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VITAL and HEALTH STATISTICS

DATA FROM THE NATIONAL VITAL STATISTICS SYSTEM

Weight at Birth and Survival of the Newborn

United States, Early 1950

Statistics derived from vital records on neonatal mortality by weight at birth and gestation age, by color and sex, to infants born in the United States during the first 3 months of 1950.

Washington, D.C. July 1965

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
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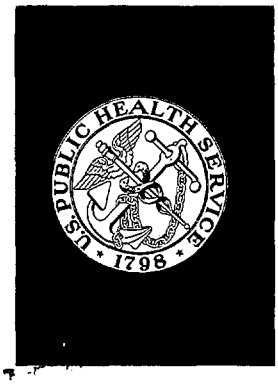

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NATIONAL CENTER FOR HEALTH STATISTICS

DIVISION OF VITAL STATISTICS

Public Health Service Publication No. 1000-Series 21-No. 3

CONTENTS

TEXT TABLES

GENERAL TABLES

FIGURES

Weight at Birth and its Effect on Survival of the Newborn in the United States, Early 1950

Sam Shapiro, Chief of the Natality Analysis Branch, and Jeanne Unger, Analytical Statistician

INTRODUCTION

Early infancy has always been an extremely hazardous period to survive. Although great progress has been made in reducing the loss during this difficult period, it has lagged behind the success in later infancy. Over the past 35 years, mortality has been cut in half in the first few weeks of life, while in the balance of the first year, the rate has been reduced to a fifth of what it was. Today, two-thirds of the infant deaths occur in the neonatal period—i. e., within 4 weeks after birth—and in most of these cases, immaturity is cited by the physician as a factor.

The need for information on the risk of mortality among babies born at different levels of maturity has long been recognized as an essential feature of programs directed at the immaturity problem. Special studies by individual hospitals and by a number of city and State departments of health have contributed greatly to meeting this need. With the addition of items on "birth weight" and "weeks of gestation" to practically all State certificates of birth in 1949, the development of data for other areas and for the nation as a whole has become a practical matter.

This report presents nationwide statistics on birth weight derived from vital records for babies born between January 1 and March 31, 1950, and for neonatal deaths among this group. The information is shown by race, sex, plurality of birth, and attendant at birth. Future reports will present birth weight statistics for broad geographic areas, and will consider the relationship between birth weight and such variables as birth order; age and previous fetal loss of the mother; age at death; and cause of death. The subject of fetal loss will also be considered in relation to neonatal mortality.

Although birth weight is used as the principal measure of maturity level at birth, a limited amount of gestation age statistics is introduced in this report. Despite serious errors in the birth record information on gestation age, the data contribute to the interpretation of a number of the differentials in mortality experience indicated by the birth weight variable. Improvement in reporting gestation age would greatly broaden the possibilities for investigating, statistically, factors that affect the survival of the newborn. That it is possible to obtain reasonably sound series of gestation age data has already been demonstrated by others.

Source of data

Matched birth and death records for infants born during the first quarter of 1950 who died within 28 days after birth were used to obtain the mortality data shown in this report. The matching of these records was incidental to carrying out an unrelated project, the 1950 birth registration test. When the matching was completed, punched cards combining information from corresponding birth and death records were prepared for the infants who died. Data from birth records for children born during January-March 1950 formed the basis for developing the weight distributions presented, and served as the denominators for the mortality rates. Birth and death certificates relating to children born to residents of Massachusetts were excluded from all tabulations since this State did not require the reporting of birth weight.

Matching birth certificates were not found for a small proportion (2.4 percent) of the neonatal death records filed. In the white group 2.0 percent and in the nonwhite group 4.6 percent of the deaths, were not matched. With regard to age at death, the proportions of unmatched certificates were higher for infants dying at under 1 hour and at 5 through 27 days than at the intervening ages, but this proportion was small in all cases, never exceeding 5.8 percent. The unmatched group was also somewhat biased as to cause of death, there being greater proportions for which the cause was pneumonia, homicide, or not stated than in the total death group.

In compiling the data for this report, all of the "unmatched" death certificates were included and a "matching" birth certificate was created for each by using data on the death certificates for certain personal particulars. This treatment of the unmatched group was decided upon because of the different procedures followed in the States with respect to obtaining birth certificates for the group. Some States routinely match birth and infant death records and take steps to have birth records placed on file in those cases where the matching birth records cannot be found. As a result of this procedure, virtually all of the neonatal death records filed in these States are matched. In the other areas, the proportions of unmatched records are generally much greater. Thus, by means of including rather than excluding all unmatched death records, a degree of comparability is achieved. This will be of especial significance for a later report where geographic data are shown.

Registration completeness

The data in this report are derived from records for registered events (except for the group discussed above). A test of registration completeness for 1950 indicated that practically all (98.6 percent) of the white births and 93.5 percent of the nonwhite were registered. No definitive information is available on the completeness of death registration, but it is

thought to vary generally as birth registration completeness. In some instances where infants die immediately after birth, it is probable that neither a live birth nor a death certificate is filed. A number of these infants may be reported as fetal deaths, while others may not be reported at all. This situation is undoubtedly of relatively greater importance at the very low birth weights than at the higher weights, and might lead to an understatement of the proportions of infants at the low weights and also to an understatement of the mortality rates among these children.

Classification

In almost all of the areas, birth weight was reported in terms of pounds and ounces. The traditional gram groupings, however, have been used to tabulate and present the data in order to facilitate comparison with the results from other studies of this type. The equivalents of these groupings in terms of pounds and ounces are as follows:

1,000 grams or less	= 2 lb. 3 oz. or less
1,001-1,250 grams	= 2 lb. 4 oz.-2 lb. 12 oz.
1,251-1,500 grams	= 2 lb. 13 oz.-3 lb. 4 oz.
1,501-1,750 grams	= 3 lb. 5 oz.-3 lb. 13 oz.
1,751-2,000 grams	= 3 lb. 14 oz.-4 lb. 6 oz.
2,001-2,250 grams	= 4 lb. 7 oz.-4 lb. 15 oz.
2,251-2,500 grams	= 5 lb. 0 oz.-5 lb. 8 oz.
2,501-2,750 grams	= 5 lb. 9 oz.-6 lb. 1 oz.
2,751-3,000 grams	= 6 lb. 2 oz.-6 lb. 9 oz.
3,001-3,500 grams	= 6 lb. 10 oz.-7 lb. 11 oz.
3,501-4,000 grams	= 7 lb. 12 oz.-8 lb. 13 oz.
4,001-4,500 grams	= 8 lb. 14 oz.-9 lb. 14 oz.
4,501 grams or more	= 9 lb. 15 oz. or more

The birth records for 1950 in all but a few of the States requested gestation age information in the following form: "Length of pregnancy—weeks." In practice, period of gestation is generally interpreted as referring to number of completed weeks that have elapsed between the first day of the last menstrual period and the date of birth of the child. At the present time, important inaccuracies due, in part, to failure to carry out this computation are evident in the data reported. These are described in a later section.

For purposes of classification, infants weighing 2,500 grams or less at birth have been referred to as "immature" or "premature." This weight criterion was recommended by the American Academy of Pediatrics in 1935, and later adopted in the Sixth Revision of the International Lists of Diseases and Causes of Death (1948). The term "premature," although containing the concept of duration of pregnancy, has been used for many years in connection with the birth weight criterion. In units of gestation age, it relates to pregnancies of less than 37 completed weeks. It is recognized in using these terms, that there may be basic differences in physical development for some of the subgroupings of births discussed, which would affect the general applicability of the criterion for classifying births as immature or premature.

Seasonality

The proportion of children weighing 2,500 grams or less in the first 3 months of 1950 (7.4 percent) is slightly smaller than that for the year as a whole (7.6 percent).[1] The full weight distributions of white and nonwhite births included in the study differ somewhat from the distributions expected on the basis of data for the year as a whole. Although these differences are statistically significant ($P < .001$), they are of small enough order of magnitude not to distrub the relationships discussed in the report.

There are also differences between the neonatal mortality rates for the entire year and the rates among births in January through March of 1950. Here too, however, the differences are very small. For all races combined, the rate for the United States for the year is 20.5 per 1,000 live births, while for January through March the rate is 19.9 for the United States and 20.0 for the United States excluding Massachusetts.

Distribution of not stated birth weights and gestation ages

It was apparent from the data that birth weight reporting was less complete for infants born at early gestation ages than at a more advanced stage of the pregnancy cycle. To reduce this bias, gestation age information was used to distribute the groups that had no weight statements.

Not stated birth weights were allocated by first distributing the not stated weights among neonatal deaths in each gestation group according to the distribution of the "known" weights in that group. The remainder of the not stated neonatal deaths which lacked information on period of gestation was then distributed by weight according to the weight distribution for all other neonatal deaths.

For births, the group referring to children who died during the neonatal period was distributed as indicated above. The residual was allocated using the relationship of gestation and birth weight for the remaining group of births.

For both births and deaths the not stated gestations were distributed proportionately within each weight group where this item was stated and according to the over-all distribution if weight was not available.

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[1] The data for the first 3 months exclude births to residents of Massachusetts while those for the year as a whole exclude births to residents of both Connecticut and Massachusetts. However, this difference does not affect the conclusion.

Table A gives the proportions of birth weights not stated among births and neonatal deaths by race and plurality. The percentages of births and deaths that had no statement of either weight or gestation age are also indicated.

Various methods for distributing the not stated birth weights were applied to the data in an effort to evaluate the effect of different treatments of this group. It was found that the relationships discussed in the main body of the report were not altered by the choice of procedure. Results in terms of percentage distributions and mortality rates under each of four procedures (including the one used throughout this report) are shown in table B together with a description of the method. It will be noted that the differences in the statistics obtained under alternative procedures are relatively small.

Despite the fact that a reasonably sound basis existed for distributing the "not stateds," the reader is cautioned not to draw conclusions from relatively small differences in view of the fairly large size of this group. An exception to this would be a series of small differences which were all in the same direction.

Chance variation

Chance variation, in addition to the biases in reporting already discussed, must be considered in evaluating the data shown. This variation is related to the size of the birth population on which the figures are based and on the frequency of the occurrence measured. The smaller the population, or the smaller the frequency of the event in a given population group, the greater the relative variability.[2] Mortality rates were not computed in the accompanying tables for certain small frequency groups, i. e., where the birth population was less than 100 and there were fewer than 20 deaths.

[2]The standard error is the measure used to evaluate this variability. Chances are less than 1 in 20 that a difference as large as 2 standard errors would arise by chance. Generally, the standard error of a rate per 1,000 births is

$$\sqrt{\frac{R(1,000-R)}{B}},$$

where R is the rate and B is the number of births used to compute the rate. The standard error of the difference between 2 rates, R_1 and R_2, is

$$\sqrt{\frac{R_1(1,000-R_1)}{B_1} + \frac{R_2(1,000-R_2)}{B_2}}.$$

If 2 rates differ by less than twice this standard error, it is usually concluded that they are not significantly different (statistically). When a rate is low and the number of deaths is very small, the standard error of the rate is $\frac{R}{\sqrt{D}}$, where R is the rate and D is the number of deaths. The standard error of the difference between 2 such rates, R_1 and R_2, is

$$\sqrt{\frac{R_1^2}{D_1} + \frac{R_2^2}{D_2}}.$$

TABLE A. PERCENT OF LIVE BIRTHS AND NEONATAL DEATHS WITH BIRTH WEIGHT AND GESTATION NOT STATED: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Excludes data for Massachusetts)

RACE	WEIGHT NOT STATED			WEIGHT AND GESTATION NOT STATED		
	All births	Single	Plural	All births	Single	Plural
	BIRTHS					
All races	3.8	3.8	4.8	2.1	2.1	2.1
White	3.2	3.2	3.8	1.9	1.9	1.6
Nonwhite	7.0	7.0	9.2	3.6	3.6	4.4
	NEONATAL DEATHS					
All races	14.7	14.8	13.8	6.0	6.4	2.8
White	13.5	13.5	12.6	4.9	5.2	2.3
Nonwhite	19.8	19.9	18.4	10.5	11.2	4.5

TABLE B. BIRTH WEIGHT STATISTICS FOR SINGLE LIVE BIRTHS, BY RACE, UNDER ALTERNATIVE METHODS FOR DISTRIBUTING NOT STATED BIRTH WEIGHTS: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	WHITE				NONWHITE			
	Method A	Method B	Method C	Method D	Method A	Method B	Method C	Method D
	PERCENT DISTRIBUTION OF BIRTHS							
All weights-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,000 or less----------	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5
1,001-1,500----------	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.7
1,501-2,000----------	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5
2,001-2,500----------	4.2	4.2	4.1	4.2	5.9	5.9	5.7	5.9
2,501-3,000----------	17.4	17.4	17.2	17.5	20.5	20.4	19.8	20.5
3,001-3,500----------	38.6	38.6	39.3	38.6	35.6	35.7	37.6	35.6
3,501-4,000----------	28.2	28.2	27.8	28.2	24.0	24.0	23.2	24.0
4,001-4,500----------	7.9	7.9	7.8	7.9	7.4	7.4	7.2	7.4
4,501 or more----------	1.8	1.8	1.8	1.8	3.9	3.9	3.8	3.9
	NEONATAL MORTALITY RATES							
All weights-----	17.3	17.3	17.3	17.3	24.4	24.4	24.4	24.4
1,000 or less----------	880.2	881.4	889.8	878.2	835.2	836.1	849.2	823.6
1,001-1,500----------	575.0	577.4	578.5	573.3	511.0	508.0	516.0	507.4
1,501-2,000----------	238.4	235.9	233.9	239.6	190.0	190.9	185.1	192.2
2,001-2,500----------	53.5	53.2	50.4	54.4	50.0	49.7	48.1	51.0
2,501-3,000----------	12.2	12.2	12.4	12.4	15.1	15.1	15.5	15.3
3,001-3,500----------	6.2	6.2	6.7	6.4	9.5	9.6	10.4	9.7
3,501-4,000----------	4.9	5.0	4.7	5.1	10.4	10.5	10.0	10.6
4,001-4,500----------	6.7	6.7	6.4	6.9	12.3	12.6	12.0	12.7
4,501 or more----------	12.1	12.1	11.5	12.4	20.3	20.9	20.1	21.1

NOTE.—The alternatives differ only in the method for allocating the not stated weights for which gestation ages were reported. These methods are described below:

A. See text for description of this method.

B. It is assumed that the not stateds at each gestation age fall at the median weight for that gestation level.

C. It is assumed that there is parallelism in the percentage distributions of known weights and gestations, and on this basis the not stateds at each gestation age are distributed to an equated weight group or groups. (See reference 8 for details of this method.)

