

Birth Outcomes in Knox County, Tennessee: 2004-2015

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Knox County Health Department

Epidemiology Program



Executive Summary

- In 2015, there were 5,358 births to residents of Knox County, Tennessee resulting in a birth rate of 11.9 per 1,000 population. The 2004 birth rate per 1,000 population for Knox County was 12.7.
- While the numbers of births to non-Hispanic white and non-Hispanic black moms in Knox County have decreased between 2004 and 2015, births to Hispanic moms have seen a relative increase of 68% from 2004 (216 births) to 2015 (362 births).
- Parental median age has increased from 27 years (moms) and 30 years (dads) in 2004 to 28 years (moms) and 31 years (dads) in 2015.
- Births to Knox County moms less than 18 years of age have been declining. The age specific birth rate among Knox County moms less than 18 years of age in 2004 was 8.8 per 1,000 population (female, 10-17 years of age) or 3.3% of the total births among moms of all ages. In contrast, the 2015 age specific birth rate for moms younger than 18 years was 4.1 per 1,000 population (female, 10-17 years of age) or 1.6% of the total births.
- In 2015, 8.6% of the babies born in Knox County were born having low birth weight (LBW), defined as weighing less than 2,500 grams. In addition, 1.2% of Knox County babies in 2015 were born with very low birth weight (VLBW), defined as less than 1,500 grams.
- Non-Hispanic black moms in Knox County were at greater risk for having a LBW child and/or pre-term delivery child compared to moms of other races or ethnicities.
- In 2015, 9.7 of births in Knox County were preterm births (defined as less than 37 weeks of gestation).
- Moms who used tobacco products during pregnancy were at greater risk for having a LBW child and/or preterm delivery compared to moms who did not use tobacco during pregnancy.
- Almost one out of three babies born Knox County in 2015 (31.3%) were delivered using Caesarean sections (C-sections).
- Each year, approximately 100 babies are reported in Knox County with Neonatal Abstinence Syndrome (NAS), a condition when the baby is born dependent on narcotics they were exposed to during the pregnancy.
- Each year, approximately 40 infants pass away in Knox County before their first birthday from a variety of causes.

Introduction

This report provides information on births, birth rates, maternal risk and protective factors, and selected birth outcomes in Knox County, Tennessee from 2004 to 2015. This assessment is geared to assist health organizations, community stakeholders and others to plan future interventions to improve Knox County's maternal and child health.

Births

As seen in Table 1, each year approximately five-thousand babies are born in Knox County (2004-2015 average = 5,241). Table 1 also shows a slight decline in birth rates between 2008 (13.1 per 1,000 population) to 2015 (11.9 per 1,000 population).

Table 1: Knox County Births from 2004-2015: Frequencies and Birth Rate per 1,000 Pop.

