

KANSAS

*Infant Mortality Statistics, Period Linked
Birth and Infant Deaths, Kansas, 1995-1998*

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Research Summary

**Center for Health and Environmental Statistics
Kansas Department of Health and Environment**

Landon State Office Building - 900 SW Jackson, Topeka, KS 66612-1220

<http://www.kdhestate.ks.us/ches/>

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Introduction

Linked birth and infant death data sets are useful tools for understanding the basic relationships between infant deaths and risk factors at birth. This report presents Kansas infant mortality data from the 1995-1998 period linked file. In the linked data set information from the death certificate for each infant under 1 year of age in a particular calendar year is linked to information from the corresponding birth certificate. Because the birth and death for an infant may not occur in the same calendar year, the numerator includes deaths for children not born during the 1995-1998 period and like wise may exclude deaths which occurred to children born during 1995-1998. Because it uses all births and deaths in a period of time (i.e. 1995-1998) rather than all deaths that occurred among a birth cohort, born during that period of time, the data is more timely. However, its validity depends on certain assumptions about the stability of cause and number of deaths. These assumptions may be less reliable for small populations such as racial groups.

While the Kansas linked file includes linked records for births and deaths that occurred to Kansas residents and nonresidents, only matched births and deaths in which both events occurred to a Kansas resident are presented in this report. Matched birth records were identified for 98.5 percent of the infant deaths occurring in 1995-1998. Thus, the 1995-1998 period linked file contains a numerator file that consists of all Kansas resident infant deaths occurring in 1995-1998 that have been linked to their corresponding resident birth certificates, whether the birth occurred in the same year as the death or in the previous year. The denominator file contains all Kansas resident births occurring in 1995-1998.

For analytical purposes, it is especially useful to combine information from the birth and death certificates to utilize many of the additional variables available from the birth certificate, as well as to utilize the more accurate race and ethnic data from the birth certificate. The linked file makes it possible to use the race of mother for both the numerator and denominator in calculating infant mortality rates. National studies have shown that race information from the birth certificate is more accurate than on the death certificate because the race is usually reported by the mother at the time of delivery, while on the death certificate the race of the deceased infant is reported by the funeral director based on information provided by an informant or on observation (*National Vital Statistics Report*, Vol 47, No. 23, 1999)

This report presents infant mortality data by a variety of characteristics including race and Hispanic origin of mother, age at death, sex of infant, plurality, birthweight, period of gestation, trimester prenatal care began, age of mother, educational attainment of mother, live-birth order, marital status, maternal smoking during pregnancy and underlying cause of death.

Text statements have been tested for statistical significance, and a statement that an infant mortality rate or percent is higher or lower than another indicates that the difference is indeed statistically significant. Information on the methods used to test for statistical significance, as well as additional information on residence data, computation of rates, rate reliability, race/ethnicity, cause-of-death classification, and handling of unknowns, is presented in the technical notes.

Infant mortality by race and Hispanic origin of mother

The infant mortality rate for all infants in the linked 1995-1998 files was 7.2 deaths per 1,000 live births (see Table 1). The neonatal rate (for deaths before the 28th day after birth) was 4.4, and the postneonatal rate (for deaths after the 27th day of life, but before 1 year of age) was 2.8. The infant mortality rate (14.4), neonatal death rate (9.0), and post neonatal death rate (5.4) for infants of black mothers were all more than twice as high as those rates for infants born to white mothers, 6.6, 4.1, and 2.6 respectively. The lowest rates of any racial group were for infants born to American Indian mothers, although the difference was only statistically significant in comparison to the rates for black mothers. The infant mortality rate was 6.3 for infants born to mothers of Hispanic origin.

Infant mortality by selected infant and maternal characteristics

Infant mortality rates for various infant and maternal characteristics have been calculated from Kansas' linked birth/death files for 1995-1998. Table 2 lists tabulations for such characteristics as plurality of birth, birth weight, and period of gestation. Figure 1 presents graphic comparisons of rates for these characteristics for total infant deaths, those occurring to infants of white and black mothers, and those occurring to infants whose mothers are of Hispanic origin. Rates based on a small minority population, and/or small number of events occurring within these minority groups, should be used with caution. While multiple risk factors may contribute to an individual infant death, it is the purpose of this report to consider the basic relationship between each characteristic and infant mortality.

Sex of infant

For 1995-1998 the overall infant mortality rate for Kansas, from the linked files, was 7.2 per 1,000 live births. The rate for males, 7.9, was 23.4 percent higher than the rate of 6.4 for females. The same relationship appeared for the white, black and Asian and Pacific Islander racial groups, although of these the difference was only statistically significant for white mothers. Among infants born to mothers of Hispanic origin, the infant mortality rates for males and females were 6.5 and 6.0, respectively, not a statistically significant difference.

Plurality of birth

For all races combined, the infant mortality rate for infants born in plural births (37.3) was almost six times as high as that for infants born in single births (6.4). A similar ratio appeared for infants born to white mothers, but for infants born to black mothers the difference was not as great. For them, the infant mortality rate of 47.3 for multiple births was only 3.5 times the infant mortality rate of 13.4 for single births. However, the narrowed gap is due to an infant mortality rate for single births (13.4) which is significantly higher for blacks than that for any other race.

For infants born to mothers of Hispanic origin the mortality rate for multiple births (59.7) was over eleven times the rate of 5.2 for single births.

Birth weight and period of gestation

Birth weight and period of gestation are the two factors which have the largest impact on infant mortality rates. Infant mortality rates were much higher for low birth weight infants (less than 2,500 grams) than for infants with birth weights of 2,500 grams or more overall. The infant mortality rate for very low birth weight (less than 1,500 grams) infants was 270.1, over 96 times the rate of 2.8 for infants with birth weights of 2,500 grams or more. Low birth weight may occur for two reasons, either the baby was born too soon (prematurity) or the fetus failed to grow at the expected rate (intrauterine growth retardation). The rate for infants with birth weights of 1,500-2,499 grams was 19.4, almost 7 times the rate for infants with birth weights of 2,500 grams or more.

While 6.8 percent of all live births to Kansas residents during the 1995-1998 time period were born with low birth weight, 63.2 percent of the infant deaths from the linked files were low birth weight. It is obvious from Figure 2 that infant deaths were associated with significantly lower birth weights than were resident live births. Similarly, only 8.0 percent of births occurred prior to 37 weeks of gestation, but 61.4 percent of infant deaths were of that gestational period (Tables 4 and 5).

Mortality rates were highest for very preterm infants (less than 32 weeks gestation) at 241.0, over 80 times the rate of 3.0 for infants with gestation of 37-41 weeks. Moderately preterm infants (gestation of 32-36 weeks) had a mortality rate of 15.0, five times the rate of term births (37-41 weeks).

Infant mortality rates for very low birth weight and very preterm delivery were greatest for blacks, at 297.1 and 275.9, although the differences between those rates and the rates for whites were not statistically significant. Reliable rates for infants born to American Indian, and Asian and Pacific Islander mothers, and mothers of Hispanic origin could not be calculated because of the small number of such births.

Table 6 presents a more detailed breakdown of infant mortality rates by birth weight. Over 9 out of 10 infants with birth weight of less than 500 grams died within the first year of life, almost all within the first month. Mortality rates dropped dramatically as birth weight increased, with about 92 out of 100 infants with birth weight of 1,000-1,249 grams surviving their first year.