D. It is assumed that the not stateds are distributed according to the general weight distribution without regard to gestation age reported.

DISTRIBUTIONS OF LIVE BIRTHS

Birth weight

A great majority of the children born in the first 3 months of 1950 weighed over 2,500 grams at birth. In fact, only 7.4 percent weighed 2,500 grams or less (table C). However, in this group are about two-thirds of the children that died in the neonatal period.

The birth of a live born infant weighing 1,500 grams or less was a very infrequent event (1.1 percent of all births). Each advance toward higher weight brought a sharp increase in the proportion of children born, with the result that over two-thirds of the immature births fell in the weight group 2,001-2,500 grams.

TABLE C. PERCENT DISTRIBUTION OF LIVE BIRTHS, BY BIRTH WEIGHT, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Births with birth weight not stated are distributed. Excludes births to residents of Massachusetts)

BIRTH WEIGHT (IN GRAMS)	ALL RACES			WHITE			NONWHITE		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
	TOTAL BIRTHS								
All weights	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,000 or less	0.5	0.5	0.5	0.4	0.4	0.4	0.6	0.6	0.6
1,001-1,500	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.9
1,501-2,000	1.4	1.3	1.4	1.3	1.2	1.4	1.8	1.7	2.0
2,001-2,500	4.9	4.3	5.6	4.7	4.1	5.3	6.4	5.6	7.3
2,501-3,000	18.1	15.4	21.0	17.7	14.9	20.7	20.6	18.3	23.0
3,001-3,500	37.7	36.1	39.4	38.1	36.3	40.0	35.1	34.6	35.6
3,501-4,000	27.1	29.8	24.2	27.7	30.5	24.7	23.5	25.5	21.5
4,001-4,500	7.7	9.5	5.8	7.8	9.7	5.8	7.3	8.5	6.0
4,501 or more	2.1	2.6	1.5	1.8	2.3	1.2	3.8	4.5	3.2
2,500 or less	7.4	6.7	8.1	7.0	6.3	7.6	9.7	8.7	10.7
2,501 or more	92.6	93.3	91.9	93.0	93.7	92.4	90.3	91.3	89.3
Median weight (in grams)[1]	3,320	3,390	3,260	3,330	3,400	3,270	3,280	3,330	3,220
	SINGLE BIRTHS								
All weights	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,000 or less	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
1,001-1,500	0.5	0.5	0.5	0.5	0.5	0.4	0.7	0.6	0.8
1,501-2,000	1.1	1.0	1.1	1.0	1.0	1.1	1.5	1.4	1.6
2,001-2,500	4.4	3.8	5.1	4.2	3.6	4.8	5.9	5.1	6.7
2,501-3,000	17.9	15.1	20.8	17.4	14.6	20.5	20.5	18.1	22.9
3,001-3,500	38.2	36.5	40.0	38.6	36.7	40.6	35.6	35.1	36.2
3,501-4,000	27.6	30.3	24.7	28.2	31.0	25.1	24.0	26.0	21.9
4,001-4,500	7.8	9.7	5.9	7.9	9.8	5.9	7.4	8.7	6.1
4,501 or more	2.1	2.7	1.5	1.8	2.4	1.2	3.9	4.6	3.2
2,500 or less	6.4	5.8	7.1	6.0	5.5	6.6	8.6	7.6	9.6
2,501 or more	93.6	94.2	92.9	94.0	94.5	93.4	91.4	92.4	90.4
Median weight (in grams)[1]	3,330	3,400	3,270	3,340	3,410	3,280	3,290	3,340	3,240
	BIRTHS IN PLURAL SETS								
All weights	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,000 or less	4.0	3.9	4.1	3.9	3.8	4.1	4.2	4.4	4.0
1,001-1,500	5.6	5.0	6.1	5.4	4.8	6.1	6.1	5.9	6.3
1,501-2,000	14.2	12.6	15.9	14.2	12.3	16.0	14.5	13.7	15.3
2,001-2,500	29.2	28.1	30.4	29.2	28.2	30.2	29.2	27.3	31.3
2,501-3,000	29.5	30.2	28.7	29.9	30.8	29.1	27.1	27.1	27.2
3,001-3,500	14.1	16.1	12.0	14.2	16.2	12.1	13.4	15.3	11.3
3,501-4,000	2.8	3.5	2.1	2.5	3.2	1.9	4.0	4.7	3.2
4,001-4,500	0.6	0.6	0.6	0.5	0.5	0.5	1.2	1.2	1.2
4,501 or more	0.1	0.1	0.1	0.0	0.1	0.0	0.3	0.4	0.3
2,500 or less	53.0	49.5	56.5	52.8	49.2	56.4	54.0	51.3	56.8
2,501 or more	47.0	50.5	43.5	47.2	50.8	43.6	46.0	48.7	43.2
Median weight (in grams)[1]	2,460	2,520	2,400	2,460	2,520	2,400	2,440	2,480	2,400

[1]Computed to nearest 10 grams on basis of original reporting units of pounds and ounces.

NOTE.—Percentages for summary groups were independently computed and therefore do not necessarily equal exactly the sum of the individual component groups.

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The area of peak concentration of births was between 2,501 and 4,000 grams. The first 500-gram group in this interval (2,501-3,000) contained 18 percent of all births, while almost two-thirds weighed 3,001-4,000 grams. Only a comparatively small proportion of births (2.1 percent) fell in the upper weight interval (4,501 grams or more).

Race.—Nonwhite babies weighed on the average 50 grams less than white babies (table C). Although this gap is small, there are some notable differences in the weight distributions of white and nonwhite births (figure 1A).

A greater proportion of the nonwhite children were born at the immature weights and weights above 4,500 grams, where the major problems of obstetric and pediatric care exist. Infants weighing 2,500 grams or less represented 7.0 percent of all white live births as compared with 9.7 percent of nonwhite. At the highest weight level shown, the percent of nonwhite births (3.8) was double that of white (1.8).

Comparison of the percentages of white and nonwhite births at weights around the modal groups for the distributions also reveals some variation. For both, the highest proportion of births occurred at 3,001-3,500 grams. Around this peak, however, there was somewhat greater symmetry in the nonwhite distribution with the percentages of babies weighing 2,501-3,000 and 3,501-4,000 grams being nearly equal. In contrast, the distribution of white births was weighted more heavily at 3,501-4,000 grams.

Plurality.—Members of plural sets represented only 2.0 percent of all live births, but they accounted for 14.8 percent of the children weighing 2,500 grams or less at birth. Figure 1B indicates the extreme difference in the weight of children born in single and plural deliveries, which gives rise to this situation. In multiple deliveries, over half of the liveborn children (53.0 percent) were 2,500 grams or less at birth, while only 3.5 percent weighed over 3,500 grams. This is in sharp contrast with the situation among single births, where the corresponding figures were 6.4 and 37.5 percent, respectively.

In both single and plural births, the average weight was slightly lower for nonwhite children than for white.

Sex.—Another characteristic showing important weight differentials at birth is sex (figure 1C). Females on the average weighed less than males. This was true in the case of both single and plural births in each race group.

For single births in the white and nonwhite groups, there was very little difference in the proportions of male and female children weighing under 2,001 grams (table C). At 2,001-2,500 grams, however, the proportions of female births turned up more sharply, and the total group prematurely born according to the weight criterion was a fifth higher than that among males.

The peak frequency class for both male and female births in the two race groups was 3,001-3,500 grams. Comparison of the percentages on each side of this weight interval demonstrates, as do the average weights, the tendency of males to reach appreciably heavier weights in utero than females. A white male child was more than twice as likely to weigh 3,501-4,000 as 2,501-3,000 grams. For females, the percentages in these weight groups nearly balanced each other. A somewhat similar situation existed among nonwhite births.

Larger proportions of male than female infants were found at the higher weights through 4,501 grams or more. For both male and female nonwhite infants, the proportion weighing 4,501 grams or more, however, was higher than in either sex of white births.

Gestation and birth weight

Birth record information on length of gestation is seriously deficient. Some of the shortcomings are evident in the distributions of births by gestation shown in table D.

The comparatively large proportions at 36 weeks of gestation result principally from the erroneous conversion of 9-month gestations to 36 weeks. Because of the distortion in the basic data, statistics for 36 weeks are shown separately. This type of error was also present at earlier gestations although the broad intervals into which the data are grouped reduce its effect. In addition, the heavy concentrations at 40 weeks are indicative, in part, of a failure to calculate the period of gestation for infants who seem to be normally developed at birth. Although the main result of this is to lessen the numbers in the adjacent gestation intervals, some understatement of gestations of less than 36 weeks may also occur as a consequence.

Because of the substantial errors, gestation age data can be taken as being only suggestive of what the actual situation might be. Figures are shown principally for broad comparative purposes, rather than for the absolute values.

The percentage distributions of births by period of gestation in table D indicate that somewhat greater proportions of nonwhite than white babies were born before the 36th week of gestation. It is also clear that a much higher proportion of the plural than single births occurred relatively early in pregnancy. In the white group, 20.5 percent of the live births in plural sets occurred prior to the completion of 36 weeks of gestation, as compared with 3.1 percent for single births. The corresponding proportions among the nonwhite were 17.6 percent for plural births and 3.8 percent for single births. With regard to sex, however, there appeared to be little difference in both the white and nonwhite groups in the proportions reported at these early gestations.

FIGURE 1

BIRTH WEIGHT DISTRIBUTION OF LIVE BIRTHS: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

