
70 years and over-----	111,616	65,753	52,176
<u>Female</u>			
All ages-----	1,801,828	1,442,275	<sup>1</sup> 1,155,169
Under 5 years-----	150,371	116,357	139,253
5-9 years-----	147,448	137,078	128,103
10-14 years-----	154,269	139,888	118,200
15-19 years-----	128,862	133,004	107,726
20-29 years-----	200,078	241,935	181,285
30-39 years-----	236,483	206,488	139,544
40-49 years-----	249,955	157,641	117,960
50-59 years-----	219,479	127,954	92,091
60-69 years-----	172,793	96,182	67,625
70 years and over-----	142,090	85,748	63,382

<sup>1</sup>Figure does not correspond exactly to that in table 2 as the resident population has been computed in two different ways.

Table 2. Population by rural districts and towns: Norway, census years, 1900-1960

Year	Total population	Towns <sup>1</sup>		Rural districts <sup>1</sup>			
		Number	Percent of total population	Total	Rural agglomerations <sup>1</sup>		
					Number	Percent of total population	Percent of total rural population
1960-----	3,591,234	1,152,377	32.1	2,438,857	900,254	25.0	36.9
1950-----	3,278,546	1,054,820	32.2	2,223,726	656,808	20.0	29.5
1946-----	3,156,950	884,097	28.0	2,272,853	697,804	22.1	30.7
1930-----	2,814,194	800,514	28.5	2,013,680	529,703	18.8	26.3
1920-----	2,649,775	785,404	29.6	1,864,371	414,616	15.6	22.2
1910-----	2,391,782	689,228	28.8	1,702,554	232,154	9.7	13.6
1900-----	2,240,032	627,650	28.0	1,612,382	172,548	7.7	10.7

<sup>1</sup>Towns include all municipalities with administrative and legal urban status. Rural districts include all remaining municipalities in Norway. Rural agglomerations include densely populated areas within rural districts, and at the 1960 census were defined as areas with at least 100 persons or 20 inhabited houses. Boundaries of urban and rural municipalities are according to those existing in census years.

Table 3. Average annual death rates by age and sex: Norway, selected years, 1901-60

Age	1956-60		1946-50		1931-35		1901-5	
	Male	Female	Male	Female	Male	Female	Male	Female
	Rate per 10,000 live births of specified group							
Under 1 year-----	222.7	172.9	352.5	266.3	505.5	389.4	881.6	725.4
	Rate per 10,000 population of specified group							
1-4 years-----	12.4	9.4	23.4	18.0	34.6	30.8	107.5	103.9
5-9 years-----	6.7	3.6	11.9	7.4	14.8	11.9	36.5	37.2
10-14 years-----	4.8	2.6	7.5	4.6	13.6	11.6	31.9	36.3
15-19 years-----	9.7	3.3	13.4	9.0	24.3	23.3	61.7	56.6
20-29 years-----	13.0	4.8	20.9	13.5	43.1	34.8	91.6	66.5
30-39 years-----	15.6	9.4	24.8	17.0	46.4	39.1	77.1	75.8
40-49 years-----	33.3	21.1	41.6	30.7	60.4	52.8	92.7	84.4
50-59 years-----	87.7	50.7	85.4	63.0	109.8	94.5	142.4	120.3
60-69 years-----	222.6	142.7	204.3	162.1	250.9	204.0	286.2	240.5
70-79 years-----	563.2	454.0	530.5	473.9	627.6	546.5	644.3	584.2
80 years and over-----	1,525.0	1,485.6	1,606.9	1,500.2	1,743.3	1,629.4	1,634.0	1,512.0

Table 4. Average annual perinatal and infant mortality rates and index numbers by age: Norway, 1901-62