Prenatal care

Although the effects of prenatal care are hard to measure, the high mortality rate for infants whose mothers received no prenatal care (49.0 deaths per 1,000 live births) suggests that prenatal care maybe an important contributor to infant survival. The infant mortality rate for births to women who began care during the 3rd trimester (5.9) was lower than the rates for those who received earlier care (6.5 and 8.9 for first and second trimesters), although differences were not statistically significant. This is contrary to what one might expect since prenatal care that begins during the third trimester is considered inadequate, and inadequate care is associated with increased rates of infant mortality.

Overall, 85.6 percent of all live births were to mothers who began prenatal care in the first trimester (Table 5). Percentages were lower for blacks (75.7) and for mothers of Hispanic origin (65.5). As shown in Figure 3, approximately 5 percent of the newborns who died during their first year of life were born to mothers who had no prenatal care, compared to only 0.7 percent of all resident live births.

Maternal age

Overall, the mortality rate was highest for infants of teenage mothers, at 10.1 deaths per 1,000 live births. Rates declined steadily with increasing age of mother to reach a low of 5.6 for the 35-39 year old age-group. Mortality rates for infants born to black mothers (14.4) were the highest of any racial group, but for them the variations by age-group of mother were not statistically significant, with rates ranging from 13.4 for 30-34 and 35-39 year-olds to 14.7 for 20-24 year-olds. Therefore, even though over one-fourth (26.1 percent) of infants born to black mothers were to teenagers, that fact did not seem to contribute to the higher infant mortality rate for such births.

Maternal education

In general, infant mortality rates decreased with increased levels of education of the mother. Rates were highest, at 10.1 deaths per 1,000 live births, for mothers who completed 1-8 years of education. The lowest rate, 5.2, was for mothers completing 16 or more years. More than 4 out of 5 (81.8 percent) mothers in the linked files had completed 12 or more years of school. Mothers of Hispanic origin had a much lower percentage, 45.8, completing 12 years or more, but did not show the pattern of decreased mortality with increased education.

Live birth order

Infant mortality rates were highest overall for fourth and higher order births, although the difference was not statistically significant. Fourth births had a rate of 8.4, and fifth and above a rate of 9.8 deaths per 1,000 live births. Among infants of black mothers, second and third births had the highest rates, 16.5 and 16.9 respectively. Infants of mothers of Hispanic origin had the highest rate, 10.2, for fifth and higher births. However, differences were again not statistically significant for black mothers or mothers of Hispanic origin. The racial group having the highest percentage of fourth and higher order births was American Indians at 16.2, followed by blacks at 15.9 percent.

Marital status

Infant mortality rates for unmarried mothers were higher than for married mothers overall. The rate for unmarried mothers (10.8) was 1.8 times the rate (5.9) for married mothers. Of the racial groups (white, black, and American Indian) where the rates were higher for unmarried mothers than married mothers, the difference was only statistically significant for white mothers (9.9 and 5.6). Blacks had the highest percentage of unmarried mothers, at 68.5 percent, compared to 27.0 percent for all mothers regardless of race.

Maternal smoking

The overall infant mortality rate for smokers (9.1) was 42.2 percent higher than that for nonsmokers (6.4). Infant mortality rates for each racial and Hispanic origin group were higher for mothers who smoked than for nonsmokers, although the difference was only significant for white mothers. Reliable rates could not be calculated for American Indian, and Asian Pacific Islander mothers due to the low number of infant deaths in those groups. All groups had less than 14 percent of

mothers smoking during pregnancy, with the exception of American Indians at 19.3 percent. Mothers of Hispanic origin had an especially low percentage of smokers (4.6 percent).

Leading causes of infant death

Table 7 presents five leading causes of infant death. Together they accounted for over half of the deaths to infants in the 1995-1998 linked files. Overall, and for infants born to white mothers, congenital anomalies were the leading cause of death. For infants born to black mothers, the leading cause was the group of disorders related to short gestation and low birth weight. SIDS was the cause of approximately ten percent of infant deaths for all races.

For all the leading causes of death, mortality rates were higher for infants born to black mothers (1,439.0 per 100,000 live births) than they were overall (721.3). For each cause other than congenital anomalies, the black rate was over twice as high as the overall rate, and for disorders related to short gestation and low birth weight the rate was almost 5 times as high. Mortality rates for infants born to mothers of Hispanic origin were comparable to overall rates for each cause of death (Figure 3).

Table 1. Infant, neonatal, and postneonatal deaths and mortality rates by race and Hispanic origin of mother: Kansas, 1995-1998 linked files

Race of Mother and Hispanic Origin	Live Births	Number of deaths			Mortality rate per 1,000 live births		
		Infant	Neonatal	Postneonatal	Infant	Neonatal	Postneonatal
All races	149,174	1,076	658	418	7.2	4.4	2.8
White	132,887	882	539	343	6.6	4.1	2.6
Black	11,188	161	101	60	14.4	9.0	5.4
American Indian	1,336	4	2	2	3.0	1.5	1.5
Asian/Pacific Islander	3,434	22	13	9	6.4	3.8	2.6
Other	98	1	1	-	n/a	n/a	n/a
N.S.	231	6	2	4	n/a	n/a	n/a
Hispanic origin*	13,408	84	58	26	6.3	4.3	1.9

n/a not applicable

* Hispanic origin may be of any race.

Table 2. Infant mortality rates* by selected characteristics by race and Hispanic origin of mother: Kansas, 1995-1998 linked files

Characteristics	Race of Mother					Hispanic Origin*** of Mother
	All Races	White	Black	American Indian	Asian/Pacific Islander	
Total	7.2	6.6	14.4	3.0	6.4	6.3
Age at death:						
Neonatal	4.4	4.1	9.0	1.5	3.8	4.3
Postneonatal	2.8	2.6	5.4	1.5	2.6	1.9
Sex:						
Male	7.9	7.2	16.2	2.9	7.9	6.5
Female	6.4	6.0	12.6	3.1	4.8	6.0
Plurality:						
Single births	6.4	5.8	13.4	3.1	5.6	5.2
Plural births	37.3	36.5	47.3	-	**	59.7
Birthweight:						
Less than 1,500 grams	270.1	263.5	297.1	**	**	**
1,500-2,499 grams	19.4	20.0	18.3	-	14.0	20.0
2,500 grams or more	2.8	2.8	3.8	0.8	2.2	2.1
Period of gestation:						
Less than 32 weeks	241.0	230.8	275.9	**	**	**
32-36 weeks	15.0	15.5	14.4	-	**	22.3
37-41 weeks	3.0	2.9	4.3	0.9	2.6	2.1
42 weeks or more	2.9	2.9	3.7	-	-	4.1
Trimester prenatal care began:						
First trimester	6.5	6.0	13.2	3.9	6.8	5.5
After first trimester or no care	10.4	9.7	16.3	-	4.9	6.8
Second trimester	8.9	8.7	12.5	-	3.9	6.3
Third trimester	5.9	5.6	7.4	-	**	4.6
No prenatal care	49.0	42.5	69.4	-	-	23.0
Age of mother:						
Under 20 years	10.1	9.6	14.0	-	8.5	8.1
20-24 years	7.8	7.1	14.7	4.5	5.3	6.3
25-29 years	6.2	5.9	14.1	-	3.5	5.8
30-34 years	6.4	6.0	13.4	9.7	8.4	4.2
35-39 years	5.6	5.1	13.4	-	13.2	5.5
40 or more years	9.4	8.4	**	-	-	**
Educational attainment of mother:						
1-8 years	10.1	10.4	17.6	-	-	7.6
9-11 years	9.5	8.8	16.1	-	4.4	4.3
12 years	7.8	7.2	12.3	2.0	12.8	7.3
13-15 years	6.5	5.7	15.8	5.9	6.3	4.3
16 years and over	5.2	5.0	12.0	**	3.6	7.3
Kind./None/N.S.	47.7	44.8	**	-	-	**
Live-birth order:						
1	7.3	6.9	12.4	3.7	5.8	5.7
2	6.7	6.0	16.5	2.6	4.6	6.2
3	7.0	6.0	16.9	4.9	10.2	6.9
4	8.4	8.3	10.1	-	**	5.1
5 or more	9.8	9.2	15.2	-	**	10.2
Marital status:						
Married	5.9	5.6	12.2	1.4	7.4	5.2
Unmarried	10.8	9.9	15.4	4.7	1.7	8.0
Maternal smoking during pregnancy:						
Smoker	9.1	8.6	18.2	-	-	6.7
Nonsmoker	6.4	5.9	12.7	4.1	6.0	5.9