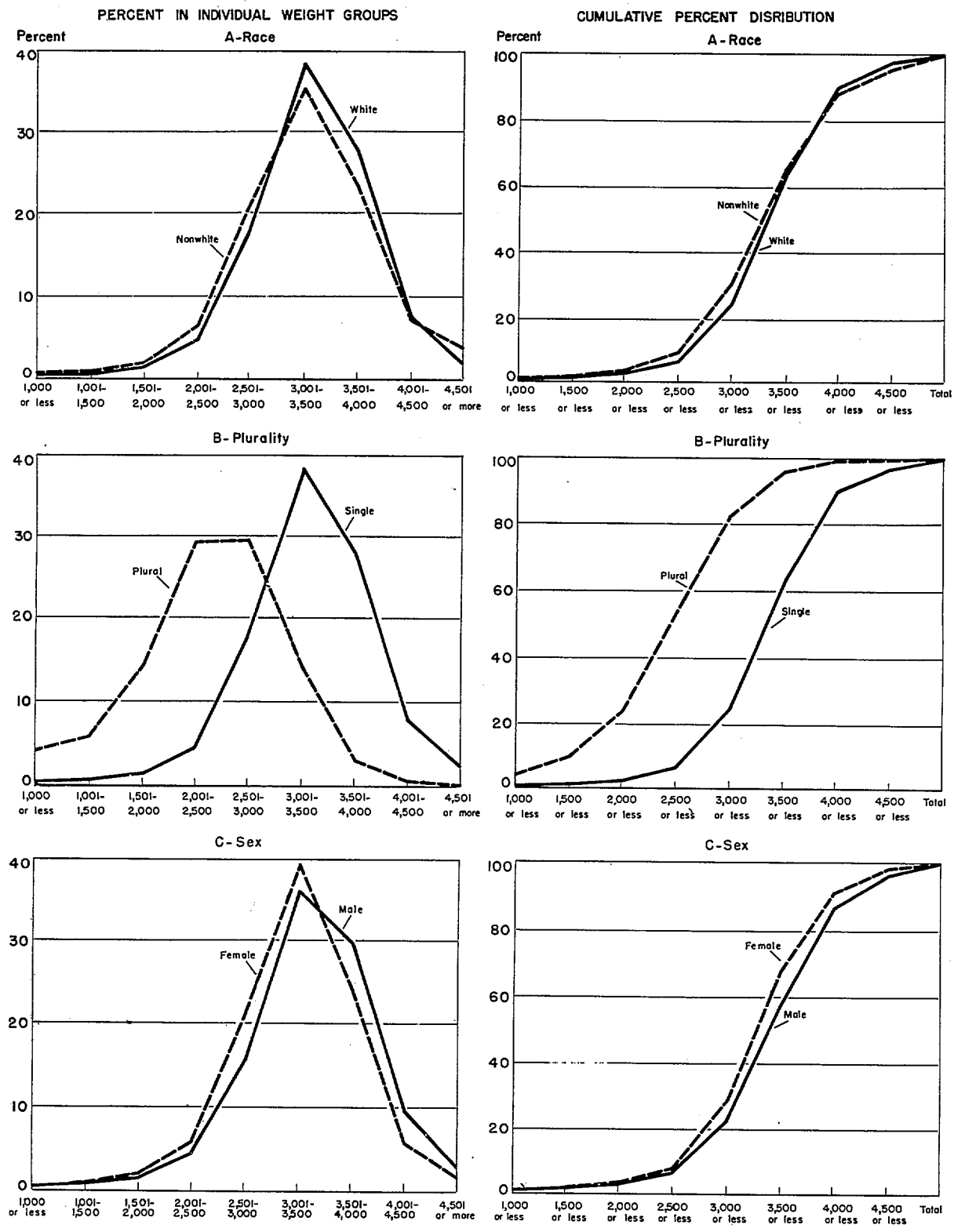


TABLE D. PERCENT DISTRIBUTION OF LIVE BIRTHS BY WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Births with gestation not stated are distributed. Excludes births to residents of Massachusetts)

RACE AND SEX	Total	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over	37-39 weeks	40 weeks	41 weeks and over
	TOTAL BIRTHS								
All races-----	100.0	0.6	0.9	2.0	8.5	88.0	8.9	75.9	3.2
Male----------	100.0	0.6	0.9	2.1	8.4	87.9	---	---	---
Female--------	100.0	0.6	0.9	2.0	8.5	88.1	---	---	---
White----------	100.0	0.6	0.8	2.0	7.8	88.8	9.3	76.1	3.5
Male----------	100.0	0.6	0.9	2.1	7.8	88.7	---	---	---
Female--------	100.0	0.5	0.8	2.0	7.8	88.9	---	---	---
Nonwhite--------	100.0	0.8	1.3	2.1	12.5	83.3	6.9	74.9	1.5
Male----------	100.0	0.8	1.3	1.9	12.5	83.5	---	---	---
Female--------	100.0	0.8	1.3	2.2	12.5	83.2	---	---	---
	SINGLE BIRTHS								
All races-----	100.0	0.5	0.8	1.9	8.4	88.4	8.8	76.4	3.2
White----------	100.0	0.5	0.8	1.8	7.7	89.2	9.1	76.6	3.5
Nonwhite-------	100.0	0.7	1.2	1.9	12.4	83.7	6.9	75.4	1.5
	BIRTHS IN PLURAL SETS								
All races-----	100.0	4.0	5.2	10.8	12.7	67.3	14.9	51.4	1.1
White----------	100.0	3.9	5.3	11.4	12.3	67.2	16.1	50.0	1.2
Nonwhite-------	100.0	4.6	4.8	8.2	14.6	67.9	9.3	58.0	0.6

NOTE.—Percents for summary groups were independently computed and therefore do not necessarily equal exactly the sum of the individual component groups.

In the broad gestation intervals shown in table E, there is considerable dispersion of births by weight. Many children who would be considered premature according to gestation age weighed over 2,500 grams, and conversely many of the low-weight infants were reported as born at or near full term. For example, in about two-fifths of the single deliveries occurring in 32-35 weeks of gestation, the infants weighed over 2,500 grams. Although the proportion of single births at gestations of 37 weeks and over that weighed 2,500 grams or less was small (3.6 percent), this group represented half of the immature births.

At all gestations, there were high proportions of births in plural deliveries weighing 2,500 grams or less at birth. Among those delivered before the completion of 36 weeks of gestation, all but a small segment weighed 2,500 grams or less. At the same time, two-fifths of those born at 37 weeks and over also fell in this weight group. In fact, half of the plural births immature according to the weight criterion were in this gestation group.

Although a wide range of birth weights is represented in each gestation age group, the median weights by gestation follow a consistent pattern.

TABLE E. PERCENT DISTRIBUTION OF LIVE BIRTHS BY BIRTH WEIGHT, WEEKS OF GESTATION, RACE, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Births with birth weight or gestation not stated are distributed. Excludes births to residents of Massachusetts)

BIRTH WEIGHT (IN GRAMS)	WHITE					NONWHITE				
	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
	SINGLE BIRTHS									
All weights	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,500 or less	86.1	33.8	5.8	0.2	0.0	77.8	34.6	7.1	0.3	0.1
1,501-2,000	6.7	32.5	20.3	1.7	0.3	10.3	33.0	21.7	1.7	0.5
2,001-2,500	1.7	19.7	33.6	8.9	3.0	2.4	20.4	33.9	8.4	4.7
2,501-3,000	1.5	5.9	21.1	18.8	17.4	2.1	5.4	17.4	17.3	21.4
3,001-3,500	2.3	4.1	12.7	34.4	40.0	2.3	3.5	12.9	31.2	37.6
3,501 or more	1.7	3.9	6.6	36.0	39.2	5.2	3.1	6.9	41.2	35.8
2,500 or less	94.5	86.0	59.6	10.8	3.4	90.4	88.0	62.8	10.3	5.2
2,501 or more	5.5	14.0	40.4	89.2	96.6	9.6	12.0	37.2	89.7	94.8
	BIRTHS IN PLURAL SETS									
All weights	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,500 or less	93.1	55.4	14.2	3.3	1.2	90.6	47.2	16.3	4.8	2.6
1,501-2,000	4.6	34.7	38.0	19.5	8.1	3.6	43.1	39.2	14.4	10.3
2,001-2,500	0.9	8.2	33.9	41.3	29.5	4.3	6.3	30.6	35.9	30.9
2,501-3,000	0.5	1.3	11.1	24.5	38.1	1.4	1.4	10.6	25.9	32.9
3,001-3,500	0.5	0.1	2.4	9.2	19.0	0	0	2.4	13.0	16.6
3,501 or more	0.4	0.3	0.4	2.2	4.1	0	2.1	0.8	5.9	6.6
2,500 or less	98.5	98.3	86.1	64.1	38.9	98.6	96.5	86.1	55.1	43.8
2,501 or more	1.5	1.7	13.9	35.9	61.1	1.4	3.5	13.9	44.9	56.2

NOTE.—Percents for summary groups were independently computed and therefore do not necessarily equal exactly the sum of the individual component groups.

Among single births, the medians for gestation groups below 36 weeks all fall at immature weights. For 37 weeks and over, the figure is well above the immaturity weight level (table F).

Male infants at each gestation interval weighed on the average somewhat more than female infants. In terms of gram differences, the excess was greatest at the mature gestation level. Relative to the average weight at each gestation, however, the gap between the weights of males and females was most pronounced in the very early group under 28 weeks.

At gestation ages of 32 weeks or higher, the white children weighed slightly more at birth on the average than the nonwhite. A reverse relationship is found at gestations under 28 weeks. The explanation for this may lie in reporting inaccuracies rather than in any developmental factor. Underreporting and misreporting as fetal deaths of the small infants who die soon after birth are believed to be more serious with respect to nonwhite births because of the high proportion not attended by physicians.

TABLE F. MEDIAN WEIGHTS OF LIVE BIRTHS BY WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Births with birth weight or gestation not stated are distributed. Excludes births to residents of Massachusetts. Medians computed to nearest 10 grams on basis of original reporting units of pounds and ounces)

RACE AND SEX	MEDIAN WEIGHT (IN GRAMS) AT GESTATION GROUP			
	Under 28 weeks[1]	28-31 weeks	32-35 weeks	37 weeks and over
	TOTAL BIRTHS			
All races	920	1,700	2,310	3,350
Male	940	1,720	2,340	3,410
Female	890	1,680	2,290	3,280
White	900	1,700	2,320	3,360
Male	930	1,720	2,340	3,420
Female	880	1,680	2,290	3,290
Nonwhite	970	1,700	2,280	3,300
Male	970	1,730	2,290	3,350
Female	980	1,680	2,270	3,240
	SINGLE BIRTHS			
All races	930	1,740	2,360	3,360
White	920	1,740	2,360	3,360
Nonwhite	1,000	1,730	2,320	3,310
	BIRTHS IN PLURAL SETS			
All races	820	1,430	1,960	2,640
White	810	1,420	1,970	2,650
Nonwhite	840	1,520	1,930	2,600

[1]In computing the median weights for this gestation group, a further division was made in the lowest weight group shown in this report.

NEONATAL DEATHS

Birth weight

The risk of death among the newborn was closely related to the weight at birth. Among infants weighing 2,500 grams or less at birth, the neonatal rate was 173.7 per 1,000, compared with 7.8 among all other infants (table G).

Only a very small proportion of the children weighing 1,000 grams or less lived through the first 28 days. Chances of survival improved considerably with a moderate increase in weight, but a little over half of those weighing 1,001-1,500 grams also died. Mortality continued to decline steeply with each added 500 grams of weight, and neonatal deaths in the highest group of the immature category (2,001-2,500 grams) amounted to 50.4 per 1,000 infants. Substantial decreases were recorded well into the mature weights and the optimum birth weight group for the survival of infants fell at 3,501-4,000 grams. Additional weight, particularly when it brought the weight above 4,500 grams, was on the average decidedly disadvantageous.

Race.—The over-all neonatal mortality rate among nonwhite births was about 40 percent higher than that among the white. This excess was due, in part, to the differences in the weight distributions already described and, in part, to substantially greater mortality among the nonwhite at weights above 2,500 grams (figure 2A). If the weight distributions for both white and nonwhite births were the same as the distribution for all births, the over-all rates would become 19.6 for the white and 22.6 for the nonwhite. In standardizing rates in this manner, it is assumed that the differences between the birth weights of white and nonwhite infants are not of an intrinsic nature but reflect basically the effect of socio-economic and other demographic factors. Comparison of the standardized with the unstandardized rate clearly indicates the major reduction in neonatal mortality for the nonwhite group that would result from bringing the weight distribution of nonwhite births closer to that for total births.

At the lower weights, where the risk of mortality is great, nonwhite infants had a somewhat better chance of survival than the white. The mortality rates for the two groups differed only slightly at 2,001-2,500 grams. However, in the higher weights at which a preponderance of the births occur, the mortality risk among nonwhite births was greater, with the gap between the two race groups becoming relatively wider at each successive level through 3,501-4,000 grams and then narrowing slightly (figure 2A).