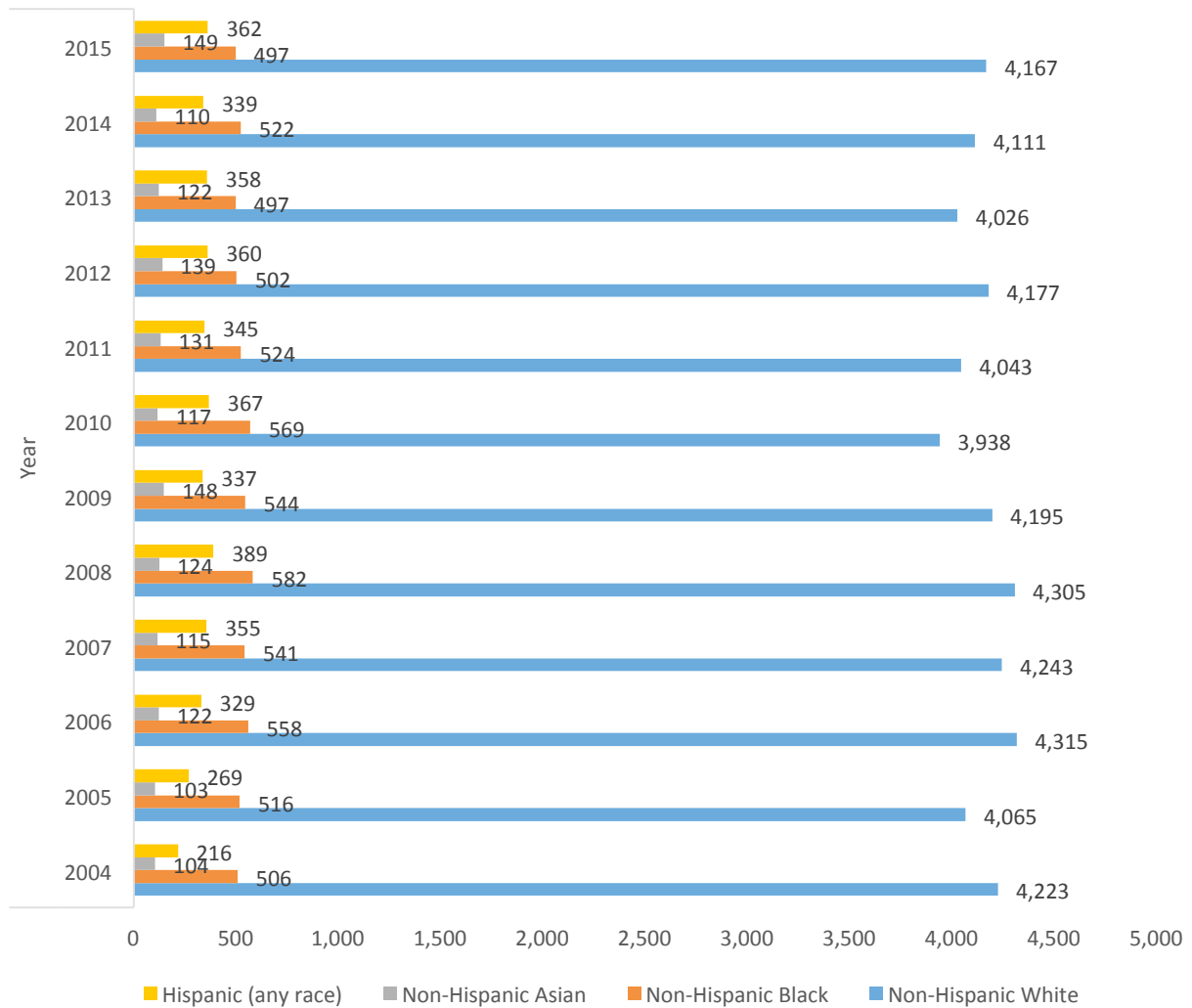
Year	Total Births	Birth Rate per 1,000 pop.
2004	5,086	12.7
2005	5,028	12.4
2006	5,387	13.1
2007	5,339	12.9
2008	5,492	13.1
2009	5,323	12.7
2010	5,090	12.0
2011	5,143	12.1
2012	5,285	12.3
2013	5,113	11.5
2014	5,255	11.7
2015	5,358	11.9

Source: 2004-2015: Tennessee Department of Health Statistics HIT website; Knox County birth records provided by the Office of Policy, Planning and Assessment, Tennessee Department of Health

This decline in the Knox County, Tennessee birth rate since 2008 may have been partially the product of an economic recession which began in the fall of 2008, sometimes termed "The Great Recession." Some analysts believe that birth rates tend to decline following major economic downturns (Pew Research, October 12, 2011).

The number of births in Knox County is broken down by selected race/ethnic groups in Figure 1. Figure 1 shows the number of births among non-Hispanic (NH) white moms and non-Hispanic (NH) black moms has remained relatively static from 2004 to 2015. In contrast, births have grown among Hispanic moms (of any race) from 216 births in 2004 to 358 in 2013—a 66% relative increase.