* Rate per 1,000 live births in specified group

** Rate does not meet statistical standards of precision or reliability (designated whenever the denominator is less than 200).

*** Hispanic origin may be of any race.

Table 3. Live births by selected characteristics by race and Hispanic origin of mother: Kansas, 1995-1998

Characteristics	Race of Mother							Hispanic Origin* of Mother
	All Races	White	Black	American Indian	Asian/ Pacific Islander	Other	N.S.	
Total	149,174	132,887	11,188	1,336	3,434	98	231	13,408
Sex:								
Male	76,442	68,127	5,695	682	1,764	58	116	6,915
Female	72,730	64,758	5,493	654	1,670	40	115	6,493
N.S.	2	2	-	-	-	-	-	-
Plurality:								
Single births	145,064	129,179	10,871	1,303	3,382	98	231	13,139
Plural births	4,105	3,703	317	33	52	-	-	268
N.S.	5	5	-	-	-	-	-	1
Birthweight:								
Less than 1,500 grams	1,914	1,503	350	22	32	4	3	143
1,500-2,499 grams	8,261	6,854	1,094	79	214	5	15	651
2,500 grams or more	138,978	124,513	9,744	1,235	3,188	89	209	12,612
N.S.	21	17	-	-	-	-	4	2
Period of gestation:								
Less than 32 weeks	2,104	1,664	377	17	37	4	5	165
32-36 weeks	9,746	8,453	973	110	194	3	13	716
37-41 weeks	133,102	118,964	9,553	1,169	3,131	89	196	11,994
42 weeks or more	3,852	3,471	270	32	70	2	7	490
N.S.	370	335	15	8	2	-	10	43
Trimester prenatal care began:								
First trimester	127,111	114,606	8,436	1,038	2,794	67	170	8,650
After first trimester or no care	21,360	17,674	2,705	289	617	31	44	4,565
Second trimester	17,277	14,408	2,085	223	511	25	25	3,474
Third trimester	3,043	2,490	404	52	85	4	8	874
No prenatal care	1,040	776	216	14	21	2	11	217
N.S.	703	607	47	9	23	-	17	193
Age of mother:								
Under 20 years	19,314	15,826	2,923	268	236	27	34	2,607
20-24 years	39,508	34,427	3,800	449	754	29	49	4,420
25-29 years	42,324	38,414	2,348	330	1,153	23	56	3,592
30-34 years	31,853	29,316	1,420	207	837	10	63	1,906
35-39 years	13,699	12,619	599	71	380	8	22	730
40 or more years	2,452	2,266	96	10	74	1	5	151
N.S.	24	19	2	1	-	-	2	2
Educational attainment of mother:								
1-8 years	5,424	4,893	227	27	246	23	8	3,161
9-11 years	21,225	17,595	2,802	320	456	23	29	3,923
12 years	45,360	39,483	4,376	502	935	24	40	3,675
13-15 years	37,423	33,537	2,845	341	637	18	45	1,642
16 years and over	39,260	37,022	916	142	1,108	6	66	826
Kind./None/N.S.	482	357	22	4	52	4	43	181
Live-birth order:								
1	58,614	52,182	4,179	535	1,564	44	110	4,930
2	48,432	43,609	3,275	380	1,077	25	66	4,046
3	25,843	23,153	1,950	205	490	15	30	2,478
4	10,236	8,922	993	125	180	4	12	1,167
5 or more	6,026	5,005	790	91	120	10	10	782
N.S.	23	16	1	-	3	-	3	5
Marital status:								
Married	108,794	101,538	3,522	692	2,829	42	171	8,266
Unmarried	40,309	31,280	7,665	644	605	56	59	5,129
N.S.	71	69	1	-	-	-	1	13
Maternal smoking during pregnancy:								
Smoker	18,539	16,896	1,266	235	117	8	17	597
Nonsmoker	119,892	106,159	9,392	984	3,172	89	96	12,387
N.S.	10,743	9,832	530	117	145	1	118	424

* Hispanic origin may be of any race.

Table 4. Infant deaths by selected characteristics by race and Hispanic origin of mother: Kansas, 1995-1998

Characteristics	Race of Mother							Hispanic Origin* of Mother
	All Races	White	Black	American Indian	Asian/Pacific Islander	Other	N.S.	
Total	1,076	882	161	4	22	1	6	84
Age at death:								
Neonatal	658	539	101	2	13	1	2	58
Postneonatal	418	343	60	2	9	-	4	26
Sex:								
Male	606	493	92	2	14	1	4	45
Female	468	387	69	2	8	-	2	39
N.S.	2	2	-	-	-	-	-	-
Plurality:								
Single births	922	747	146	4	19	1	5	68
Plural births	153	135	15	-	3	-	-	16
N.S.	1	-	-	-	-	-	1	-
Birthweight:								
Less than 1,500 grams	517	396	104	3	12	1	1	44
1,500-2,499 grams	160	137	20	-	3	-	-	13
2,500 grams or more	394	347	37	1	7	-	2	26
N.S.	5	2	-	-	-	-	3	1
Period of gestation:								
Less than 32 weeks	507	384	104	3	13	1	2	41
32-36 weeks	146	131	14	-	1	-	-	16
37-41 weeks	400	349	41	1	8	-	1	25
42 weeks or more	11	10	1	-	-	-	-	2
N.S.	12	8	1	-	-	-	3	-
Trimester prenatal care began:								
First trimester	822	687	111	4	19	-	1	48
After first trimester or no care	223	172	44	-	3	1	3	31
Second trimester	154	125	26	-	2	1	-	22
Third trimester	18	14	3	-	1	-	-	4
No prenatal care	51	33	15	-	-	-	3	5
N.S.	31	23	6	-	-	-	2	5
Age of mother:								
Under 20 years	196	152	41	-	2	-	1	21
20-24 years	309	245	56	2	4	-	2	28
25-29 years	264	225	33	-	4	1	1	21
30-34 years	205	176	19	2	7	-	1	8
35-39 years	77	64	8	-	5	-	-	4
40 or more years	23	19	4	-	-	-	-	1
N.S.	2	1	-	-	-	-	1	1
Educational attainment of mother:								
1-8 years	55	51	4	-	-	-	-	24
9-11 years	201	154	45	-	2	-	-	17
12 years	352	285	54	1	12	-	-	27
13-15 years	242	190	45	2	4	1	-	7
16 years and over	203	186	11	1	4	-	1	6
Kind./None/N.S.	23	16	2	-	-	-	5	3
Live-birth order:								
1	425	359	52	2	9	-	3	28
2	323	262	54	1	5	-	1	25
3	182	140	33	1	5	1	2	17
4	86	74	10	-	2	-	-	6
5 or more	59	46	12	-	1	-	-	8
N.S.	1	1	-	-	-	-	-	-
Marital status:								
Married	639	571	43	1	21	-	3	43
Unmarried	434	309	118	3	1	1	2	41
N.S.	3	2	-	-	-	-	1	-
Maternal smoking during pregnancy:								
Smoker	169	146	23	-	-	-	-	4
Nonsmoker	769	626	119	4	19	-	1	73
N.S.	138	110	19	-	3	1	5	7

* Hispanic origin may be of any race.