TABLE G. NEONATAL MORTALITY RATES BY BIRTH WEIGHT, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	ALL RACES			WHITE			NONWHITE		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
	RATES AMONG TOTAL BIRTHS								
All weights[1]	20.0	22.7	17.1	18.9	21.6	16.0	26.7	29.4	23.9
1,000 or less	871.7	894.2	848.0	883.3	905.0	861.0	821.4	849.9	789.0
1,001-1,500	551.3	621.8	478.2	562.1	643.1	474.5	507.0	524.7	491.6
1,501-2,000	211.0	265.0	160.5	214.6	271.9	160.4	195.7	235.1	161.1
2,001-2,500	50.4	67.4	36.6	50.6	69.1	35.5	49.5	60.0	41.2
2,501-3,000	12.6	16.6	9.5	12.0	15.9	9.1	15.4	19.9	11.8
3,001-3,500	6.7	8.1	5.3	6.2	7.6	4.9	9.7	10.9	8.4
3,501-4,000	5.6	6.4	4.6	4.9	5.6	4.1	10.5	12.2	8.4
4,001-4,500	7.5	7.7	7.2	6.7	6.9	6.4	12.5	13.1	11.4
4,501 or more	14.2	13.7	15.1	12.0	10.8	14.7	20.2	23.1	16.0
2,500 or less	173.7	213.9	138.9	175.8	218.8	138.4	164.7	192.8	141.3
2,501 or more	7.8	9.1	6.4	7.1	8.3	5.8	11.9	13.9	9.7
	RATES AMONG SINGLE BIRTHS								
All weights	18.3	20.9	15.6	17.3	20.0	14.5	24.4	26.9	21.8
1,000 or less	871.7	895.1	846.7	880.2	903.8	855.2	835.2	858.5	809.0
1,001-1,500	562.3	629.1	489.6	575.0	648.5	489.9	511.0	537.4	488.8
1,501-2,000	228.9	281.1	178.3	238.4	294.5	182.2	190.0	221.3	163.1
2,001-2,500	52.8	71.1	38.3	53.5	73.2	37.7	50.0	62.1	40.6
2,501-3,000	12.6	16.7	9.5	12.2	16.1	9.2	15.1	19.7	11.3
3,001-3,500	6.7	8.1	5.3	6.2	7.6	4.9	9.5	10.7	8.4
3,501-4,000	5.6	6.4	4.6	4.9	5.6	4.0	10.4	12.1	8.4
4,001-4,500	7.4	7.6	7.2	6.7	6.8	6.5	12.3	13.0	11.2
4,501 or more	14.2	13.7	15.1	12.1	10.8	14.7	20.3	23.2	16.0
2,500 or less	173.4	215.6	137.1	176.7	222.1	137.1	159.5	187.2	137.0
2,501 or more	7.7	9.0	6.3	7.1	8.3	5.8	11.7	13.7	9.6
	RATES AMONG BIRTHS IN PLURAL SETS								
All weights	98.6	107.9	88.9	94.4	103.6	85.2	118.0	128.2	107.1
1,000 or less	871.5	890.2	853.4	898.0	910.8	886.2	754.0	808.8	689.7
1,001-1,500	503.7	585.8	434.1	507.1	615.6	418.8	489.0	472.5	505.5
1,501-2,000	145.4	200.4	100.8	129.5	179.3	90.6	218.4	287.7	152.5
2,001-2,500	32.9	43.1	23.3	30.2	42.7	18.4	45.6	[2]45.0	46.2
2,501-3,000	11.3	13.7	8.6	8.5	11.8	[2]4.9	25.8	[2]23.9	[2]27.8
3,001-3,500	10.4	[2]10.7	[2]9.8	[2]8.0	[2]6.9	[2]9.4	[2]22.4	[2]29.5	[2]12.1
3,501-4,000	[2]18.7	[2]13.3	[2]27.8	[2]16.6	[2]8.8	[2]30.1	[2]25.0	([3])	([3])
4,001-4,500	[2]38.1	([3])	([3])	([3])	([3])	([3])	([3])	([3])	([3])
4,501 or more	([3])	([3])	([3])	([3])	([3])	([3])	([3])	([3])	([3])
2,500 or less	175.6	204.4	149.7	171.0	199.9	145.3	196.9	224.5	170.5
2,501 or more	11.8	13.2	10.0	9.0	10.5	7.2	25.3	26.6	23.8

[1]Including data for Massachusetts, the over-all rates become: All races, 19.9; white, 18.8; nonwhite, 26.6.

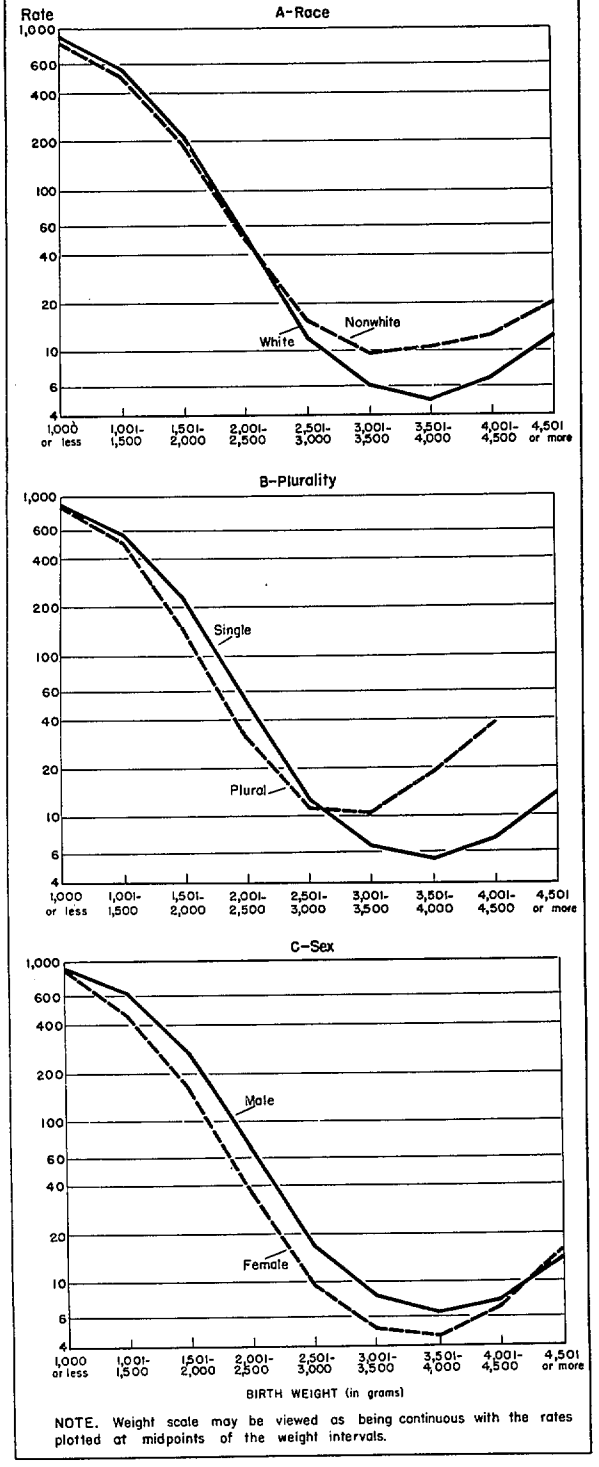
[2]This rate is subject to wide variability. It is based on more than 100 births, but less than 20 deaths.

[3]Rate not computed for this group because of small numbers of births (less than 100) and deaths (less than 20) occurring in the interval.

FIGURE 2

NEONATAL MORTALITY RATES BY BIRTH WEIGHT, UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Rates per 1,000 live births)



NOTE. Weight scale may be viewed as being continuous with the rates plotted at midpoints of the weight intervals.

For both white and nonwhite babies, the risk of mortality was reduced markedly with increasing weight until well past the prematurity level. The sharpest relative reductions in mortality in each race group, however, occurred at weight intervals 2,001-2,500 and 2,501-3,000 grams. At these levels the addition of 500 grams meant cutting mortality by two-thirds to three-fourths.

Among white children, the group weighing 3,501-4,000 grams had the lowest mortality. The neonatal rate at this optimum level, 4.9 per 1,000 was only a fourth the figure for all weights, 18.9. For the nonwhite races, children weighing somewhat less (3,001-3,500 grams) experienced the lowest mortality. While the rate for this optimum group (9.7) did not compare quite as favorably with the over-all rate as in the case of white births, it was also far below the neonatal rate for all weights combined (26.7).

Plurality.—Because of the heavy preponderance of plural births at the low weights, the neonatal mortality rate for babies born in multiple sets was five to six times the rate for single births. On a weight-specific basis, the mortality risk among plural births was actually lower than among single births between 1,001 and 3,000 grams. Above this point, however, single births had a major advantage (figure 2B).

The relationships observed between rates in the case of total births also hold for single events for the white and nonwhite groups. For plural births, however, the situation was not at all the same. White children at all weights above 1,500 grams experienced lower mortality than the nonwhite at comparable weights. The differential was most marked between 2,501 and 3,500 grams, where the mortality risk among the white was about a third of the nonwhite.

Sex.—During the neonatal period, the mortality risk for males and females differed greatly at almost every weight level, and the over-all mortality rate among females was only three-quarters of that among males.

The prognosis was considerably better for girls than for boys at most weights in both the white and nonwhite groups (figure 2C). In the white race, the neonatal mortality rates for females at weights between 1,501 and 3,500 grams were one-half to two-thirds of the rates for males. Only in the highest weight group (4,501 grams or more) was the rate lower for males. Sex differences in mortality in the nonwhite races were slightly less pronounced than in the white at most premature weight levels and also at weights between 2,501 and 3,500 grams. In the weight group 4,501 grams or more, the rate for the nonwhite female was less than that for the male.

Table G gives mortality rates for both single and plural births by race and sex as well as rates for the two groups combined. Comparisons based on single births do not change the relationships already discussed. It will also be noted that for this group race differentials among males weighing between 1,001 and 2,500 grams were larger than those among

females. In fact, for single immature births, as a group, there was no difference between white and nonwhite female mortality, but the rate among white males was 19 percent above that for nonwhite males. In the weights above 2,500 grams, race differences for each sex were large, with the white groups having the lower rates.

By treating the mortality experience of males and females in the same weight class as comparable, no account is taken of developmental differences that may exist. An evaluation of these differences is needed, but will require more detailed data than are available from the present study. In this connection, it is of interest, however, to compare the weight levels at which male and female mortality correspond. For this purpose, the mortality rates per 1,000 live births for single white males and females by 250 gram intervals are shown below. These rates indicate that at many points in the range 1,001 to 3,000 grams (the highest weight for which data in this detail are available) males had to weigh about 250 grams more than females to have somewhat the same chance of survival.

Weight	Male	Female
1,001-1,250 grams	731.7	589.3
1,251-1,500 grams	579.4	412.3
1,501-1,750 grams	383.0	246.0
1,751-2,000 grams	246.0	147.7
2,001-2,250 grams	117.1	59.5
2,251-2,500 grams	55.8	30.2
2,501-2,750 grams	23.8	13.2
2,751-3,000 grams	11.6	6.8

There is evidence, however, of a basic differential in mortality between the sexes that is not taken care of by this approach. This arises from the fact that at no point in the weight scale does mortality for males reach the low recorded for females.

Gestation

Inadequate as the gestation data are for exact measurements, they do demonstrate the sharp changes in the mortality risk with increasing gestation age. About 1 out of every 3 infants born at 28-31 weeks of gestation died in the neonatal period, as compared with 1 in 8 at 32-35 weeks, and less than 1 in 100 at 37 weeks and over (table H).

At gestations through 35 weeks, mortality was about 10 percent lower among nonwhite than among white children in single births. For infants born after the completion of 37 weeks of gestation, however, neonatal mortality was about two-thirds higher for nonwhite single births than for white. In plural births, the experience among the nonwhites was better only in the gestation group under 28 weeks. Major differentials in relative loss were also found between the sexes at each of the broad gestation levels given.

TABLE H. NEONATAL MORTALITY RATES BY WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with gestation not stated are distributed. Excludes data for Massachusetts)

RACE AND SEX	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
	RATES AMONG TOTAL BIRTHS				
All races--	788.4	379.4	121.3	18.4	8.8
Male----------	811.9	419.6	140.3	22.2	10.1
Female---------	761.4	334.0	101.0	14.4	7.5
White--------	803.6	387.9	122.4	18.1	8.1
Male----------	825.9	429.5	142.1	22.4	9.2
Female---------	777.6	339.1	100.5	13.5	6.8
Nonwhite-----	724.4	346.5	115.4	19.7	13.8
Male----------	751.0	377.9	128.7	21.5	15.9
Female---------	695.0	316.1	103.5	17.8	11.7
	RATES AMONG SINGLE BIRTHS				
All races--	779.1	365.4	118.0	17.2	8.6
White----------	793.5	374.3	119.7	17.1	7.9
Nonwhite-------	718.3	332.4	108.9	17.9	13.1
	RATES AMONG BIRTHS IN PLURAL SETS				
All races--	847.2	484.8	148.4	55.1	24.5
White----------	868.9	484.6	144.3	48.9	19.1
Nonwhite-------	760.9	486.1	175.5	80.1	49.6

Female infants experienced considerably lower mortality than did the male in all groups.

Gestation and birth weight

Mortality varied greatly by weight within each gestation group and by gestation within each weight group. At each gestation level, mortality dropped off sharply as weight increased, and reached a low point at the more mature weights. Similarly, among children falling in the same weight group, the mortality

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rate declined as the gestation age approached term.[3] For an intensive study of the separate and joint influence of gestation age and birth weight, it would be necessary to use smaller intervals for both of these characteristics than was warranted by the information available for this report. Despite this shortcoming, the data in table I give some indication of the important effect that both gestation and birth weight have on the survival of the newborn. For example, the loss during the neonatal period among white babies weighing 3,001-3,500 grams and born at gestations of 32-35 weeks, was considerably smaller than that among infants weighing between 2,001 and 2,500 grams and born after the completion of at least 37 weeks of gestation, but it greatly exceeded the rate for those weighing 2,501-3,000 grams who were born at or near term. Similar relations, emphasizing the need to consider both gestation and birth weight in evaluating mortality experience, may be noted in the data for nonwhite births.