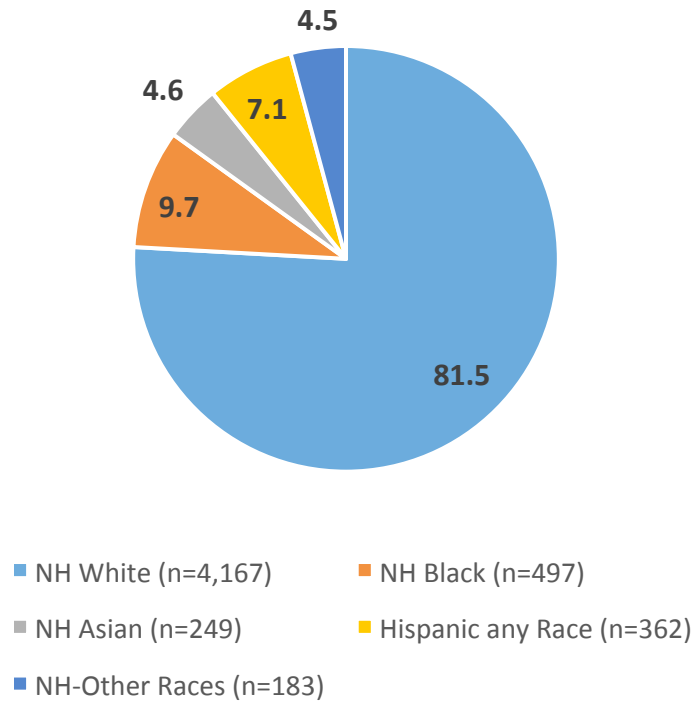
Figure 1: Births in Knox County, Tennessee by Maternal Race/Ethnicity from 2004 to 2015: Frequencies



Source: Knox County birth records 2004-2015 provided by the Office of Policy, Planning and Assessment, Tennessee Department of Health

Approximately 78% of the births in 2015 (77.8%) were to non-Hispanic, white moms followed by non-Hispanic, black moms (9.3%), Hispanic moms of any race (6.8%), non-Hispanic, Asian moms (2.9%) and moms of other races (3.4%)—see Figure 2 and Table 2.

Figure 2: Knox County, Tennessee births by race/ethnicity of the birth mother in 2015



Source: 2015 Knox County birth record provided by the Office of Policy, Planning and Assessment, Tennessee Department of Health

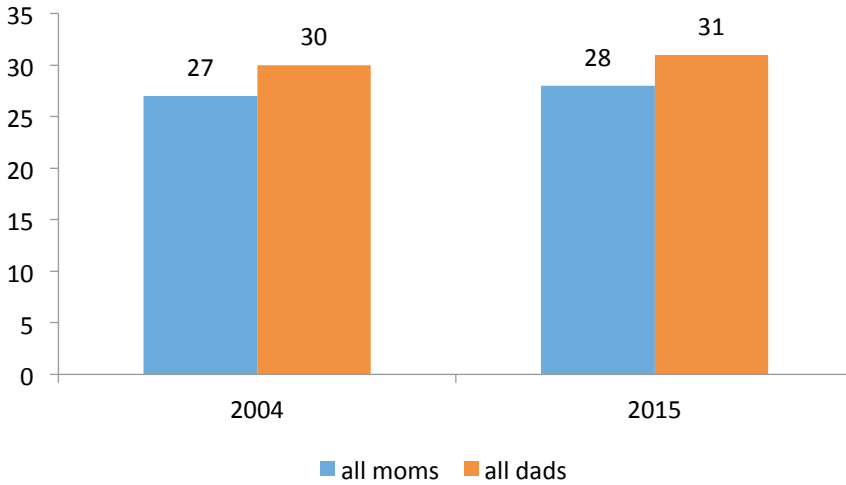
Table 2: Knox County births by selected races/ethnicities of the birth mother from 2004 to 2015: Frequencies

	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Asian	Hispanic (any race)
2004	4,223	506	104	216
2005	4,065	516	103	269
2006	4,315	558	122	329
2007	4,243	541	115	355
2008	4,305	582	124	389
2009	4,195	544	148	337
2010	3,938	569	117	367
2011	4,043	524	131	345
2012	4,177	502	139	360
2013	4,026	497	122	358
2014	4,111	522	110	339
2015	4,167	497	149	362

Source: 2004-2015 Knox County birth records 2004-2013 provided by the Office of Policy, Planning and Assessment, Tennessee Department of Health

In 2015, the median age for moms giving birth in Knox County was 28 years and the median age for fathers was 31 years (Figure 3). Between the years of 2004 and 2015, the youngest recorded age for moms was 13 years and the oldest was 51 years. The youngest age for fathers was 14 years and the oldest age for fathers was 75 years.