Year	Perinatal mortality rate <sup>1</sup>	Infant mortality rate						
		Under 1 year	Under 1 month <sup>2</sup>	Under 7 days	Under 24 hours	1-6 days	7 days to 1 month <sup>3</sup>	1-11 months <sup>4</sup>
Rate per 1,000 live births								
1901-5-----	38.9	80.1	28.7	15.2	7.7	7.5	13.5	51.4
1906-10-----	37.4	69.2	26.0	15.0	7.8	7.2	11.0	43.2
1911-15-----	37.0	65.9	25.4	15.1	7.8	7.3	10.3	40.5
1916-20-----	37.1	61.9	25.7	15.5	7.0	8.5	10.2	36.2
1921-25-----	35.4	51.7	22.1	14.4	6.3	8.1	7.7	29.6
1926-30-----	41.2	49.5	24.5	16.8	8.7	8.1	7.7	25.0
1931-35-----	40.7	44.9	22.5	16.2	8.3	7.9	6.3	22.4
1936-40-----	38.3	39.4	21.3	16.1	8.3	7.8	5.2	18.1
1941-45-----	32.6	37.2	18.4	12.7	7.3	5.4	5.7	18.9
1946-50-----	30.0	31.1	16.0	12.6	7.0	5.6	3.4	15.1
1951-55-----	26.1	22.6	13.1	11.0	6.0	5.0	2.1	9.5
1956-60-----	24.5	19.9	12.4	10.4	5.8	4.6	2.0	7.5
1961-62-----	23.5	17.8	12.2	10.3	5.5	4.8	1.9	5.6
Index number								
<u>Change since 1901-5</u>								
1901-5-----	100	100	100	100	100	100	100	100
1906-10-----	96	86	91	99	101	96	81	84
1911-15-----	95	82	89	99	101	97	76	79
1916-20-----	95	77	90	102	91	113	76	70
1921-25-----	91	64	77	95	82	108	57	58
1926-30-----	106	61	85	111	113	108	57	48
1931-35-----	105	56	78	107	108	105	47	44
1936-40-----	99	49	74	106	108	104	39	35
1941-45-----	84	46	64	84	95	72	42	37
1946-50-----	77	39	56	83	91	75	25	29
1951-55-----	67	28	46	72	78	67	16	18
1956-60-----	63	25	43	68	75	61	15	15
1961-62-----	60	22	43	68	71	64	14	11
<u>Change since 1931-35</u>								
1931-35-----	100	100	100	100	100	100	100	100
1936-40-----	94	88	95	99	100	99	83	81
1941-45-----	80	83	82	78	88	68	81	84
1946-50-----	74	69	71	78	84	71	54	67
1951-55-----	64	50	59	68	72	63	35	42
1956-60-----	60	44	55	64	70	58	32	33
1961-62-----	58	40	54	64	66	61	30	25

<sup>1</sup>Rate per 1,000 total births.

<sup>2</sup>1951-62, under 28 days.

<sup>3</sup>1951-62, 7-27 days.

<sup>4</sup>1951-62, 28 days-11 months.

Table 5. Average annual infant mortality rates, by age and sex: Norway, 1901-62

Year	Under 1 year		Under 7 days		7 days to 1 month <sup>1</sup>		1-11 months <sup>2</sup>	
	Male	Female	Male	Female	Male	Female	Male	Female
	Rate per 1,000 live births of specified sex							
1961-62-----	20.4	15.0	12.1	8.3	2.1	1.7	6.2	5.0
1956-60-----	22.3	17.3	12.1	8.7	2.2	1.7	8.0	6.9
1951-55-----	25.3	19.8	12.6	9.3	2.2	2.0	10.5	8.5
1946-50-----	35.2	26.6	14.5	10.6	3.7	3.0	17.0	13.0
1941-45-----	40.6	33.6	14.1	11.3	6.2	5.2	20.3	17.1
1936-40-----	44.3	34.2	17.9	14.1	5.9	4.4	20.5	15.7
1931-35-----	50.6	38.9	18.5	13.8	7.0	5.6	25.1	19.5
1926-30-----	55.4	43.3	19.4	14.2	8.2	7.0	27.8	22.1
1921-25-----	56.8	46.3	16.0	12.7	8.4	7.0	32.4	26.6
1916-20-----	68.4	55.1	17.6	13.2	11.1	9.2	39.7	32.7
1911-15-----	72.3	59.7	16.7	13.3	11.2	9.2	44.4	37.2
1906-10-----	76.4	63.0	17.0	13.0	12.1	9.8	47.3	40.2
1901-5-----	88.2	72.5	17.3	12.8	14.6	12.4	56.3	47.3

<sup>1</sup>1951-62, 7-27 days.

<sup>2</sup>1951-62, 28 days-11 months.

Table 6. Average annual stillbirth and perinatal mortality rates and mortality rates during the first week of life, by age and sex: Norway, 1901-62

Year	Perinatal mortality rate		Stillbirth rate		Mortality rate during first week of life			
	Male	Female	Male	Female	Under 24 hours		24 hours-6 days	
					Male	Female	Male	Female
	Rate per 1,000 total births of specified sex				Rate per 1,000 live births of specified sex			
1961-62-----	25.6	21.1	13.7	12.9	6.3	4.5	5.8	3.8
1956-60-----	26.8	22.2	14.9	13.6	6.6	4.8	5.5	3.9
1951-55-----	28.8	23.1	16.5	14.0	6.9	5.1	5.7	4.2
1946-50-----	33.1	26.6	18.9	16.1	8.0	5.9	6.5	4.7
1941-45-----	35.7	29.3	22.0	18.2	8.0	6.6	6.1	4.7
1936-40-----	42.1	34.2	24.6	20.4	9.4	7.1	8.5	7.0
1931-35-----	44.6	36.6	26.5	23.1	9.3	7.1	9.2	6.7
1926-30-----	45.8	36.2	26.9	22.4	10.1	7.2	9.3	7.0
1921-25-----	38.8	31.8	23.1	19.3	6.9	5.6	9.1	7.1
1916-20-----	40.9	33.1	23.7	20.2	7.9	6.0	9.7	7.2
1911-15-----	40.5	33.2	24.2	20.2	8.6	7.0	8.1	6.3
1906-10-----	40.9	33.6	24.4	20.9	8.6	6.8	8.4	6.2
1901-5-----	42.9	34.6	26.1	22.0	8.6	6.7	8.7	6.1