TABLE I. NEONATAL MORTALITY RATES BY BIRTH WEIGHT, WEEKS OF GESTATION, AND RACE: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with birth weight or gestation not stated are distributed. Excludes data for Massachusetts)

RACE AND BIRTH WEIGHT (IN GRAMS)	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
WHITE					
1,000 or less-	914.7	828.8	787.0	[1]428.6	485.3
1,001-1,500---	762.2	560.0	416.6	377.5	353.1
1,501-2,000---	593.9	345.8	204.8	142.6	119.5
2,001-2,500---	400.0	187.6	92.7	49.9	33.5
2,501-3,000---	([2])	108.4	51.3	18.1	10.1
3,001-3,500---	([2])	[1]36.5	23.8	8.3	5.9
3,501-4,000---	([2])	[1]48.0	[1]11.3	6.1	4.8
4,001-4,500---	([2])	([2])	[1]90.5	9.6	5.9
4,501 or more-	([2])	([2])	([2])	[1]13.9	11.5
NONWHITE					
1,000 or less-	865.9	800.0	766.7	[1]500.0	[1]419.4
1,001-1,500---	743.3	467.8	383.7	[1]383.0	347.5
1,501-2,000---	566.7	284.9	155.7	141.4	134.9
2,001-2,500---	([2])	190.6	86.1	54.9	32.9
2,501-3,000---	([2])	([2])	[1]44.9	13.3	14.4
3,001-3,500---	([2])	([2])	[1]26.8	11.3	9.2
3,501-4,000---	([2])	([2])	[1]40.0	9.4	10.4
4,001-4,500---	([2])	([2])	([2])	[1]10.7	11.9
4,501 or more-	([2])	([2])	([2])	[1]16.3	20.7

[1]This rate is subject to wide variability. It is based on more than 100 births, but less than 20 deaths.

[2]Rate not computed for this group because of small numbers of births (less than 100) and deaths (less than 20) occurring in the interval.

[3]Supplementary data not shown here indicate an upturn in mortality as gestation age extended much beyond term.

The differences between the rates for males and females according to birth weight within a gestation group (table J) were generally greater than in the gestation group as a whole (especially among white births). This apparent contradiction can be explained by the previously discussed differences in the weight distributions of male and female births within each gestation group. It is worth noting that the rate among males in the optimum weight-gestation class was above the minimum recorded for females. The same situation held when more detailed data than shown in table J were examined. Thus, it would appear that an explanation of the sex differential in mortality, at least among the more favorable risk groups, would have to be sought among factors other than weight or gestation.

ATTENDANT AT BIRTH

The discussion in this section distinguishes between births that occurred in hospitals and those that were delivered at home[4] either by a physician or nonmedical person. While both race groups shared in the marked increase in the use of hospital facilities that took place during the 1940-50 decade, almost 45 percent of the nonwhite births in January-March 1950 were delivered at home (table 4). A substantial proportion of these were to rural residents in the South with midwives as the attendants. In the white race 8 percent of the births occurred out of a hospital, with a large fraction of these having a physician in attendance.

In interpreting the relationships presented below, it should be borne in mind that the attendant data do not take into account subsequent hospitalization of some of the infants delivered at home or the medical care received by others soon after delivery by a nonphysician. The effect of these factors could be appreciable in communities where special programs for the care of prematurely born infants existed.

A more significant factor for "attendant" statistics is the possible selection of obstetrical cases presenting complications for referral to hospitals, where ordinarily the mother would have remained at

[4]The phrase "at home" refers to all deliveries occurring out of hospitals or institutions.

TABLE J. NEONATAL MORTALITY RATES BY BIRTH WEIGHT, WEEKS OF GESTATION, RACE, AND SEX: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with birth weight or gestation not stated are distributed. Excludes data for Massachusetts)

RACE AND BIRTH WEIGHT (IN GRAMS)	MALE				FEMALE			
	Under 28 weeks	28-31 weeks	32-35 weeks	37 weeks and over	Under 28 weeks	28-31 weeks	32-35 weeks	37 weeks and over
White	825.9	429.5	142.1	9.2	777.6	339.1	100.5	6.8
1,500 or less	885.7	699.4	517.3	449.4	844.1	556.7	403.9	326.1
1,501-2,000	640.2	389.4	251.7	161.8	515.5	294.2	158.3	87.4
2,001-2,500	(1)	214.4	115.7	45.9	(1)	150.3	66.9	24.7
2,501-3,000	(1)	138.6	63.3	13.0	(1)	2 76.4	37.1	8.0
3,001-3,500	(1)	2 63.1	29.7	7.2	(1)	2 9.3	2 16.2	4.7
3,501 or more	(1)	2 76.9	2 32.4	5.9	(1)	(1)	2 33.0	4.6
Nonwhite	751.0	377.9	128.7	15.9	695.0	316.1	103.5	11.7
1,500 or less	860.8	617.4	421.1	342.9	785.5	508.5	457.9	379.7
1,501-2,000	600.0	288.5	211.9	162.8	533.3	281.5	108.7	112.0
2,001-2,500	(1)	242.0	77.7	43.5	(1)	2 133.8	93.5	25.1
2,501-3,000	(1)	(1)	2 52.1	18.5	(1)	(1)	2 39.0	11.0
3,001-3,500	(1)	(1)	2 46.4	10.4	(1)	(1)	2 6.8	8.1
3,501 or more	(1)	(1)	(1)	13.3	(1)	(1)	(1)	9.8

[1]Rate not computed for this group because of small numbers of births (less than 100) and deaths (less than 20) occurring in the interval.

[2]This rate is subject to wide variability. It is based on more than 100 births, but less than 20 deaths.

home for the delivery; also, the calling in of physicians by some midwives to handle difficult deliveries. In the nonwhite group, where midwives had a critical role, this selectivity may have been a particularly important factor. During the 1940's, the understanding of the midwife about the need for medical intervention in certain cases had increased greatly as a result of contacts by public health nurses and their success in having midwives bring patients to prenatal clinics.

Several qualitative factors also enter into the consideration of birth weight statistics for the various attendant categories. The most accurate information is unquestionably obtained for the births occurring in hospitals. Many of the attendants who weighed infants born at home used fairly crude scales, calibrated by quarter pounds. In addition, whether or not a midwife, for example, made a correct allowance for the diaper, blanket, or other material in which the newborn infant was wrapped, would have an appreciable effect on the birth weight distribution.

Still another factor that may be operating differentially among births at home and in the hospital, is underreporting of infants who die shortly after birth or misreporting them as fetal deaths. Although no objective measures are available, the general level of registration completeness alone, which is greatly in favor of the latter group, would make it reasonable to assume that this biasing situation is far more apt to occur among births at home.

These qualifications impose heavy restrictions on the inferences that can be drawn from current statistics on deliveries occurring out of hospitals. However, a number of the relationships found are highly suggestive and could be used as the framework for more intensive investigations.

Weight distribution and neonatal mortality

Babies born in hospitals generally weighed less at birth than those delivered at home. Infants delivered by nonphysicians were on the average the heaviest, weighing about 140 grams more than the babies delivered by physicians at home and 260 grams more than the hospital births (table K).

TABLE K. PERCENT DISTRIBUTION OF LIVE BIRTHS AND NEONATAL MORTALITY RATES, BY BIRTH WEIGHT, RACE, AND ATTENDANT AT BIRTH: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Neonatal mortality rates based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	ALL RACES			WHITE			NONWHITE		
	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified
	PERCENT DISTRIBUTION OF BIRTHS[2]								
All weights	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1,000 or less	0.5	0.5	0.3	0.4	0.5	0.4	0.9	0.5	0.2
1,001-1,500	0.6	0.7	0.5	0.6	0.6	0.8	1.0	1.1	0.4
1,501-2,000	1.4	1.2	1.2	1.3	1.1	1.4	2.2	1.6	1.2
2,001-2,500	5.0	4.5	4.4	4.7	4.0	4.9	7.8	5.7	4.2
2,501-3,000	18.8	14.8	12.0	18.1	13.3	12.1	25.8	18.7	12.0
3,001-3,500	38.7	33.7	28.0	38.6	33.3	28.0	39.0	34.9	28.0
3,501-4,000	26.6	29.1	31.6	27.4	30.2	31.1	18.3	26.3	31.7
4,001-4,500	7.1	10.6	13.1	7.4	11.7	13.0	4.0	7.6	13.1
4,501 or more	1.4	4.9	8.9	1.4	5.3	8.4	1.0	3.7	9.1
2,500 or less	7.5	6.9	6.4	7.0	6.2	7.4	11.9	8.8	6.1
2,501 or more	92.5	93.1	93.6	93.0	93.8	92.6	88.1	91.2	93.9
Median weight (in grams)[3]	3,300	3,420	3,560	3,320	3,460	3,540	3,150	3,320	3,560
	NEONATAL MORTALITY RATES								
All weights	19.1	25.6	26.4	18.2	23.7	35.9	27.4	30.6	23.6
1,000 or less	882.4	793.0	766.7	890.8	796.5	833.3	839.4	784.1	730.8
1,001-1,500	549.5	556.7	572.0	558.1	577.3	677.8	500.8	524.3	512.5
1,501-2,000	203.7	265.2	263.1	211.5	255.8	246.7	158.5	283.6	268.9
2,001-2,500	45.7	78.9	91.7	46.7	94.6	115.7	39.8	48.7	83.2
2,501-3,000	11.2	23.5	27.4	11.2	22.4	36.2	11.2	25.6	24.7
3,001-3,500	6.0	10.9	14.9	5.8	10.5	21.5	7.8	12.1	12.9
3,501-4,000	5.0	7.1	11.5	4.7	5.7	12.6	9.5	11.7	11.2
4,001-4,500	6.7	8.7	13.0	6.3	7.5	16.8	13.0	13.6	11.8
4,501 or more	13.0	15.3	16.4	10.8	13.7	20.5	44.1	21.5	15.2
2,500 or less	169.5	211.6	191.3	171.6	223.6	238.4	157.5	188.5	173.7
2,501 or more	6.9	11.7	15.2	6.7	10.5	19.7	9.8	15.2	13.9

[1]It is assumed that all births in hospitals or institutions are attended by physicians.

[2]Percents for summary groups were independently computed and therefore do not necessarily equal exactly the sum of the individual component groups.

[3]Computed to nearest 10 grams on basis of original reporting units of pounds and ounces.

The divergence in the weight distribution among white births did not become large until the upper level of immaturity (2,500 grams) was passed. But important differences from one attendant group to the other were observed starting with the lowest weight group for nonwhite births. Here the proportion of hospital births weighing 2,500 grams or less (11.9) was almost twice the figure for midwife deliveries (6.1).

Although some of the biases mentioned previously could have produced the difference in incidence of immaturity noted for the nonwhite births, it is unlikely that they could account for the entire amount. A full explanation would have to cover such things as birth order of the children involved, and the distribution of fetal loss from the earliest stage of pregnancy.

At the other end of the birth weight scale, i. e., in the group weighing 4,501 grams or more, was concentrated a substantial proportion of both the white and nonwhite infants delivered by midwives. These cases were relatively less frequent among the deliveries taken care of by physicians at home, and formed a very small percentage of the hospital births. Again, the magnitude of the variability suggests that it is not entirely due to "artificial" factors but that other causes must be sought.

The record of survival among white births was greatly in favor of hospital events. The advantage over the nonmedically attended births was especially marked in weight groups above 2,000 grams. In each of these weight intervals, the mortality rate among infants delivered by nonmedical persons was two to four times that found among hospital deliveries. The experience in the group handled by physicians at home fell between that in hospitals and that of midwives in most weight intervals.

In the nonwhite races, the neonatal mortality rate for all of the midwife deliveries was lower than the rates for deliveries in the other two attendant categories. The higher rate for hospital births is not entirely unexpected, in view of the relatively small proportion of midwife deliveries that fell at the low weights where the mortality risk was highest.

Actually, in the weights between 2,001 and 3,000 grams, within which the mortality rate declined precipitously, the neonatal loss among nonwhite babies delivered by midwives was twice that among the events in hospitals. It was only at weights above 4,500 grams that hospital births had a much higher rate. Births attended by physicians at home had a lower mortality rate than the nonmedically attended only in the weight groups 2,001-2,500 and 3,001-3,500 grams.

Considering the weight specific rates, it is not surprising that among nonwhite births the over-all neonatal mortality rate standardized for weight is far more favorable for hospital births than for either of the other two categories.[5] A comparison of standardized and unstandardized rates for the nonwhite births by attendant follows:

Attendant	Standardized	Unstandardized
Physician in hospital	24.6	27.4
Physician not in hospital	31.5	30.6
Midwife, other, and not specified	32.7	23.6

One of the interesting features of the weight specific rates among nonwhite births that occurred in hospitals was the exceptionally sharp increase as the babies' weights entered the interval 4,501 grams or more. The rate for infants weighing this much (44.1) was even above the level for the weight interval 2,001-2,500 grams. Furthermore, the figure was much higher than the comparable rate in any other attendant group handling either white or nonwhite deliveries.

This situation more than any other relationship revealed by the data suggests a selectivity of difficult cases by both midwives and physicians for referral to hospitals. There is a distinct possibility that a sufficiently large number of attendants called for hospital aid when faced with difficulties in the delivery of the very large babies to affect seriously the rate for nonwhite hospital births at this weight. The differences between doctors and midwives, in rates among home deliveries, might also reflect the operation of a selectivity factor in favor of the midwife group.