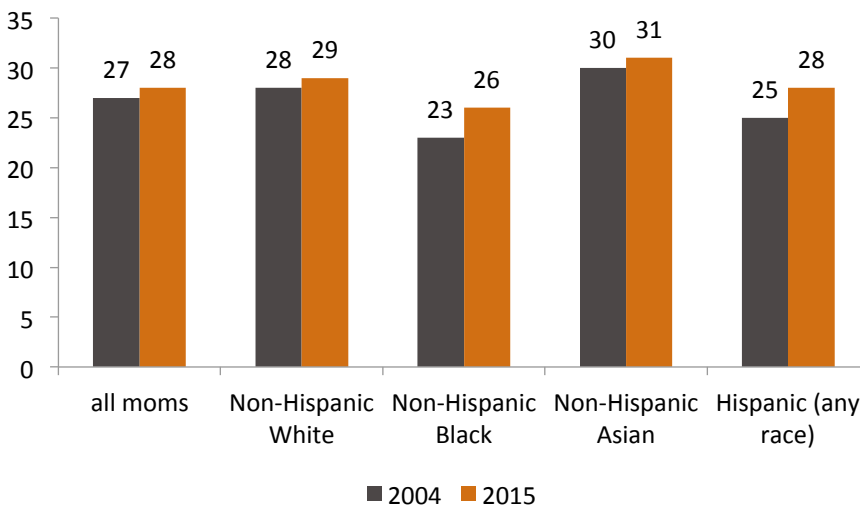
Figure 3: Median parental age for Knox County births, 2004 and 2015



Source: 2004 & 2015 Knox County birth records provided by the Office of the Policy, Planning and Assessment, Tennessee Department of Health

Figure 4 displays the median maternal age by the mother’s race/ethnicity in 2004 and 2015. The median age of Hispanic moms (of any race) increased from 25 years of age in 2004 to 28 years of age in 2015.

Figure 4: Median maternal age for Knox County residents by race/ethnicity in 2004 and 2015



Source: 2004 and 2015 Knox County birth records provided by the Office of Policy, Planning and Assessment, Tennessee Department of Health

Births to Knox County moms younger than 18 years from 2004 to 2015 are displayed in Table 3. The prevalence of births to moms less than 18 years in Knox County has declined from a birth rate of 8.8 per 1,000 population in 2004 (3.3% of total births) to 4.1 per 1,000 population in 2015 or 1.6% of total births (Table 3).

Table 3: Births to Knox County, Tennessee moms aged 10-17 years of age from 2004 to 2015

Year	Births	Age Specific Birth Rate (10-17 years) per 1,000 pop.	Percent of Total Births
2004	167	8.8	3.3
2005	172	9.0	3.4
2006	191	9.9	3.5
2007	166	8.5	3.1
2008	180	9.2	3.3
2009	146	7.4	2.7
2010	141	7.1	2.8
2011	112	5.6	2.2
2012	108	5.4	2.0
2013	93	4.5	1.8
2014	95	4.4	1.8
2015	88	4.1	1.6

Source: 2004-2015: Tennessee Department of Health Statistics HIT website

Birth Outcomes

This section focuses on the birth outcomes of low birth weight (LBW), very low birth weight (VLBW), and preterm births in Knox County.