Table 7. Average annual perinatal and infant mortality rates, by age and legitimacy: Norway, 1901-60

Year	Perinatal mortality rate		Infant mortality rate					
			Under 1 year		Under 1 month <sup>1</sup>		1-11 months <sup>2</sup>	
	Legit- imate	Illegit- imate	Legit- imate	Illegit- imate	Legit- imate	Illegit- imate	Legit- imate	Illegit- imate
	Rate per 1,000 total births of specified legitimacy		Rate per 1,000 live births of specified legitimacy					
1956-60-----	23.8	44.8	19.2	37.2	11.9	25.3	7.3	11.9
1951-55-----	25.3	46.1	21.7	46.9	12.5	28.6	9.2	18.3
1946-50-----	28.9	49.9	29.4	63.7	15.2	33.5	14.2	30.2
1941-45-----	31.1	52.1	34.5	71.2	17.0	35.7	17.5	35.5
1936-40-----	36.9	58.1	37.4	68.8	20.0	38.9	17.4	29.9
1931-35-----	39.0	63.0	42.5	76.8	21.3	40.9	21.2	35.9
1926-30-----	39.4	63.8	47.2	80.5	22.9	45.2	24.3	35.3
1921-25-----	33.7	58.6	49.4	82.8	20.8	39.8	28.6	43.1
1916-20-----	35.3	61.1	59.2	97.9	24.4	43.1	34.8	54.8
1911-15-----	35.1	62.9	62.2	119.4	23.9	44.4	38.3	75.0
1906-10-----	35.8	59.8	65.4	132.4	24.5	47.2	40.9	85.2
1901-5-----	36.7	67.2	75.3	149.8	26.9	52.2	48.4	97.6

<sup>1</sup>1951-60, under 28 days.<sup>2</sup>1951-60, 28 days-11 months.

Table 8. Average annual infant mortality rates for legitimate births, by birth order and age: Norway, 1931-60

Age and year	Total	Birth order			
		1	2	3	4 or more
<u>Under 1 year</u>		Rate per 1,000 legitimate live births of specified birth order			
1956-60-----	19.2	19.4	17.2	19.1	23.4
1951-55-----	21.7	21.5	19.5	21.6	26.9
1946-50-----	29.4	28.4	26.1	29.3	37.6
1941-45-----	34.5	33.5	31.0	33.5	44.3
1936-40-----	37.4	36.0	33.2	37.3	45.1
1931-35-----	42.5	40.5	37.5	42.2	48.7
<u>Under 24 hours</u>					
1956-60-----	5.6	6.1	4.8	5.4	5.9
1951-55-----	5.7	6.7	5.1	5.1	5.1
1946-50-----	6.6	8.1	5.2	5.5	6.6
1941-45-----	6.7	8.0	5.7	5.4	6.3
1936-40-----	7.8	8.8	7.0	7.2	7.2
1931-35-----	7.6	8.9	7.4	6.7	7.0
<u>24 hours to 1 month<sup>1</sup></u>					
1956-60-----	6.4	7.5	5.4	5.7	6.8
1951-55-----	6.8	7.6	5.5	6.4	7.7
1946-50-----	8.6	9.2	7.4	7.7	10.3
1941-45-----	10.3	11.2	8.5	8.7	12.9
1936-40-----	12.2	13.2	10.1	10.3	14.1
1931-35-----	13.7	14.4	10.6	12.7	15.7
<u>1-11 months<sup>2</sup></u>					
1956-60-----	7.3	5.7	7.0	8.0	10.7
1951-55-----	9.2	7.2	8.8	10.0	14.1
1946-50-----	14.2	11.1	13.5	16.1	20.7
1941-45-----	17.5	14.3	16.8	19.4	25.1
1936-40-----	17.4	14.0	16.1	19.8	23.8
1931-35-----	21.2	17.2	19.5	22.8	26.0

<sup>1</sup>1951-60, 24 hours-27 days.<sup>2</sup>1951-60, 28 days-11 months.