Within each race, about the same proportion of the births delivered at home and in a hospital were members of plural sets. The advantage, previously discussed, that went with hospitalization at time of birth held for both the single and the plural birth groups (table L). In view of the special problems that arise in the delivery of multiple births and in their care after parturition, hospitalization would be expected to be a more important factor for these births than for single births. This is borne out by the experience in several of the weight groups—especially, among the nonwhite babies weighing 2,501 grams or more. However, the pattern was not consistent throughout the weight range.

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[5] For the white race there was virtually no difference between the standardized and unstandardized rates.

TABLE L. NEONATAL MORTALITY RATES AMONG BIRTHS IN HOSPITALS AND NOT IN HOSPITALS, BY BIRTH WEIGHT, RACE, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	WHITE		NONWHITE	
	In hospital	Not in hospital	In hospital	Not in hospital
	RATES AMONG SINGLE BIRTHS			
1,000 or less	887.7	796.3	853.2	772.1
1,001-1,500	571.3	610.2	510.1	512.8
1,501-2,000	235.9	269.5	154.2	271.5
2,001-2,500	49.3	106.4	40.9	69.1
2,500 or less	172.3	229.9	153.7	172.1
2,501 or more	6.6	12.1	9.8	14.0
	RATES AMONG BIRTHS IN PLURAL SETS			
1,000 or less	905.3	826.9	770.8	700.0
1,001-1,500	502.1	558.8	454.5	541.7
1,501-2,000	124.5	194.4	177.8	284.8
2,001-2,500	27.9	[1]55.1	[1]30.5	72.1
2,500 or less	167.5	210.2	182.8	221.8
2,501 or more	8.2	[1]16.5	[1]10.1	40.8

[1]This rate is subject to wide variability. It is based on more than 100 births, but less than 20 deaths.

SINGLE BIRTHS IN HOSPITALS

The birth weights considered thus far have been principally in 500 gram intervals, or slightly more than 1 pound. This was selected as the measuring unit to reduce the effect on comparisons of the errors associated with the weight information for births that occurred at home. Class intervals of 250 grams for single births in hospitals are introduced in this section for the weight range between 1,001 and 3,000 grams to discern more clearly the points at which marked changes in the rate of decline in mortality occur. While it would undoubtedly be desirable to measure in finer intervals, lack of control and specific knowledge about the errors that exist even in hospital data would make this highly questionable. Also, many of the frequencies would be too low for close study.

In examining mortality differences between white and nonwhite births that are delivered in hospitals, it should be kept in mind that the data are for all hospitals combined. The heterogeneity among hospitals in types of services available for handling prematurely born infants is probably reflected differentially in the figures for white and nonwhite hospital births.

The mortality data by race for single births in hospitals, shown in table M and figure 3, clearly indicate the significance of relatively small increases in weight on the mortality rate. Among white babies, the addition of 250 grams to the birth weight of an infant meant a large reduction in the mortality risk. From one 250 gram group to the next, over the range of weights between 1,751 and 3,000 grams, the mortality rate was cut approximately in half. It is particularly noteworthy that at this stage of development in the special efforts to save the immature infant, the rate of decline in the neonatal loss was about the same over an interval which includes both prematurely born and mature babies. In the lower weights, percentage reductions were important but not as large.

A slowing down in the rapid rate of decline in mortality occurred when the weight group 3,001-3,500 grams was reached. As in the case for all births combined, the optimum weight interval among single white births in hospitals was 3,501-4,000 grams.

The downward sweep in the nonwhite mortality rate as birth weight increased had a number of points

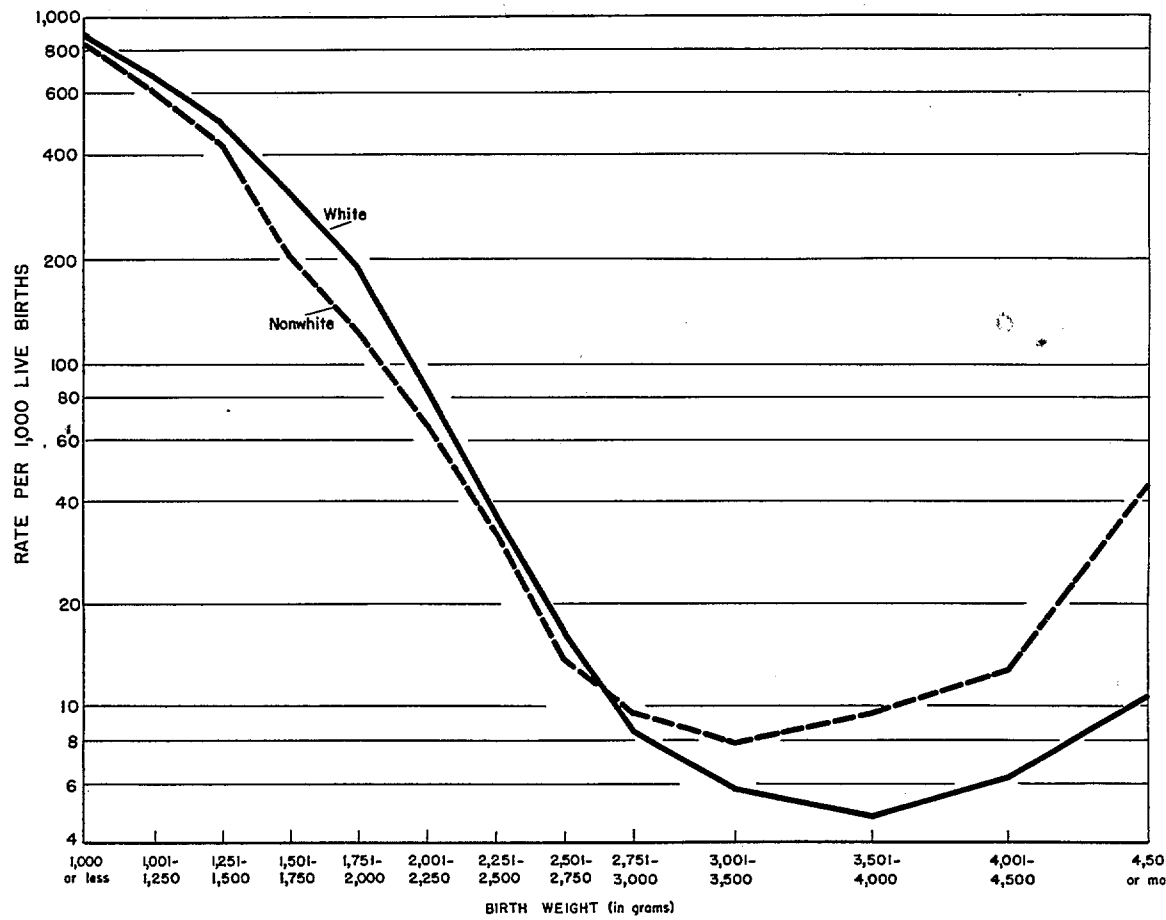
TABLE M. NEONATAL MORTALITY RATES AMONG SINGLE BIRTHS IN HOSPITALS, BY DETAILED BIRTH WEIGHT AND RACE: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Based on deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Rates per 1,000 live births. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	All races	White	Nonwhite
All weights	17.5	16.7	25.1
1,000 or less	882.0	887.7	853.2
1,001-1,250	660.2	668.1	614.4
1,251-1,500	480.1	489.5	430.9
1,501-1,750	297.6	315.4	203.1
1,751-2,000	181.6	191.6	125.5
2,001-2,250	81.9	84.2	67.4
2,251-2,500	35.5	36.0	32.4
2,501-2,750	16.2	16.6	13.8
2,751-3,000	8.4	8.3	9.5
3,001-3,500	6.0	5.8	7.8
3,501-4,000	5.0	4.7	9.5
4,001-4,500	6.6	6.3	12.7
4,501 or more	13.0	10.8	44.1

FIGURE 3

NEONATAL MORTALITY RATES AMONG SINGLE BIRTHS IN HOSPITALS, BY DETAILED BIRTH WEIGHT AND RACE: UNITED STATES, JANUARY 1 TO MARCH 31, 1950



See note on figure 2.

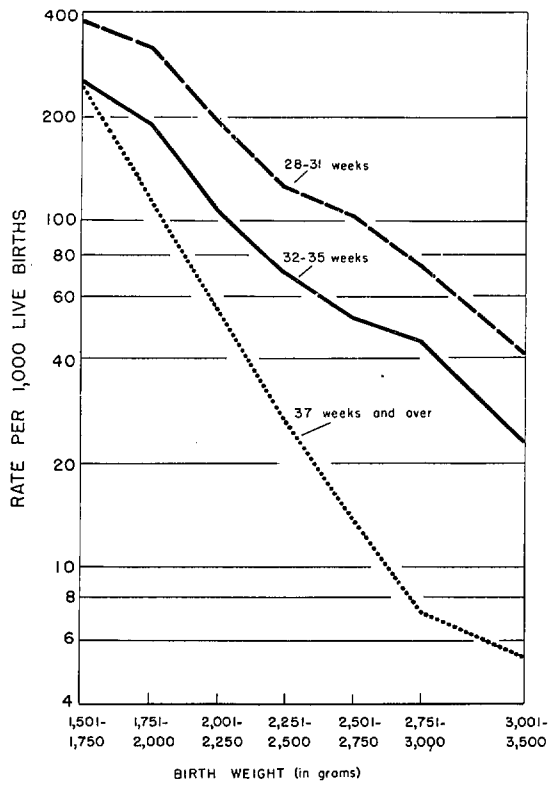
of similarity to the pattern shown by the rates for white births. However, it will be noted that the gap between the lines representing white and nonwhite rates in figure 3 widens as the weights increase from 1,000 grams or less to 1,501-1,750. In view of the semilogarithmic scale used, this indicates a relatively steeper rate of decline in nonwhite mortality over the weight interval. The drop in mortality among nonwhite births was so sharp that the rate in the weight group 1,501-1,750 was approximately the same as for white babies in the next higher 250 gram interval. After 2,000 grams, however, the rate of decline was generally in favor of the white births, and the mortality curves for white and nonwhite single births occurring in hospitals cross in the neighborhood of 2,750 grams. The curves then diverged rapidly.

The influence of gestation age on neonatal mortality was examined for as accurate a set of detailed data as is now available on a nationwide basis. These statistics relate to single white births delivered in hospitals. To avoid irregularities in the series due to small frequencies and known deficiencies, consideration was limited to three gestation-age intervals (28-31, 32-35, and 37 weeks and over) over the weight span 1,501 to 3,500 grams.

Figure 4 illustrates how important a factor gestation age was, particularly when the birth weight approached the upper weight level of immaturity. In the weight group 1,501-1,750, the loss among infants of gestations of 37 weeks and over was about two-thirds the mortality in the 28-31 weeks group. With increasing weight, the mortality rate declined sharply in each of the gestation groups. But, the decrease was so much more rapid among the babies who were mature according to the gestation criterion that the rate for this group at weight 2,251-2,500 grams was only one-fifth the corresponding figure for babies of 28-31 weeks of gestation. In fact, mortality among

FIGURE 4

NEONATAL MORTALITY RATES AMONG SINGLE WHITE BIRTHS IN HOSPITALS, BY DETAILED BIRTH WEIGHT AND SPECIFIED GESTATION GROUPS: UNITED STATES, JANUARY 1 TO MARCH 31, 1950



See note on figure 2.

the latter group of infants was as high as the rate for infants of gestation ages of 37 weeks and over who weighed 500 grams or less at birth. The same disparity continued well into the mature weight groups as indicated by the following:

	28-31 weeks	32-35 weeks	37 weeks and over
1,501-1,750 grams	382.9	253.8	243.9
1,751-2,000 grams	315.3	192.8	115.2
2,001-2,250 grams	195.5	108.2	57.7
2,251-2,500 grams	125.4	71.9	27.0
2,501-2,750 grams	103.4	52.3	13.9
2,751-3,000 grams	76.1	44.4	7.4
3,001-3,500 grams	40.5	23.1	5.5

SUMMARY

Statistics on maturity at birth derived from vital records relating to babies born in the United States during the first 3 months of 1950 and neonatal deaths among this group, provided the following information;

1. Of the total number of children born, 7.4 percent weighed 2,500 grams or less. Nonwhite babies weighed on the average 50 grams less than the white, and greater proportions of nonwhite infants were born at the very low and very high weights where the mortality risk is greatest. Over one-half of the liveborn children in plural deliveries weighed 2,500 grams or less as compared with only 6.4 percent in single births. Female babies weighed on the average 130 grams less than male.
2. Median weights for children in single births were less than 2,500 grams at gestation age groups under 36 weeks, and were over 2,500 grams at gestations of 37 weeks and over. However, appreciable proportions of the children at some of the gestation ages considered premature weighed over 2,500 grams, and about half of the infants below this weight were reported as born at or near full term.
3. The neonatal mortality rate among infants weighing 2,500 grams or less at birth was 173.7 per 1,000 as compared with 7.8 per 1,000 among all other children. Mortality declined sharply with relatively small increases in weight until well past the prematurity weight level with the optimum weight for survival falling at 3,501-4,000 grams. Marked increase in weight beyond this point was an important liability. At the low weights where the risk of mortality is great, nonwhite infants had a somewhat better chance for survival than the white. However, at almost all of the mature weights the risk among nonwhite births was considerably higher. Mortality among plural births was below that among single births at the weights between 1,001 and 3,000 grams but higher at weights above 3,000 grams. At all but the very high and very low weights, the mortality risk was far greater for male births than for female. The over-all neonatal mortality rate among males was about one-third above the rate for females.
4. Children born in hospitals weighed on the average less at birth than those delivered at home (part of this difference may be due to biases in reporting in the nonhospital group).