Table 5. Percent of live births with selected maternal and infant characteristics by race and Hispanic origin of mother: Kansas, 1995-1998 linked files

Selected Characteristics	Race of Mother					Hispanic Origin* of Mother
	All Races	White	Black	American Indian	Asian/Pacific Islander	
Birthweight						
Less than 1,500 grams	1.3	1.1	3.1	1.6	0.9	1.1
Less than 2,500 grams	6.8	6.3	12.9	7.6	7.2	5.9
Period of gestation						
Less than 32 weeks	1.4	1.3	3.4	1.3	1.1	1.2
32-36 weeks	6.5	6.4	8.7	8.3	5.7	5.4
Prenatal care beginning in the first trimester	85.6	86.6	75.7	78.2	81.9	65.5
No prenatal care	0.7	0.6	1.9	1.1	0.6	1.6
Births to mothers under 20 years	12.9	11.9	26.1	20.1	6.9	19.4
Fourth and higher order births	10.9	10.5	15.9	16.2	8.7	14.5
Births to unmarried mothers	27.0	23.6	68.5	48.2	17.6	38.3
Mothers completing 12 or more years of school	81.8	82.8	72.7	73.7	78.0	45.8
Mother smoked during pregnancy	13.4	13.7	11.9	19.3	3.6	4.6

* Hispanic origin may be of any race.

Table 6. Live births, infant, neonatal, and postneonatal deaths and mortality rates by race of mother and birthweight: Kansas, 1995-1998 linked files

	Number				Mortality rate per 1,000 live births		
	Live Births	Infant deaths	Neonatal deaths	Postneonatal deaths	Infant	Neonatal	Postneonatal
All races	149,174	1,076	658	418	7.2	4.4	2.8
Less than 2,500 grams	10,175	677	524	153	66.5	51.5	15.0
Less than 500 grams	228	214	202	12	938.6	886.0	52.6
500-749 grams	379	174	147	27	459.1	387.9	71.2
750-999 grams	365	63	44	19	172.6	120.5	52.1
1,000-1,249 grams	416	32	17	15	76.9	40.9	36.1
1,250-1,499 grams	526	34	25	9	64.6	47.5	17.1
1,500-1,999 grams	1,976	60	37	23	30.4	18.7	11.6
2,000-2,499 grams	6,285	100	52	48	15.9	8.3	7.6
2,500 grams or more	138,978	394	131	263	2.8	0.9	1.9
2,500-2,999 grams	23,191	122	46	76	5.3	2.0	3.3
3,000-3,499 grams.....	54,465	156	49	107	2.9	0.9	2.0
3,500-3,999 grams	45,161	86	24	62	1.9	0.5	1.4
4,000-4,499 grams	13,697	27	10	17	2.0	0.7	1.2
4,500 grams or more	2,464	3	2	1	1.2	0.8	0.4
N.S.	21	5	3	2	n/a	n/a	n/a
White	132,887	882	539	343	6.6	4.1	2.6
Less than 2,500 grams	8,357	533	413	120	63.8	49.4	14.4
Less than 500 grams	162	152	141	11	*	*	*
500-749 grams	284	131	115	16	461.3	404.9	56.3
750-999 grams	285	54	40	14	189.5	140.4	49.1
1,000-1,249 grams	338	29	17	12	85.8	50.3	35.5
1,250-1,499 grams	434	30	22	8	69.1	50.7	18.4
1,500-1,999 grams	1,668	54	33	21	32.4	19.8	12.6
2,000-2,499 grams	5,186	83	45	38	16.0	8.7	7.3
2,500 grams or more	124,513	347	124	223	2.8	1.0	1.8
2,500-2,999 grams	19,407	110	44	66	5.7	2.3	3.4
3,000-3,499 grams.....	48,189	133	47	86	2.8	1.0	1.8
3,500-3,999 grams	41,649	76	23	53	1.8	0.6	1.3
4,000-4,499 grams	12,933	25	8	17	1.9	0.6	1.3
4,500 grams or more	2,335	3	2	1	1.3	0.9	0.4
N.S.	17	2	2	-	n/a	n/a	n/a
Black	11,188	161	101	60	14.4	9.0	5.4
Less than 2,500 grams	1,444	124	96	28	85.9	66.5	19.4
Less than 500 grams	58	54	53	1	*	*	*
500-749 grams	87	37	27	10	*	*	*
750-999 grams	66	7	4	3	*	*	*
1,000-1,249 grams	61	2	-	2	*	-	*
1,250-1,499 grams	78	4	3	1	*	*	*
1,500-1,999 grams	244	5	4	1	20.5	16.4	4.1
2,000-2,499 grams	850	15	5	10	17.6	5.9	11.8
2,500 grams or more	9,744	37	5	32	3.8	0.5	3.3
2,500-2,999 grams	2,724	11	1	10	4.0	0.4	3.7
3,000-3,499 grams.....	4,219	18	1	17	4.3	0.2	4.0
3,500-3,999 grams	2,285	6	1	5	2.6	0.4	2.2
4,000-4,499 grams	449	2	2	-	4.5	4.5	-
4,500 grams or more	67	-	-	-	-	-	-
N.S.	-	-	-	-	n/a	n/a	n/a

* Rate does not meet statistical standards of precision or reliability (designated whenever the denominator is less than 200).

n/a not applicable

**Table 7. Infant deaths and mortality rates* for leading causes of infant death by race and Hispanic origin of mother:
Kansas, 1995-1998 linked files**

Cause of death (ICD-9 codes)	All races**		White		Black		American Indian		Asian/Pacific Islander		Other		Hispanic Origin****	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
All causes**	1,076	721.3	882	663.7	161	1,439.0	4	299.4	22	640.7	1	***	84	626.5
Congenital anomalies (740-759)	208	139.4	189	142.2	18	160.9	-	-	-	-	-	-	16	119.3
Disorders related to short gestation and low birth weight (765)	87	58.3	52	39.1	32	286.0	-	-	2	58.2	1	***	8	59.7
Sudden infant death syndrome (798.0)	106	71.1	86	64.7	17	151.9	1	74.9	2	58.2	-	-	10	74.6
Respiratory distress syndrome (770)	70	46.9	54	40.6	12	107.3	1	74.9	2	58.2	-	-	5	37.3
Newborn affected by maternal complications of pregnancy (760-761, 763-764)	69	46.3	53	39.9	15	134.1	-	-	1	29.1	-	-	4	29.8