Table 9. Average annual infant mortality rates and index numbers, by month of birth and age: Norway, selected years, 1935-59

Age and year	Month of birth												
	Total	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<u>Under 1 year</u>													
Rate per 1,000 live births of specified month													
1955-59-----	20.0	21.9	20.0	19.3	17.8	18.1	18.9	20.9	20.8	20.5	20.9	21.7	20.1
1950-54-----	23.7	25.1	22.0	22.2	21.3	22.8	22.8	22.8	25.2	22.2	27.2	26.7	24.9
1945-49-----	32.3	36.0	33.2	26.4	29.4	31.3	28.0	32.2	34.0	34.3	34.5	38.2	33.4
1935-39-----	40.3	42.3	39.1	37.7	36.4	39.3	40.6	40.2	39.2	42.3	42.1	43.9	42.1
<u>Under 1 month</u> <sup>1</sup>													
1955-59-----	12.6	14.0	12.1	12.4	12.2	12.1	12.7	13.4	12.4	11.4	12.2	13.2	12.9
1950-54-----	13.5	14.5	13.4	13.6	13.7	13.3	14.1	12.7	12.7	11.6	14.9	14.5	13.7
1945-49-----	16.7	19.8	18.8	15.4	16.6	17.2	14.4	15.8	16.0	14.7	15.7	18.9	17.4
1935-39-----	21.4	23.5	22.2	21.4	20.2	22.2	21.8	20.9	19.5	19.9	20.6	21.4	23.9
<u>1-11 months</u> <sup>2</sup>													
1955-59-----	7.5	8.0	8.0	7.0	5.6	6.1	6.3	7.6	8.4	9.1	8.8	8.6	7.3
1950-54-----	10.2	10.8	8.7	8.8	7.7	9.7	8.9	10.2	12.7	10.7	12.5	12.4	11.3
1945-49-----	15.9	16.5	14.6	11.2	13.0	14.4	13.9	16.7	18.3	19.9	19.0	19.7	16.3
1935-39-----	19.3	19.3	17.3	16.7	16.6	17.4	19.2	19.8	20.1	22.9	22.0	22.9	18.7
<u>Under 1 year</u>													
Index number													
1955-59-----	100	110	100	97	89	91	95	105	104	103	105	109	101
1950-54-----	100	106	93	94	90	96	96	96	106	94	115	113	105
1945-49-----	100	111	103	82	91	97	87	100	105	106	107	118	103
1935-39-----	100	105	97	94	90	98	101	100	97	105	105	109	105
<u>Under 1 month</u> <sup>1</sup>													
1955-59-----	100	111	96	98	97	96	101	106	98	90	97	105	102
1950-54-----	100	107	99	101	101	99	104	94	94	86	110	107	101
1945-49-----	100	119	113	92	99	103	86	95	96	88	94	113	104
1935-39-----	100	110	104	100	94	104	102	97	91	93	96	100	112
<u>1-11 months</u> <sup>2</sup>													
1955-59-----	100	107	107	93	75	81	84	101	112	121	117	115	97
1950-54-----	100	106	85	86	75	95	87	100	125	105	123	122	111
1945-49-----	100	104	92	70	82	91	87	105	115	125	119	124	103
1935-39-----	100	100	99	87	86	90	100	102	104	119	114	119	97

<sup>1</sup>1951-59, under 28 days.

<sup>2</sup>1951-59, 28 days-11 months.

Table 10. Average annual perinatal and infant mortality rates, by age and rural districts and towns: Norway, 1901-62

Year	Perinatal mortality rate		Infant mortality rate					
			Under 1 year		Under 1 month <sup>1</sup>		1-11 months <sup>2</sup>	
	Rural districts <sup>3</sup>	Towns <sup>3</sup>	Rural districts <sup>3</sup>	Towns <sup>3</sup>	Rural districts <sup>3</sup>	Towns <sup>3</sup>	Rural districts <sup>3</sup>	Towns <sup>3</sup>
	Rate per 1,000 total births of specified group		Rate per 1,000 live births of specified group					
1961-62-	23.5	23.4	18.0	17.3	12.2	12.0	5.8	5.3
1956-60-	24.7	24.0	20.3	18.7	12.3	12.8	8.0	5.9
1951-55-	26.3	25.5	23.5	20.3	13.3	12.9	10.2	7.4
1946-50-	29.7	30.8	31.5	29.6	15.6	16.4	15.9	13.2
1941-45-	32.4	33.3	38.1	34.5	18.4	18.5	19.7	16.0
1936-40-	37.6	40.7	39.6	38.5	21.2	21.4	18.4	17.1
1931-35-	39.7	44.7	43.9	48.6	22.1	24.1	21.8	24.5
1926-30-	39.3	48.1	48.3	54.1	24.2	25.7	24.1	28.4
1921-25-	34.8	37.2	49.6	58.4	21.7	23.3	27.9	35.1
1916-20-	35.4	41.8	57.7	73.3	24.7	28.1	33.0	45.2
1911-15-	35.6	40.1	58.7	84.6	23.8	28.9	34.9	55.7
1906-10-	36.5	39.6	62.6	89.0	24.8	28.9	37.8	60.1
1901-5--	37.4	42.3	70.4	103.3	27.2	32.0	43.2	71.3

<sup>1</sup>1951-62, under 28 days.