Mortality among white infants delivered by nonmedical persons was two to four times that for hospital deliveries at all weights above 2,000 grams. Among nonwhite births, the rates for hospital deliveries were substantially lower than those for midwife deliveries at weights of 1,501 to 3,000 grams, but were much higher at weights above 4,500 grams. The latter suggests a selectivity of difficult cases for referral to hospitals.

5. Gestation age as well as birth weight has a considerable influence on the survival of the newborn. Generally, the heavier babies at each gestation age level fared better than the lighter ones; and similarly among children falling in the same weight group, those at gestations at or near term had the most favorable mortality experience.

REFERENCES

The most complete set of references available today on studies related to birth weight and gestation age is found in Dr. Ethel C. Dunham's book, "Premature Infant" (Edition 2, Paul B. Hoeber, Inc., Publishers, in Press). A selected group of references which are particularly relevant to a number of the statements made in this article follows:

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(8) _____, _____, _____, "Suggested Tabulations of Statistics on Birth Weight and Related Characteristics for Live Births and Neonatal Deaths," National Office of Vital Statistics, 1952.

SYMBOLS USED IN SPECIAL REPORTS

Class or item not applicable (three dots)	...
Data not available (three dashes)	---
Quantity is zero, in frequency tables (one dash)	-
Quantity is zero, in rate or percent tables (one cipher)	0
If rate or percent is more than 0 but less than 0.05	0.0
If both frequency and population base are zero in rate or percent tables (one dash)	

TABLE 1. LIVE BIRTHS AND NEONATAL DEATHS, BY BIRTH WEIGHT, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Neonatal deaths include deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	BIRTHS				NEONATAL DEATHS			
	White		Nonwhite		White		Nonwhite	
	Male	Female	Male	Female	Male	Female	Male	Female
	TOTAL							
All weights	368,378	348,755	61,128	59,525	7,952	5,569	1,799	1,421
000 or less	1,621	1,568	393	346	1,467	1,350	334	273
1 001-1,500	2,121	1,958	465	537	1,364	929	244	264
1,501-2,000	4,480	4,726	1,021	1,161	1,218	758	240	187
2,001-2,500	15,034	18,426	3,433	4,347	1,039	654	206	179
2,501-3,000	54,833	72,073	11,211	13,691	873	655	223	161
3,001-3,500	133,719	139,566	21,149	21,195	1,021	682	231	178
3,501-4,000	112,366	86,023	15,561	12,789	633	349	190	108
4,001-4,500	35,564	20,189	5,172	3,583	244	130	68	41
4,501 or more	8,640	4,226	2,723	1,876	93	62	63	30
	SINGLE							
All weights	361,233	341,733	59,583	58,069	7,212	4,971	1,601	1,265
1,000 or less	1,352	1,278	325	288	1,222	1,093	279	233
1,001-1,500	1,775	1,533	374	446	1,151	751	201	218
1,501-2,000	3,599	3,600	809	938	1,060	656	179	153
2,001-2,500	13,018	16,304	3,011	3,892	953	615	187	158
2,501-3,000	52,630	70,033	10,793	13,295	847	645	213	150
3,001-3,500	132,559	138,715	20,912	21,030	1,013	674	224	176
3,501-4,000	112,138	85,890	15,488	12,742	631	345	188	107
4,001-4,500	35,528	20,155	5,154	3,566	242	130	67	40
4,501 or more	8,634	4,225	2,717	1,872	93	62	63	30
	IN PLURAL SETS							
All weights	7,145	7,022	1,545	1,456	740	598	198	156
1,000 or less	269	290	68	58	245	257	55	40
1,001-1,500	346	425	91	91	213	178	43	46
1,501-2,000	881	1,126	212	223	158	102	61	34
2,001-2,500	2,016	2,122	422	455	86	39	19	21
2,501-3,000	2,203	2,040	418	396	26	10	10	11
3,001-3,500	1,160	851	237	165	8	8	7	2
3,501-4,000	228	133	73	47	2	4	2	1
4,001-4,500	36	34	18	17	2	-	1	1
4,501 or more	6	1	6	4	-	-	-	-

TABLE 2. LIVE BIRTHS BY BIRTH WEIGHT, WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES JANUARY 1 TO MARCH 31, 1950

(Births with birth weight or gestation not stated are distributed. Excludes births to residents of Massachusetts)

BIRTH WEIGHT (IN GRAMS) AND SEX	WHITE					NONWHITE				
	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
	TOTAL BIRTHS									
Both sexes	4,064	6,024	14,537	55,796	636,712	965	1,564	2,522	15,039	100,563
1,000 or less	2,415	584	108	14	68	507	155	30	16	31
1,001-1,500	1,123	1,616	869	151	320	261	404	172	47	118
1,501-2,000	261	1,975	3,232	1,262	2,476	90	530	591	304	667
2,001-2,500	65	1,098	4,885	5,507	21,905	26	299	848	1,384	5,223
2,501-3,000	56	323	2,902	10,579	113,046	19	79	423	2,636	21,745
3,001-3,500	83	219	1,684	18,753	252,546	19	50	299	4,615	37,361
3,501-4,000	44	125	619	14,039	183,562	31	28	100	3,837	24,354
4,001-4,500	15	68	199	4,270	51,201	3	15	44	1,403	7,290
4,501 or more	2	16	39	1,221	11,588	9	4	15	797	3,774
Male	2,189	3,255	7,641	28,597	326,696	506	770	1,189	7,627	51,036
1,000 or less	1,242	289	49	10	31	267	86	16	9	15
1,001-1,500	647	862	413	72	127	128	178	79	25	55
1,501-2,000	164	1,071	1,609	567	1,069	45	260	269	146	301
2,001-2,500	38	639	2,584	2,708	9,065	15	157	399	630	2,232
2,501-3,000	24	166	1,581	4,880	48,182	16	45	192	1,253	9,705
3,001-3,500	44	111	942	9,165	123,457	9	26	151	2,267	18,696
3,501-4,000	21	67	328	7,731	104,219	19	13	51	2,037	13,441
4,001-4,500	8	41	111	2,676	32,728	3	4	26	794	4,345
4,501 or more	1	9	24	788	7,818	4	1	6	466	2,246
Female	1,875	2,769	6,896	27,199	310,016	459	794	1,333	7,412	49,527
1,000 or less	1,173	295	59	4	37	240	69	14	7	16
1,001-1,500	476	754	456	79	193	133	226	93	22	63
1,501-2,000	97	904	1,623	695	1,407	45	270	322	158	366
2,001-2,500	27	459	2,301	2,799	12,840	11	142	449	754	2,991
2,501-3,000	32	157	1,321	5,699	64,864	3	34	231	1,383	12,040
3,001-3,500	39	108	742	9,588	129,089	10	24	148	2,348	18,665
3,501-4,000	23	58	291	6,308	79,343	12	15	49	1,800	10,913
4,001-4,500	7	27	88	1,594	18,473	-	11	18	609	2,945
4,501 or more	1	7	15	433	3,770	5	3	9	331	1,528
	SINGLE BIRTHS									
Both sexes	3,515	5,277	12,929	54,056	627,189	827	1,420	2,277	14,602	98,526
1,000 or less	2,029	449	82	11	59	419	127	25	14	28
1,001-1,500	998	1,337	666	97	210	224	364	137	28	67
1,501-2,000	236	1,716	2,621	923	1,703	85	468	495	241	458
2,001-2,500	60	1,037	4,340	4,788	19,097	20	290	773	1,227	4,593
2,501-3,000	53	313	2,723	10,153	109,421	17	77	397	2,523	21,074
3,001-3,500	80	218	1,646	18,593	250,737	19	50	293	4,558	37,022
3,501-4,000	43	124	616	14,009	183,236	31	26	99	3,818	24,256
4,001-4,500	14	67	196	4,261	51,145	3	14	43	1,398	7,262
4,501 or more	2	16	39	1,221	11,581	9	4	15	795	3,766
Male	1,909	2,869	6,823	27,728	321,904	429	695	1,068	7,399	49,992
1,000 or less	1,060	218	39	7	28	221	70	11	9	14
1,001-1,500	574	732	322	47	100	108	160	62	13	31
1,501-2,000	148	935	1,334	428	754	42	227	226	112	202
2,001-2,500	35	599	2,283	2,332	7,769	9	151	363	549	1,939
2,501-3,000	22	159	1,471	4,661	46,317	14	43	174	1,199	9,363
3,001-3,500	42	111	914	9,083	122,409	9	26	149	2,236	18,492
3,501-4,000	20	66	326	7,711	104,015	19	13	51	2,023	13,382
4,001-4,500	7	40	110	2,671	32,700	3	4	26	793	4,328
4,501 or more	1	9	24	788	7,812	4	1	6	465	2,241

TABLE 2. LIVE BIRTHS BY BIRTH WEIGHT, WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950—Continued

(Births with birth weight or gestation not stated are distributed. Excludes births to residents of Massachusetts)

BIRTH WEIGHT (IN GRAMS) AND SEX	WHITE					NONWHITE				
	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
	SINGLE BIRTHS—Continued									
Female	1,606	2,408	6,106	26,328	305,285	398	725	1,209	7,203	48,534
1,000 or less	969	231	43	4	31	198	57	14	5	14
1,001-1,500	424	605	344	50	110	116	204	75	15	36
1,501-2,000	88	781	1,287	495	949	43	241	269	129	256
2,001-2,500	25	438	2,057	2,456	11,328	11	139	410	678	2,654
2,501-3,000	31	154	1,252	5,492	63,104	3	34	223	1,324	11,711
3,001-3,500	38	107	732	9,510	128,328	10	24	144	2,322	18,530
3,501-4,000	23	58	290	6,298	79,221	12	13	48	1,795	10,874
4,001-4,500	7	27	86	1,590	18,445	-	10	17	605	2,934
4,501 or more	1	7	15	433	3,769	5	3	9	330	1,525
	BIRTHS IN PLURAL SETS									
Both sexes	549	747	1,608	1,740	9,523	138	144	245	437	2,037
1,000 or less	386	135	26	3	9	88	28	5	2	3
1,001-1,500	125	279	203	54	110	37	40	35	19	51
1,501-2,000	25	259	611	339	773	5	62	96	63	209
2,001-2,500	5	61	545	719	2,808	6	9	75	157	630
2,501-3,000	3	10	179	426	3,625	2	2	26	113	671
3,001-3,500	3	1	38	160	1,809	-	-	6	57	339
3,501-4,000	1	1	3	30	326	-	2	1	19	98
4,001-4,500	1	1	3	9	56	-	1	1	5	28
4,501 or more	-	-	-	-	7	-	-	-	2	8
Male	280	386	818	869	4,792	77	75	121	228	1,044
1,000 or less	182	71	10	3	3	46	16	5	-	1
1,001-1,500	73	130	91	25	27	20	18	17	12	24
1,501-2,000	16	136	275	139	315	3	33	43	34	99
2,001-2,500	3	40	301	376	1,296	6	6	36	81	293
2,501-3,000	2	7	110	219	1,865	2	2	18	54	342
3,001-3,500	2	-	28	82	1,048	-	-	2	31	204
3,501-4,000	1	1	2	20	204	-	-	-	14	59
4,001-4,500	1	1	1	5	28	-	-	-	1	17
4,501 or more	-	-	-	-	6	-	-	-	1	5
Female	269	361	790	871	4,731	61	69	124	209	993
1,000 or less	204	64	16	-	6	42	12	-	2	2
1,001-1,500	52	149	112	29	83	17	22	18	7	27
1,501-2,000	9	123	336	200	458	2	29	53	29	110
2,001-2,500	2	21	244	343	1,512	-	3	39	76	337
2,501-3,000	1	3	69	207	1,760	-	-	8	59	329
3,001-3,500	1	1	10	78	761	-	-	4	26	135
3,501-4,000	-	-	1	10	122	-	2	1	5	39
4,001-4,500	-	-	2	4	28	-	1	1	4	11
4,501 or more	-	-	-	-	1	-	-	-	1	3