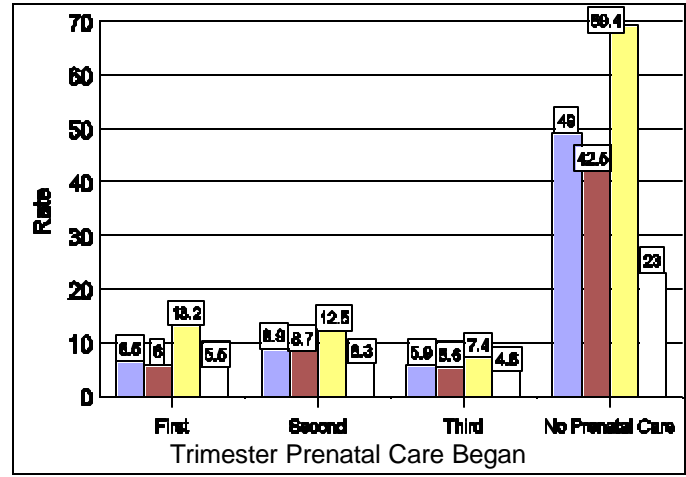
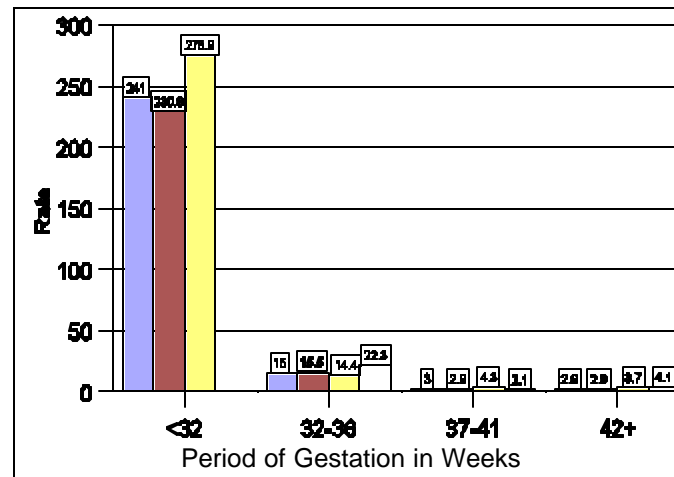
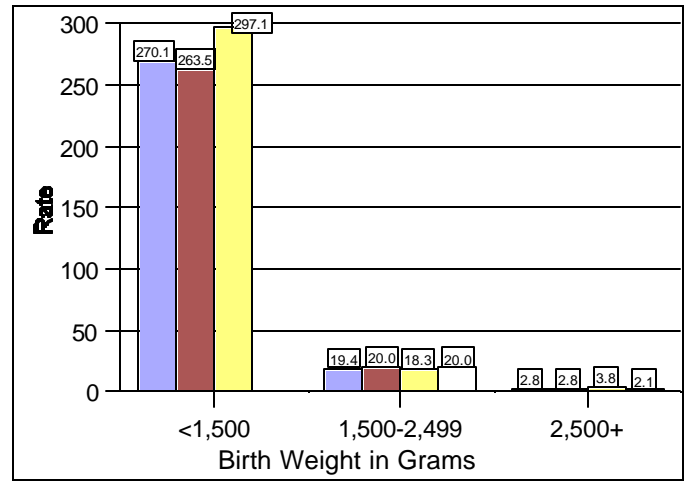
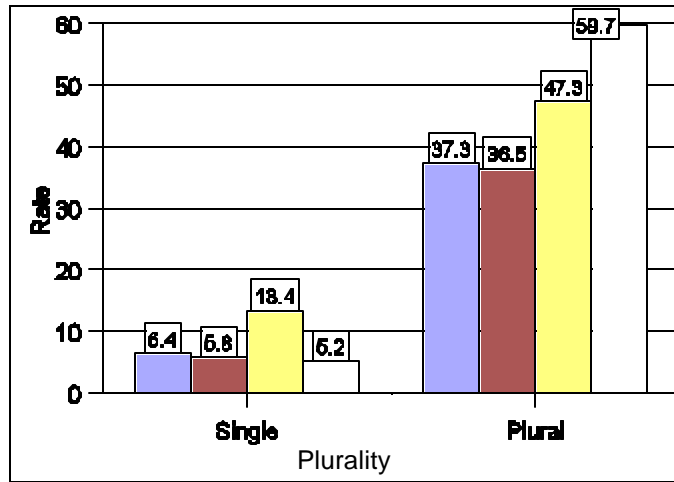
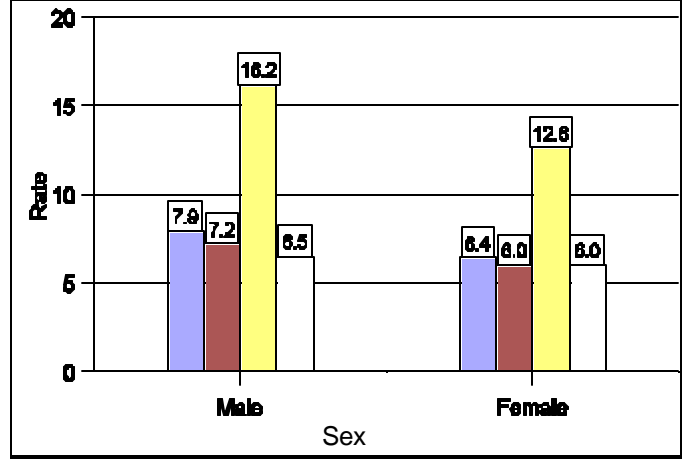
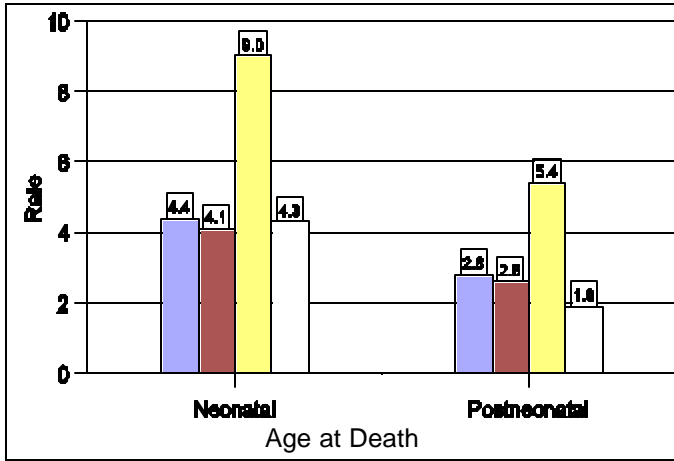
* Rate per 100,000 live births in specified group

** Totals include those not stated and other causes which are not shown.

*** Rate does not meet statistical standards of precision or reliability (designated whenever the denominator is less than 200).