<sup>2</sup>1951-62, 28 days-11 months.

<sup>3</sup>Towns include all municipalities with administrative and legal urban status. Rural districts include all remaining municipalities in Norway. Boundaries of urban and rural municipalities are according to those existing in census years.



Table 11. Average annual infant mortality rates for selected causes: Norway, 1931-62

Cause of death	1961-1962	1956-1960	1951-1955	1946-1950	1941-1945	1936-1940	1931-1935
	Rate per 10,000 live births						
All causes-----	177.9	198.5	226.3	310.8	372.4	393.8	449.1
Congenital malformations-----	37.0	33.6	33.2	23.6	21.5	13.8	9.8
Birth injuries-----	19.0	21.6	22.0	17.3	12.7	8.0	8.0
Postnatal asphyxia and all other defined diseases peculiar to early infancy-----	23.3	28.3	25.1	12.7	19.1	14.7	9.8
Ill-defined diseases peculiar to early infancy--	7.5	9.4	27.4	40.8	48.4	73.7	106.6
Immaturity not otherwise specified-----	38.0	38.5	33.5	54.4	53.7	74.4	65.1
Congenital malformations and certain diseases of early infancy-----	124.8	131.4	141.2	148.8	155.4	184.6	199.3
Tuberculosis-----	0.1	0.1	0.7	2.0	3.6	6.5	10.1
Scarlet fever, diphtheria, whooping cough, and measles-----	0.5	1.2	2.3	7.7	16.4	8.2	14.5
All other infective and parasitic diseases-----	1.2	2.8	3.6	6.8	8.0	10.4	9.4
Pneumonia and influenza, including pneumonia of newborn-----	17.6	22.4	31.1	60.3	72.0	66.1	76.9
All other diseases of respiratory system-----	1.7	2.9	3.6	6.3	8.1	6.0	9.4
Diarrhea and enteritis, including diarrhea of newborn-----	3.4	4.2	6.1	11.9	16.4	17.1	19.5
All other diseases of digestive system-----	2.8	3.3	3.0	4.0	5.6	10.0	12.3
All other diseases-----	7.5	10.0	11.7	18.3	23.2	40.5	44.7
Accidents-----	4.5	4.4	3.4	3.1	3.5	2.9	3.0
Symptoms and ill-defined conditions-----	13.8	15.8	19.6	41.6	60.2	41.5	50.0

[Ed. note: Data for the years 1951-62 were classified to the underlying cause of death according to the Sixth Revision of the International Classification of Diseases and Causes of Death (1948). For 1941-50, deaths were classified to the primary cause of death according to the Fifth Revision (1938). For 1931-40, the Interscandinavian Nomenclature of Causes of Death (1926) was used. Cause groups shown in the stub of the table are applicable to 1951-62. Nomenclature and cause groups for years prior to 1951 do not coincide in their entirety with those for 1951-62.]

Table 12. Average annual morbidity and case fatality rates for common infective diseases: Norway, 1901-62

Year	Diphtheria		Scarlet fever		Whooping cough		Measles	
	Morbidity rate <sup>1</sup>	Case fatality rate <sup>2</sup>	Morbidity rate <sup>1</sup>	Case fatality rate <sup>2</sup>	Morbidity rate <sup>1</sup>	Case fatality rate <sup>2</sup>	Morbidity rate <sup>1</sup>	Case fatality rate <sup>2</sup>
1961-62-----	0.0	0.0	19.9	0.0	32.8	0.0	70.0	0.0
1956-60-----	0.0	0.0	16.9	0.0	62.1	0.0	65.0	0.0
1951-55-----	0.1	6.1	6.3	0.0	75.1	0.1	62.0	0.1
1946-50-----	3.8	5.8	14.1	0.3	83.3	0.2	40.6	0.1
1941-45-----	36.8	3.9	30.5	0.7	57.1	0.3	65.2	0.2
1936-40-----	0.8	4.0	15.1	0.7	38.8	0.4	32.4	0.2
1931-35-----	3.5	3.3	13.2	0.6	36.0	0.7	40.3	0.4
1926-30-----	4.1	4.7	15.3	0.6	37.1	1.1	30.8	0.4
1921-25-----	9.2	6.0	6.3	0.6	43.4	1.7	38.5	0.7
1916-20-----	34.7	6.5	13.8	1.8	38.3	2.1	30.3	1.3
1911-15-----	21.2	7.2	22.4	1.7	38.3	3.3	52.5	0.9
1906-10-----	28.0	7.5	17.2	2.2	35.4	4.1	28.3	1.9
1901-5-----	15.9	8.2	18.1	2.6	37.2	4.4	30.3	2.9

<sup>1</sup>Morbidity rate: cases per 10,000 population.

<sup>2</sup>Case fatality rate: deaths per 100 cases.