TABLE 3. NEONATAL DEATHS BY BIRTH WEIGHT, WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Includes deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Deaths with birth weight or gestation not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS) AND SEX	WHITE					NONWHITE				
	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
	TOTAL									
Both sexes	3,266	2,337	1,779	1,008	5,131	699	542	291	296	1,392
1,000 or less	2,209	484	85	6	33	439	124	23	8	13
1,001-1,500	856	905	362	57	113	194	189	66	18	41
1,501-2,000	155	683	662	180	296	51	151	92	43	90
2,001-2,500	26	206	453	275	733	7	57	73	76	172
2,501-3,000	6	35	149	191	1,147	5	12	19	35	313
3,001-3,500	8	8	40	155	1,492	1	3	8	52	345
3,501-4,000	2	6	7	86	881	1	4	4	36	253
4,001-4,500	3	9	18	41	303	-	2	5	15	87
4,501 or more	1	1	3	17	133	1	-	1	13	78
Male	1,808	1,398	1,086	640	3,020	380	291	153	164	811
1,000 or less	1,154	251	44	5	13	240	70	13	5	6
1,001-1,500	519	554	195	38	58	100	93	27	6	18
1,501-2,000	105	417	405	118	173	27	75	57	32	49
2,001-2,500	15	137	299	172	416	6	38	31	34	97
2,501-3,000	4	23	100	121	625	5	8	10	20	180
3,001-3,500	6	7	28	96	884	1	3	7	26	194
3,501-4,000	2	4	3	55	569	1	3	2	22	162
4,001-4,500	2	4	11	27	200	-	1	5	8	54
4,501 or more	1	1	1	8	82	-	-	1	11	51
Female	1,458	939	693	368	2,111	319	251	138	132	581
1,000 or less	1,055	233	41	1	20	199	54	10	3	7
1,001-1,500	337	351	167	19	55	94	96	39	12	23
1,501-2,000	50	266	257	62	123	24	76	35	11	41
2,001-2,500	11	69	154	103	317	1	19	42	42	75
2,501-3,000	2	12	49	70	522	-	4	9	15	133
3,001-3,500	2	1	12	59	608	-	-	1	26	151
3,501-4,000	-	2	4	31	312	-	1	2	14	91
4,001-4,500	1	5	7	14	103	-	1	-	7	33
4,501 or more	-	-	2	9	51	1	-	-	2	27
	AMONG SINGLE BIRTHS									
Both sexes	2,789	1,975	1,547	923	4,949	594	472	248	261	1,291
1,000 or less	1,851	369	64	3	28	374	103	17	6	12
1,001-1,500	755	744	286	34	83	163	171	54	8	23
1,501-2,000	144	603	567	151	251	48	124	75	35	50
2,001-2,500	24	201	418	250	675	2	57	68	63	155
2,501-3,000	5	34	145	189	1,119	4	12	16	33	298
3,001-3,500	6	8	39	152	1,482	1	3	8	52	336
3,501-4,000	1	6	7	86	876	1	1	4	36	253
4,001-4,500	2	9	18	41	302	-	1	5	15	86
4,501 or more	1	1	3	17	133	1	-	1	13	78
Male	1,563	1,197	959	579	2,914	319	250	129	146	757
1,000 or less	985	189	34	2	12	204	56	8	5	6
1,001-1,500	457	468	158	21	47	84	84	22	1	10
1,501-2,000	96	368	354	98	144	24	59	46	24	26
2,001-2,500	14	134	274	155	376	1	38	29	30	89
2,501-3,000	3	22	97	120	605	4	8	9	19	173
3,001-3,500	5	7	27	93	881	1	3	7	26	187
3,501-4,000	1	4	3	55	568	1	1	2	22	162
4,001-4,500	1	4	11	27	199	-	1	5	8	53
4,501 or more	1	1	1	8	82	-	-	1	11	51

TABLE 3. NEONATAL DEATHS BY BIRTH WEIGHT, WEEKS OF GESTATION, RACE, SEX, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950—Continued

(See headnote on p. 29)

BIRTH WEIGHT (IN GRAMS) AND SEX	WHITE					NONWHITE				
	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over	Under 28 weeks	28-31 weeks	32-35 weeks	36 weeks	37 weeks and over
	AMONG SINGLE BIRTHS—Continued									
Female	1,226	778	588	344	2,035	275	222	119	115	534
1,000 or less	866	180	30	1	16	170	47	9	1	6
1,001-1,500	298	276	128	13	36	79	87	32	7	13
1,501-2,000	48	235	213	53	107	24	65	29	11	24
2,001-2,500	10	67	144	95	299	1	19	39	33	66
2,501-3,000	2	12	48	69	514	-	4	7	14	125
3,001-3,500	1	1	12	59	601	-	-	1	26	149
3,501-4,000	-	2	4	31	308	-	-	2	14	91
4,001-4,500	1	5	7	14	103	-	-	-	7	33
4,501 or more	-	-	2	9	51	1	-	-	2	27
	AMONG BIRTHS IN PLURAL SETS									
Both sexes	477	362	232	85	182	105	70	43	35	101
1,000 or less	358	115	21	3	5	65	21	6	2	1
1,001-1,500	101	161	76	23	30	31	18	12	10	18
1,501-2,000	11	80	95	29	45	3	27	17	8	40
2,001-2,500	2	5	35	25	58	5	-	5	13	17
2,501-3,000	1	1	4	2	28	1	-	3	2	15
3,001-3,500	2	-	1	3	10	-	-	-	-	9
3,501-4,000	1	-	-	-	5	-	3	-	-	-
4,001-4,500	1	-	-	-	1	-	1	-	-	1
4,501 or more	-	-	-	-	-	-	-	-	-	-
Male	245	201	127	61	106	61	41	24	18	54
1,000 or less	169	62	10	3	1	36	14	5	-	-
1,001-1,500	62	86	37	17	11	16	9	5	5	8
1,501-2,000	9	49	51	20	29	3	16	11	8	23
2,001-2,500	1	3	25	17	40	5	-	2	4	8
2,501-3,000	1	1	3	1	20	1	-	1	1	7
3,001-3,500	1	-	1	3	3	-	-	-	-	7
3,501-4,000	1	-	-	-	1	-	2	-	-	-
4,001-4,500	1	-	-	-	1	-	-	-	-	1
4,501 or more	-	-	-	-	-	-	-	-	-	-
Female	232	161	105	24	76	44	29	19	17	47
1,000 or less	189	53	11	-	4	29	7	1	2	1
1,001-1,500	39	75	39	6	19	15	9	7	5	10
1,501-2,000	2	31	44	9	16	-	11	6	-	17
2,001-2,500	1	2	10	8	18	-	-	3	9	9
2,501-3,000	-	-	1	1	8	-	-	2	1	8
3,001-3,500	1	-	-	-	7	-	-	-	-	2
3,501-4,000	-	-	-	-	4	-	1	-	-	-
4,001-4,500	-	-	-	-	-	-	1	-	-	-
4,501 or more	-	-	-	-	-	-	-	-	-	-

TABLE 4. LIVE BIRTHS AND NEONATAL DEATHS, BY BIRTH WEIGHT, RACE, AND ATTENDANT AT BIRTH: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Neonatal deaths include deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	ALL RACES			WHITE			NONWHITE		
	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified
	BIRTHS								
All weights-	725,226	65,406	47,154	658,295	47,846	10,992	66,931	17,560	36,162
1,000 or less---	3,494	314	120	2,921	226	42	573	88	78
1,001-1,500-----	4,355	476	250	3,698	291	90	657	185	160
1,501-2,000-----	10,007	807	574	8,524	532	150	1,483	275	424
2,001-2,500-----	36,238	2,940	2,062	30,990	1,934	536	5,248	1,006	1,526
2,501-3,000-----	136,481	9,663	5,664	119,198	6,383	1,325	17,283	3,280	4,339
3,001-3,500-----	280,371	22,052	13,206	254,291	15,919	3,075	26,080	6,133	10,131
3,501-4,000-----	192,807	19,041	14,891	180,548	14,426	3,415	12,259	4,615	11,476
4,001-4,500-----	51,437	6,904	6,167	48,746	5,576	1,431	2,691	1,328	4,736
4,501 or more---	10,036	3,209	4,220	9,379	2,559	928	657	650	3,292
	NEONATAL DEATHS								
All weights-	13,821	1,673	1,247	11,990	1,136	395	1,831	537	852
1,000 or less---	3,083	249	92	2,602	180	35	481	69	57
1,001-1,500-----	2,393	265	143	2,064	168	61	329	97	82
1,501-2,000-----	2,038	214	151	1,803	136	37	235	78	114
2,001-2,500-----	1,657	232	189	1,448	183	62	209	49	127
2,501-3,000-----	1,530	227	155	1,337	143	48	193	84	107
3,001-3,500-----	1,674	241	197	1,470	167	66	204	74	131
3,501-4,000-----	973	136	171	857	82	43	116	54	128
4,001-4,500-----	343	60	80	308	42	24	35	18	56
4,501 or more---	130	49	69	101	35	19	29	14	50

[1]It is assumed that all births in hospitals or institutions are attended by physicians.

TABLE 5. LIVE BIRTHS AND NEONATAL DEATHS, BY BIRTH WEIGHT, RACE, ATTENDANT AT BIRTH, AND PLURALITY: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Neonatal deaths include deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	WHITE			NONWHITE		
	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified	Physician in hospital[1]	Physician not in hospital	Midwife, other, and not specified
	SINGLE BIRTHS					
All weights	645,343	46,831	10,792	65,202	17,094	35,356
1,000 or less	2,414	180	36	477	72	64
1,001-1,500	2,995	231	82	547	151	122
1,501-2,000	6,661	415	123	1,213	202	332
2,001-2,500	27,197	1,642	483	4,690	882	1,331
2,501-3,000	115,266	6,113	1,284	16,800	3,153	4,135
3,001-3,500	252,489	15,754	3,031	25,902	6,064	9,976
3,501-4,000	180,253	14,379	3,396	12,233	4,595	11,402
4,001-4,500	48,692	5,561	1,430	2,683	1,325	4,712
4,501 or more	9,376	2,556	927	657	650	3,282
	NEONATAL DEATHS AMONG SINGLE BIRTHS					
All weights	10,790	1,023	370	1,635	478	753
1,000 or less	2,143	143	29	407	59	46
1,001-1,500	1,711	135	56	279	78	62
1,501-2,000	1,571	114	31	187	64	81
2,001-2,500	1,342	169	57	192	43	110
2,501-3,000	1,306	138	48	189	77	97
3,001-3,500	1,459	165	63	202	72	126
3,501-4,000	851	82	43	116	53	126
4,001-4,500	306	42	24	34	18	55
4,501 or more	101	35	19	29	14	50
	BIRTHS IN PLURAL SETS					
All weights	12,952	1,015	200	1,729	466	806
1,000 or less	507	46	6	96	16	14
1,001-1,500	703	60	8	110	34	38
1,501-2,000	1,863	117	27	270	73	92
2,001-2,500	3,793	292	53	558	124	195
2,501-3,000	3,932	270	41	483	127	204
3,001-3,500	1,802	165	44	178	69	155
3,501-4,000	295	47	19	26	20	74
4,001-4,500	54	15	1	8	3	24
4,501 or more	3	3	1	-	-	10
	NEONATAL DEATHS AMONG BIRTHS IN PLURAL SETS					
All weights	1,200	113	25	196	59	99
1,000 or less	459	37	6	74	10	11
1,001-1,500	353	33	5	50	19	20
1,501-2,000	232	22	6	48	14	33
2,001-2,500	106	14	5	17	6	17
2,501-3,000	31	5	-	4	7	10
3,001-3,500	11	2	3	2	2	5
3,501-4,000	6	-	-	-	1	2
4,001-4,500	2	-	-	1	-	1
4,501 or more	-	-	-	-	-	-

[1]It is assumed that all births in hospitals or institutions are attended by physicians.

TABLE 6. SINGLE LIVE BIRTHS IN HOSPITALS AND NEONATAL DEATHS AMONG THIS GROUP, BY DETAILED BIRTH WEIGHT AND RACE: UNITED STATES, JANUARY 1 TO MARCH 31, 1950

(Neonatal deaths include deaths within the first 28 days after birth among children born Jan. 1 to Mar. 31, 1950. Births and deaths with birth weight not stated are distributed. Excludes data for Massachusetts)

BIRTH WEIGHT (IN GRAMS)	BIRTHS			NEONATAL DEATHS		
	All races	White	Nonwhite	All races	White	Nonwhite
All weights	710,545	645,343	65,202	12,425	10,790	1,635
1,000 or less	2,891	2,414	477	2,550	2,143	407
1,001-1,250	1,607	1,371	236	1,061	916	145
1,251-1,500	1,935	1,624	311	929	795	134
1,501-1,750	2,829	2,381	448	842	751	91
1,751-2,000	5,045	4,280	765	916	820	96
2,001-2,250	8,664	7,521	1,143	710	633	77
2,251-2,500	23,223	19,676	3,547	824	709	115
2,501-2,750	49,035	42,310	6,725	795	702	93
2,751-3,000	83,031	72,956	10,075	700	604	96
3,001-3,500	278,391	252,489	25,902	1,661	1,459	202
3,501-4,000	192,486	180,253	12,233	967	851	116
4,001-4,500	51,375	48,692	2,683	340	306	34
4,501 or more	10,033	9,376	657	130	101	29

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