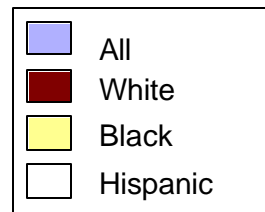
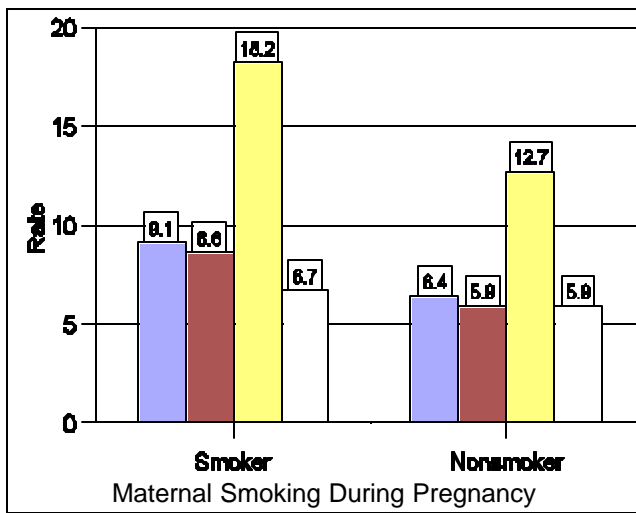
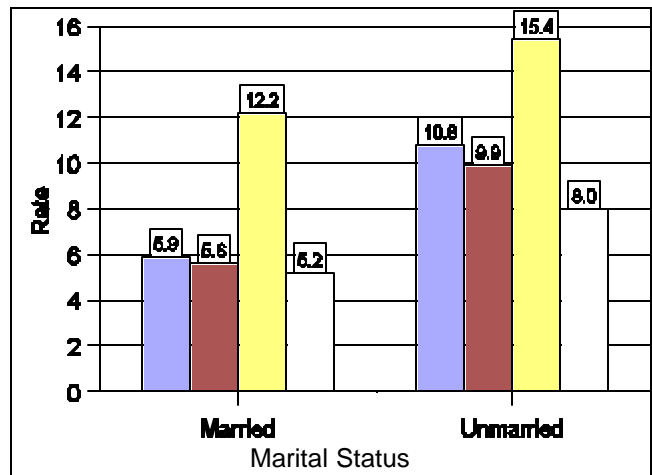
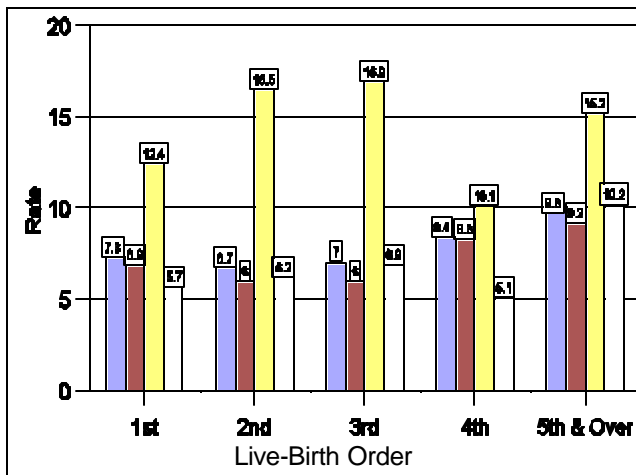
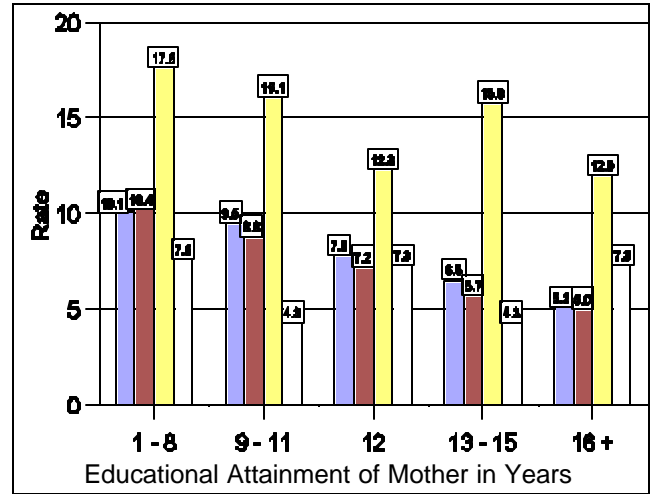
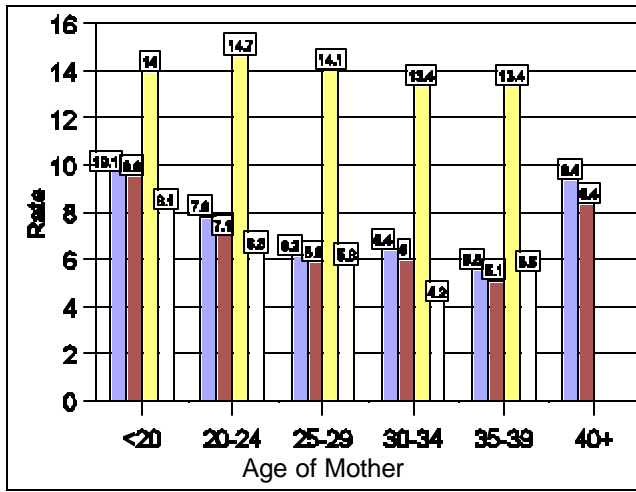
**** Hispanic origin may be of any race.

Figure 1
 Infant Mortality Rates* by Race and Hispanic Origin** of Mother
 By Selected Characteristics, Kansas 1995-1998 Linked Files



* Rates per 1,000 Live Births in Specified Group
 **Hispanic Origin may be of any race.
 Residence Data

Figure 1 (cont'd)
 Infant Mortality Rates* by Race and Hispanic Origin** of Mother
 By Selected Characteristics, Kansas 1995-1998 Linked Files



* Rates per 1,000 Live Births in Specified Group
 ** Hispanic Origin may be of any race.
 Residence Data

Figure 2
Percent Very Low and Low Birth Weight
 All Live Births and Linked Infant Deaths
 Kansas, 1995-1998

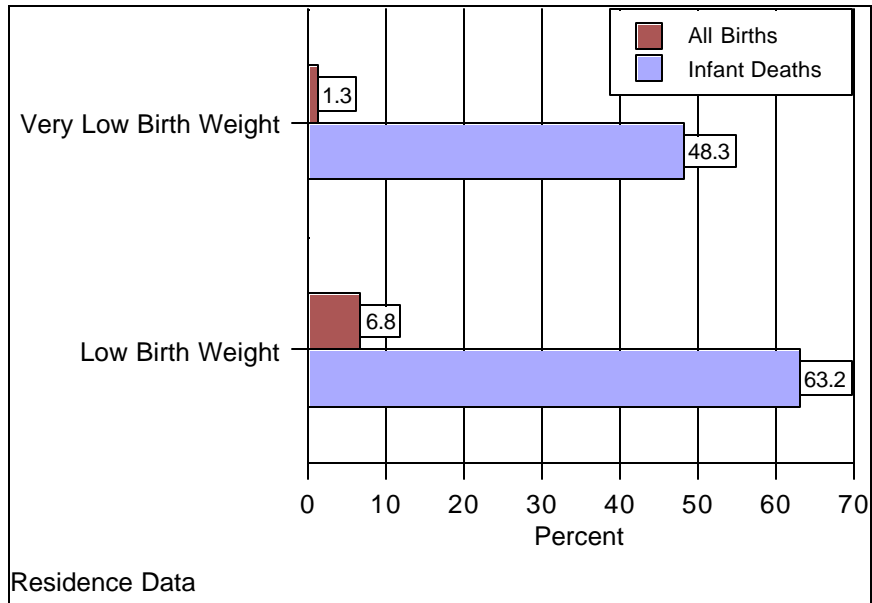


Figure 3
Percent No Prenatal Care and Prenatal Care
 in the First Trimester
 All Live Births and Linked Infant Deaths
 Kansas, 1995-1998