Table 13. Infant mortality rates for common infective diseases, by sex: Norway, selected years, 1899-1962

Year	Total		Diphtheria		Scarlet fever		Whooping cough		Measles	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	Rate per 10,000 live births of specified sex									
1961-62-----	0.8	0.2	0.0	0.0	0.0	0.0	0.5	0.2	0.3	-
1956-60-----	1.6	0.8	0.0	0.0	0.0	0.0	1.2	0.6	0.4	0.2
1951-55-----	2.1	2.5	0.0	0.0	0.0	0.0	1.9	2.0	0.2	0.5
1946-50-----	8.0	7.4	1.0	0.4	0.2	0.0	6.5	6.5	0.3	0.5
1941-45-----	15.4	17.4	6.5	6.9	0.3	0.4	7.2	8.7	1.4	1.4
1936-40-----	6.9	9.7	-	-	0.1	0.5	5.9	8.7	0.9	0.5
1931-35-----	14.1	15.0	0.6	0.3	0.5	0.1	11.4	12.7	1.6	1.9
1919-22-----	33.4	33.9	6.7	5.5	0.5	0.3	23.0	25.2	3.2	2.9
1909-12-----	57.0	57.1	5.8	2.9	1.8	2.4	40.8	45.0	8.6	6.8
1899-1902-----	65.2	67.7	4.5	4.8	4.3	2.8	44.1	50.6	12.3	9.5

Table 14. Average annual number of infant deaths and infant mortality rates for selected causes, by age: Norway, 1951-62

Cause of death (Sixth Revision--International Lists, 1948)	Under 1 year			Under 28 days			28 days-11 months		
	1961-1962	1956-1960	1951-1955	1961-1962	1956-1960	1951-1955	1961-1962	1956-1960	1951-1955
Average annual deaths									
All causes-----	1,112	1,251	1,415	761	782	817	351	469	598
Congenital malformations of circulatory system----- (754)	108	87	79	54	37	33	54	50	46
Other congenital malformations----- (750-753, 755-759)	123	125	128	78	77	77	45	48	51
Intracranial and spinal birth injuries----- (760)	96	109	113	96	106	108	-	3	5
Other birth injuries----- (761)	23	27	25	23	27	25	-	-	-
Postnatal asphyxia----- (762)	103	119	86	101	116	83	2	3	3
All other defined diseases peculiar to early infancy----- (765-772)	43	59	72	40	52	53	3	7	19
Ill-defined diseases peculiar to early infancy----- (773)	47	59	171	44	53	158	3	6	13
Immaturity not otherwise specified----- (774, 776)	237	242	209	231	237	200	6	5	9
Tuberculosis----- (001-019)	(1)	1	5	-	-	(2)	(2)	1	5
Scarlet fever, diphtheria, whooping cough, and measles----- (050, 055, 056, 085)	3	7	15	-	-	-	3	7	15
All other infective and parasitic diseases----- (020-049, 051-054, 057-084, 086-138)	7	17	22	(1)	1	2	7	16	20
Meningitis, except meningococcal and tuberculosis----- (340)	9	13	16	2	1	1	7	12	15
Other diseases of nervous system and sense organs----- (330-334, 341-398)	15	22	18	-	(2)	-	15	22	18
Cardiovascular diseases----- (400-468)	1	1	1	-	-	-	1	1	1
Pneumonia and influenza----- (480-493, 763)	109	140	195	33	25	25	76	115	170
All other diseases of respiratory system----- (470-475, 500-527)	11	19	22	1	1	1	10	18	21
Diarrhea and enteritis----- (571, 764)	22	27	39	4	3	4	18	24	35
All other diseases of digestive system----- (530-570, 572-587)	18	21	18	9	8	7	9	13	11
All other diseases----- (140-320, 590-637, 690-749)	22	28	37	3	6	7	19	22	30
Accidents----- (E800-E965)	28	28	21	2	3	2	26	25	19
Symptoms and ill-defined causes----- (780-793, 795)	87	100	123	40	29	31	47	71	92
Rate per 10,000 live births									
All causes-----	177.9	198.5	226.3	121.7	124.1	130.7	56.2	74.4	95.6
Congenital malformations of circulatory system----- (754)	17.4	13.8	12.7	8.7	5.8	5.3	8.7	8.0	7.4
Other congenital malformations----- (750-753, 755-759)	19.6	19.8	20.5	12.5	12.2	12.4	7.1	7.6	8.1
Intracranial and spinal birth injuries----- (760)	15.4	17.4	18.1	15.4	16.9	17.3	-	0.5	0.8
Other birth injuries----- (761)	3.6	4.2	3.9	3.6	4.2	3.9	-	-	-
Postnatal asphyxia----- (762)	16.5	18.9	13.6	16.2	18.4	13.2	0.3	0.5	0.4
All other defined diseases peculiar to early infancy----- (765-772)	6.8	9.4	11.5	6.3	8.3	8.5	0.5	1.1	3.0
Ill-defined diseases peculiar to early infancy----- (773)	7.5	9.4	27.4	7.0	8.4	25.2	0.5	1.0	2.2
Immaturity not otherwise specified----- (774, 776)	38.0	38.5	33.5	37.0	37.7	32.0	1.0	0.8	1.5
Tuberculosis----- (001-019)	<sup>1</sup> 0.1	0.1	0.7	-	-	<sup>2</sup> 0.0	<sup>2</sup> 0.1	0.1	0.7
Scarlet fever, diphtheria, whooping cough, and measles----- (050, 055, 056, 085)	0.5	1.2	2.3	-	-	-	0.5	1.2	2.3
All other infective and parasitic diseases----- (020-049, 051-054, 057-084, 086-138)	1.2	2.8	3.6	<sup>1</sup> 0.1	0.2	0.4	1.1	2.6	3.2
Meningitis, except meningococcal and tuberculosis----- (340)	1.3	2.0	2.6	0.3	0.2	0.2	1.0	1.8	2.4
Other diseases of nervous system and sense organs----- (330-334, 341-398)	2.4	3.4	2.9	-	<sup>2</sup> 0.0	-	2.4	3.4	2.9
Cardiovascular diseases----- (400-468)	0.2	0.2	0.2	-	-	-	0.2	0.2	0.2
Pneumonia and influenza----- (480-493, 763)	17.6	22.4	31.1	5.3	4.0	4.0	12.3	18.4	27.1
All other diseases of respiratory system----- (470-475, 500-527)	1.7	2.9	3.6	0.1	0.1	0.1	1.6	2.8	3.5
Diarrhea and enteritis----- (571, 764)	3.4	4.2	6.1	0.6	0.5	0.6	2.8	3.7	5.5
All other diseases of digestive system----- (530-570, 572-587)	2.8	3.3	3.0	1.4	1.2	1.2	1.4	2.1	1.8
All other diseases----- (140-320, 590-637, 690-749)	3.6	4.4	6.0	0.6	1.0	1.1	3.0	3.4	4.9
Accidents----- (E800-E965)	4.5	4.4	3.4	0.3	0.5	0.3	4.2	3.9	3.1
Symptoms and ill-defined causes----- (780-793, 795)	13.8	15.8	19.6	6.3	4.5	5.0	7.5	11.3	14.6

<sup>1</sup>Fewer than 2 deaths.

<sup>2</sup>Fewer than 5 deaths.

Table 15. Number of infant deaths and percent specified as immature, by selected causes and age: Norway, 1951-55 and 1956-60

Years and cause of death (Sixth Revision—International Lists, 1948)	Under 28 days		28 days-11 months	
	Number of deaths	Percent specified as immature	Number of deaths	Percent specified as immature
<u>1956-60</u>				
All causes-----	3,912	56.6	2,344	3.5
Intracranial and spinal birth injuries----- (760)	532	35.7	15	26.7
Other birth injuries----- (761)	133	46.6	-	-
Postnatal asphyxia----- (762)	579	66.7	17	41.2
Pneumonia of newborn----- (763)	128	35.2	-	-
Diarrhea of newborn----- (764)	15	26.7	-	-
All other defined diseases peculiar to early infancy----- (765-772)	261	47.5	35	5.7
Ill-defined diseases peculiar to early infancy----- (773)	264	42.8	31	19.4
Immaturity not otherwise specified----- (774,776)	1,189	100.0	25	100.0
Total diseases of early infancy----- (760-776)	3,101	68.1	123	35.8
All other causes----- (001-759,780-795,E800-E965)	811	12.5	2,221	1.7
<u>1951-55</u>				
All causes-----	4,085	---	2,988	---
Intracranial and spinal birth injuries----- (760)	540	29.4	25	28.0
Other birth injuries----- (761)	122	41.0	-	-
Postnatal asphyxia----- (762)	413	54.5	13	15.3
Pneumonia of newborn----- (763)	126	19.8	-	-
Diarrhea of newborn----- (764)	19	21.0	-	-
All other defined diseases peculiar to early infancy----- (765-772)	265	40.0	93	8.6
Ill-defined diseases peculiar to early infancy----- (773)	789	51.8	67	25.4
Immaturity not otherwise specified----- (774,776)	1,001	100.0	47	100.0
Total diseases of early infancy----- (760-776)	3,275	60.4	245	33.1
All other causes----- (001-759,780-795,E800-E965)	810	---	2,743	---

## APPENDIX I

### LEGAL PROVISIONS FOR FAMILY WELFARE

The most important legal measure enacted in Norway to secure better health and reduce mortality was the adoption of the national Health Insurance Act in 1911. At first, national health insurance was obligatory only for families with limited income. The percentage of the population covered increased constantly from 22 percent (1922) to 85 percent (1954), and in 1956 health insurance was made obligatory for all inhabitants of Norway irrespective of income. Premiums for this insurance are only partly paid by the insured person; the rest of the cost is covered by the employer, the local authorities, and the state.