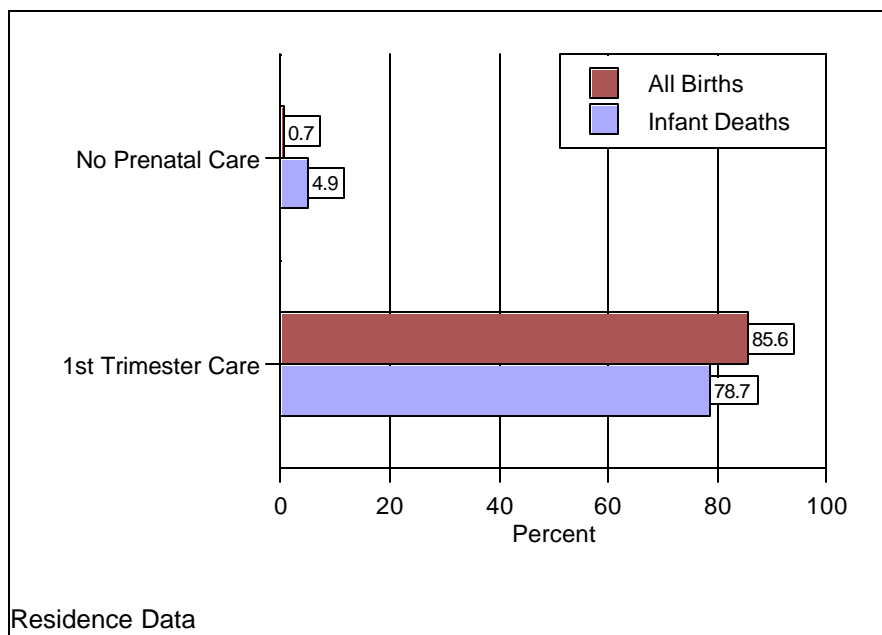
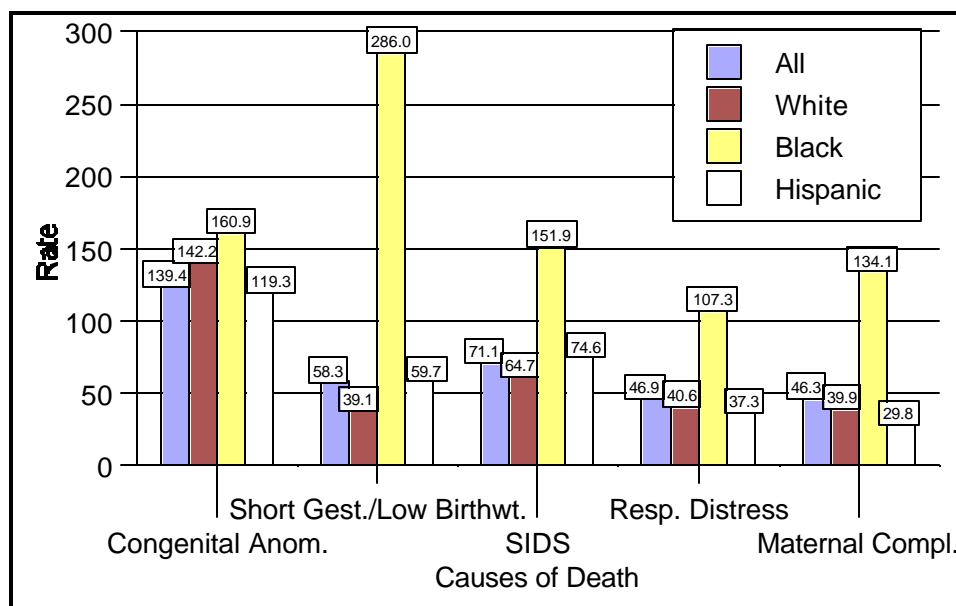


Figure 4
 Infant Death Rates* by Cause, and Race and Hispanic Origin** of Mother
 Kansas, 1995-1998 Linked Files



* Rates per 1,000 Live Births in Specified Group

** Hispanic Origin may be of any race.

Residence Data

Technical Notes

Residence Data

Residence data is information compiled according to the usual residence regardless of where the event occurred (including events occurring out-of-state).

Computation of Rates

Infant mortality rates measure the risk of death during the first year of life. It relates the number of deaths under one year of age to the number of live births during the same time period. It is expressed as the number of infant deaths per 1,000 live births. Since it is not dependent on a population census or estimate, it can be computed for any area and time period for which the numbers of infant deaths and live births are available.

Rate Reliability

According to U.S. Census Bureau estimates (as of 7-1-98), blacks are the dominant racial minority in Kansas, making up 5.9 percent of the total population and 68.9 percent of the non-white population. All other racial minority groups made up 2.7 percent of the total population (U.S. Census Bureau, Online). Due to the small minority population, and/or small number of events occurring within these minority groups, rates should be used with caution. Rates based on a relatively small number of events tend to be subject to more random variation than rates based on a large number of events.

Race/Ethnicity

Please note that persons of Hispanic origin are those who classified themselves as Mexican, Puerto Rican, Cuban, Central or South American or other and unknown Spanish in response to questions asked on the Kansas birth certificate. Hispanic origin is not a race. It can be viewed as the ancestry or country of birth of the person or the person's parents or ancestors before their arrival in the United States. Persons of Hispanic origin may be of any race.

Cause-of-Death Classification

The mortality statistics presented were coded in accordance with the **International Classification of Diseases, Ninth Revision, (ICD-9), 1979** (World Health Organization).

Accuracy of causes of death are dependent on the completeness of the information provided by the physician or coroner concerning immediate and underlying causes of death. The "underlying cause of death" is the cause considered responsible for the sequence of events leading directly to death. The MICAR (Mortality Medical Indexing Classification and Retrieval) computerized system is used to convert the exact disease terms reported on the death certificate to ICD codes. Once the appropriate codes are tabulated for a death, the codes are analyzed by the Automated Classification of Medical Entities(ACME) system as specified by the National Center for Health Statistics. Subsequently, a final underlying cause of death is assigned to each death.

Handling of Unknowns

For all variables, not stated responses were shown in tables of frequencies, but were dropped before rates were computed. To ensure the accuracy of the data, the not stated have been removed from totals when calculating percentages.

Confidence Intervals and Significance Tests

Since more than 99 percent of all births and deaths are registered, the number of vital events reported for Kansas is essentially a complete count . Although these numbers are not subject to sampling errors, they may be affected by non sampling errors such as mistakes in recording the mother's residence or age during the registration process.

The potential impact of variation increases as the number of events decreases. This makes resulting rates subject to volatility, and requires caution when comparing to rates from other populations, geographic areas, and time periods.

The 95 percent confidence interval is the range of values for the number of events, rates or percent of events that you could expect in 95 out of 100 cases (95 out of 100 rule). The confidence limits are the end points of this range of values (the highest and lowest values). Confidence limits for numbers, rates and percents can be estimated from the actual number of events. Procedures differ for rates and percent calculations and also differ depending on the number of events on which the statistics are based.

Confidence limits are important in determining whether one rate is “significantly” different from another. The term “significantly” refers to whether or not the difference between two rates indicates a small probability (< 5%) the difference might have occurred by chance.