Benefits payable under the health insurance scheme fall into two main categories: (1) medical care, treatment in hospitals and maternity homes, and certain kinds of special physiotherapy and funeral allowances; and (2) sickness benefits, family benefits, and "lying-in" money for women before and after confinement.

Originally all medical assistance was granted free of charge. However, in 1925 a system based on the refund principle was introduced through which the patient pays for medical services and then receives a refund of the major cost, as stipulated by the insurance provisions. As a rule the patient may choose his own doctor, and benefits for medical treatment are granted even if the patient consults several doctors for the same illness. Under the health insurance scheme, sojourn in municipal, county, and state hospitals and clinics is free of charge, as is a normal delivery.

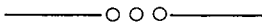
A person deprived of his or her daily income because of illness is granted sick benefits from the health insurance, the size of this benefit depending on the indi-

vidual's normal wage. This support may be paid to a patient for a period of 2 years.

The health insurance also pays "lying-in" money to pregnant women for a period of 6 weeks before and 6 weeks after confinement. Medical care expenses are refunded in accordance with the general insurance rules.

It is worth noting that the Protection of Workers Act of 1936 contains special provisions on women's work. It prescribes that a pregnant woman may be absent from work the last 6 weeks prior to her anticipated confinement, and for the first 6 weeks after delivery. In case of sickness resulting from her confinement, she is entitled to an additional leave of absence of 6 weeks, without fear of dismissal because of such absence. If she is nursing her child, she is also entitled to daily periods off work. The law has no provisions for wages during such time off, but in this respect it is supplemented by provision of the above mentioned "lying-in" money from the health insurance fund.

According to the Children's Allowance Act of 1946 all breadwinners supporting more than one child under the age of 16 are eligible for a child allowance—at present 500 kroner (about \$70) per child per annum beginning with the second child under 16, whether it is born in or out of wedlock, or whether it is a stepchild, foster-child or adopted child. Family allowances are payable beginning with the first child if the breadwinner is widowed or divorced, or if the parents of the child have not married. Besides these allowances, families with young children also enjoy lower rates of taxation than single persons or married couples with no children.



## APPENDIX II

### SYSTEM OF BIRTH AND DEATH REGISTRATION

From olden times in Norway the church official in each parish has been charged with the legal registration of births, deaths, and marriages. The first general order instructing the clergy to keep a parish register of these vital events was given in 1685. Present rules of the official registration were established in 1877 and were supplemented with regard to births in 1915.

The responsibility for notifying authorities of a legitimate birth falls on the parent or other persons present at the delivery. If birth takes place in a hospital, clinic, or nursing home, the institution is responsible for notification to the official registrar. Notification of an illegitimate birth must always be made by the midwife or physician present at delivery. If no midwife or physician is present, the mother is the legally responsible informant.

According to regulations which have been in force since the beginning of the 19th century, *live births* are defined as all infants showing signs of life at birth, even if death occurs immediately afterwards, *Stillbirths* are defined as infants delivered after 28 weeks of gestation and showing no obvious sign of life.

Each birth must be reported within 4 weeks of birth to the church official in the parish where the child is born. Willful disregard of the obligation to register a birth is punishable by law. It is the duty of the registrar (the church official of the parish) to check the accuracy and completeness of each notification and to inform the public of the necessity, procedures, and requirements for registration. Before baptizing any child, the clergyman must verify that the child has been duly registered in the civil birth register of his place of birth. As the majority of parents in Norway have their children

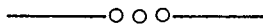
baptized, legal registration of a very high percentage of all liveborn children is controlled in this way.

Birth certificates are required to show age of mother, birth order of child, and (for married mothers) year of present marriage. Children born out of wedlock must be registered as illegitimate, even if parents marry before registration. No information is asked about the degree of maturity of the child.

In Norway a birth attended by a midwife or a doctor and occurring after 20 weeks of gestation should also be reported to the public health officer at the place of birth within 8 days after delivery. The obligation imposed on the attending midwife or doctor to report births to the public health officer is made chiefly for administrative and not statistical purposes. These birth records are very useful as supplementary information and as control of data received from legal registrars.

Every death occurring within the country must be notified to the Probate Court—the authority responsible for issuing the obligatory certificate for registration and burial purposes. The nearest relative of the deceased or other person present at death is required to notify the Probate Court of the event. The death certificate issued by the Probate Court is presented at the place of burial to the church official who in turn is responsible for registration of the death in the death register.

The death certificate used for registration and burial purposes contains no information on cause of death. This information is given as a separate declaration to the public health officer by the attending physician or the medical practitioner called in to examine the body.



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