Confidence limits specify the degree of certainty that can be placed on a given number or rate. Similarly statistical significance tests try to specify how often a difference between two rates could be expected.

If the difference between two rates would occur due to variability less than 5 times out of 100, the difference is statistically significant at the 95% level. In essence, there is a 95 percent level of confidence the difference is not due to the chance variability in the rates or the number of events on which the rates are based.

On the other hand, if the difference would occur more than 5 times out of 100, then the difference is not statistically significant. If the level of certainty is only 50 percent, or even 94 percent, the difference could not occur by chance, then the difference is not statistically significant. There must be a 95 percent level of confidence when the 95 percent significance test is used.

Computing confidence limits, and ultimately statistical significance, for pairs of rates varies depending on the number of events on which each rate was created. The procedures are listed below.

Confidence limits for rates based on less than 100 events

When the numerator's number of events is less than 100, the confidence interval for a rate can be estimated using the two formulas which follow and the values in Table 8 .

$$\text{Lower limit} = R \times L$$

$$\text{Upper limit} = R \times U$$

where:

R	=	the rate (birth rate, mortality rate, etc.)
L	=	the value in Table XX that corresponds to the number N in the numerator of the rate
U	=	the value in Table XX that corresponds to the number N in the numerator of the rate

Confidence limits for rates when the numerator is 100 or more

In this case, use the following formula for the rate R based on the number of events N:

$$\text{Lower limit} = R - [1.96 \times (R / N)]$$

$$\text{Upper limit} = R + [1.96 \times (R / N)]$$

where:

R	=	the rate (birth rate, mortality rate, etc.)
N	=	the number of events (births, deaths, etc.)

Significance test when at least one of the rates is based on fewer than 100 events

To compare two rates, when one or both of those rates are based on less than 100 events, first compute the confidence intervals for both rates. Then check to see if those intervals overlap. If they do overlap, the difference is not statistically significant at the 95-percent level. If they do not overlap, the difference is indeed "statistically significant."

Significance test when both rates are based on 100 or more events

To compare two rates when both are based on 100 or more events, first calculate the difference between the two rates by subtracting the lower rate from the higher rate. This difference is considered statistically significant if it exceeds the statistic in the formula below. This statistic equals 1.96 times the standard error for the difference between two rates.

$$1.96 \sqrt{\frac{R_1^2}{N_1} + \frac{R_2^2}{N_2}}$$

where:

R_1	=	the first rate
R_2	=	the second rate
N_1	=	the first number of events
N_2	=	the second number of events

- If the difference is greater than this statistic, then the difference would occur by chance less than 5 times out of 100. The difference is statistically significant at the 95 percent confidence level.
- If the difference is less than this statistic, the difference might occur by chance more than 5 times out of 100. The difference is not statistically significant at the 95 percent confidence level.

Confidence limits and statistical significance between two percents

When testing the difference between two percents, both percents must meet the following conditions:

$$B \times p \geq 5 \quad \text{and} \quad B \times q \geq 5$$

where:

B = number of births in the denominator

p = percent divided by 100

$q = 1 - p$

When both percents meet these conditions then the difference between the two percents is considered statistically significant if it exceeds the statistic in the formula below. This statistic equals 1.96 times the standard error for the difference between two percents.

$$1.96 \sqrt{p(1-p) \left(\frac{1}{B_1} + \frac{1}{B_2} \right)}$$

where:

B_1 = number of events in the denominator for the first percent

B_2 = number of events in the denominator for the second percent

$P = \frac{B_1 p + B_2 p}{B_1 + B_2}$

P =

$B_1 + B_2$

p_1 = first percent divided by 100

Table 8. Values of Lower (L) and Upper (U) Limits for Calculating 95 % Confidence Limits For Numbers of Events and Rates When the Number of Events Is Less Than 100

N	L	U	N	L	U
1	0.02532	5.57164	50	0.74222	1.31838
2	0.12110	3.61234	51	0.74457	1.31482
3	0.20622	2.92242	52	0.74685	1.31137
4	0.27247	2.56040	53	0.74907	1.30802
5	0.32470	2.33367	54	0.75123	1.30478
6	0.36698	2.17658	55	0.75334	1.30164
7	0.40205	2.06038	56	0.75539	1.29858
8	0.43173	1.97040	57	0.75739	1.29562
9	0.45726	1.89831	58	0.75934	1.29273
10	0.47954	1.83904	59	0.76125	1.28993
11	0.49920	1.78928	60	0.76311	1.28720
12	0.51671	1.74680	61	0.76492	1.28454
13	0.53246	1.71003	62	0.76669	1.28195
14	0.54671	1.67783	63	0.76843	1.27943
15	0.55969	1.64935	64	0.77012	1.27698
16	0.57159	1.62394	65	0.77178	1.27458
17	0.58254	1.60110	66	0.77340	1.27225
18	0.59266	1.58043	67	0.77499	1.26996
19	0.60207	1.56162	68	0.77654	1.26774
20	0.61083	1.54442	69	0.77806	1.26556
21	0.61902	1.52861	70	0.77955	1.26344
22	0.62669	1.51401	71	0.78101	1.26136
23	0.63391	1.50049	72	0.78244	1.25933
24	0.64072	1.48792	73	0.78384	1.25735
25	0.64715	1.47620	74	0.78522	1.25541
26	0.65323	1.46523	75	0.78656	1.25351
27	0.65901	1.45495	76	0.78789	1.25165
28	0.66449	1.44528	77	0.78918	1.24983
29	0.66972	1.43617	78	0.79046	1.24805
30	0.67470	1.42756	79	0.79171	1.24630
31	0.67945	1.41942	80	0.79294	1.24459
32	0.68400	1.41170	81	0.79414	1.24291
33	0.68835	1.40437	82	0.79533	1.24126
34	0.69253	1.39740	83	0.79649	1.23965
35	0.69654	1.39076	84	0.79764	1.23807
36	0.70039	1.38442	85	0.79876	1.23652
37	0.70409	1.37837	86	0.79987	1.23499
38	0.70766	1.37258	87	0.80096	1.23350
39	0.71110	1.36703	88	0.80203	1.23203
40	0.71441	1.36172	89	0.80308	1.23059
41	0.71762	1.35661	90	0.80412	1.22917
42	0.72071	1.35171	91	0.80514	1.22778
43	0.72370	1.34699	92	0.80614	1.22641
44	0.72660	1.34245	93	0.80713	1.22507
45	0.72941	1.33808	94	0.80810	1.22375
46	0.73213	1.33386	95	0.80906	1.22245
47	0.73476	1.32979	96	0.81000	1.22117
48	0.73732	1.32585	97	0.81093	1.21992
49	0.73981	1.32205	98	0.81185	1.21868
			99	0.81275	1.21746

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This Research Summary Was Prepared By:

Kansas Department of Health and Environment
Clyde D. Graeber, Secretary

Center for Health and Environmental Statistics
Lorne A. Phillips, Ph.D., Director and State Registrar

Office of Health Care Information
Elizabeth W. Saadi, Ph.D., Director

Prepared by:

Joy Crevoiserat, B.A.
Karen Sommer, M.A.

Edited by:

Greg Crawford, B.A.
Steven Pickard, M.D.,
Medical Epidemiologist
Bureau of Health Promotion

Data for This Report Were Collected by:

Office of Vital Statistics
Gabriel Faimon, M.P.A., Director