Low Birth Weight

Low birth weight (LBW) babies are born weighing less than 2,500 grams and very low birth rate (VLBW) babies are born weighing less

Low Birth Weight: Less than 2,500 grams

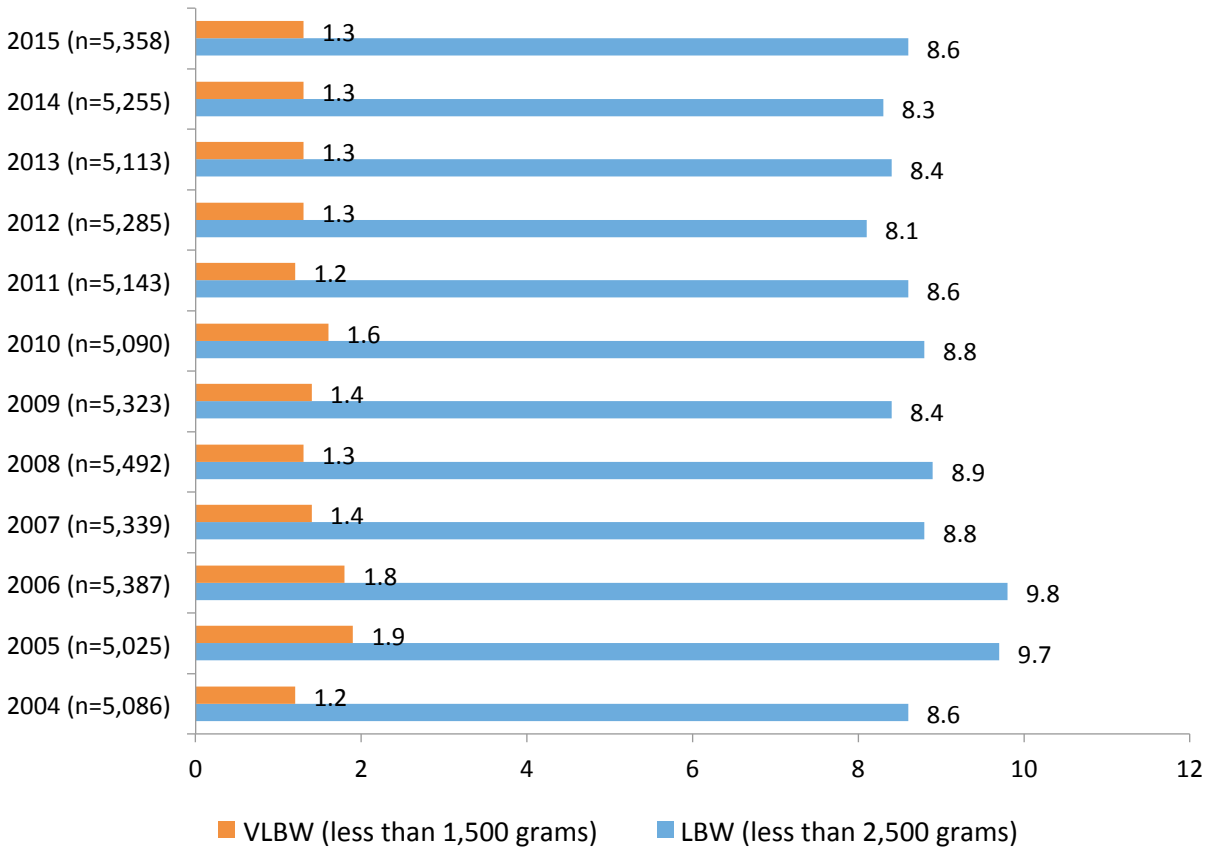
Very Low Birth Weight: Less than 1,500 grams

Premature Births: Less than 37 weeks of gestation

than 1,500 grams. For years, research has provided strong evidence that LBW babies and VLBW babies are at higher risk for dying within one year of birth, and are more likely to have a variety of acute medical conditions compared to normal weight babies (National Center for Health Statistics, 1980, April). More recent research has correlated LBW and VLBW births with greater risk for long-term developmental problems compared to normal weight babies (Wise, 2003).

Figure 5 displays the number of low birth weight births (LBS <2,500 grams) and very low birth weight (VLBW; <1,500 grams) in Knox County from 2004-2015.

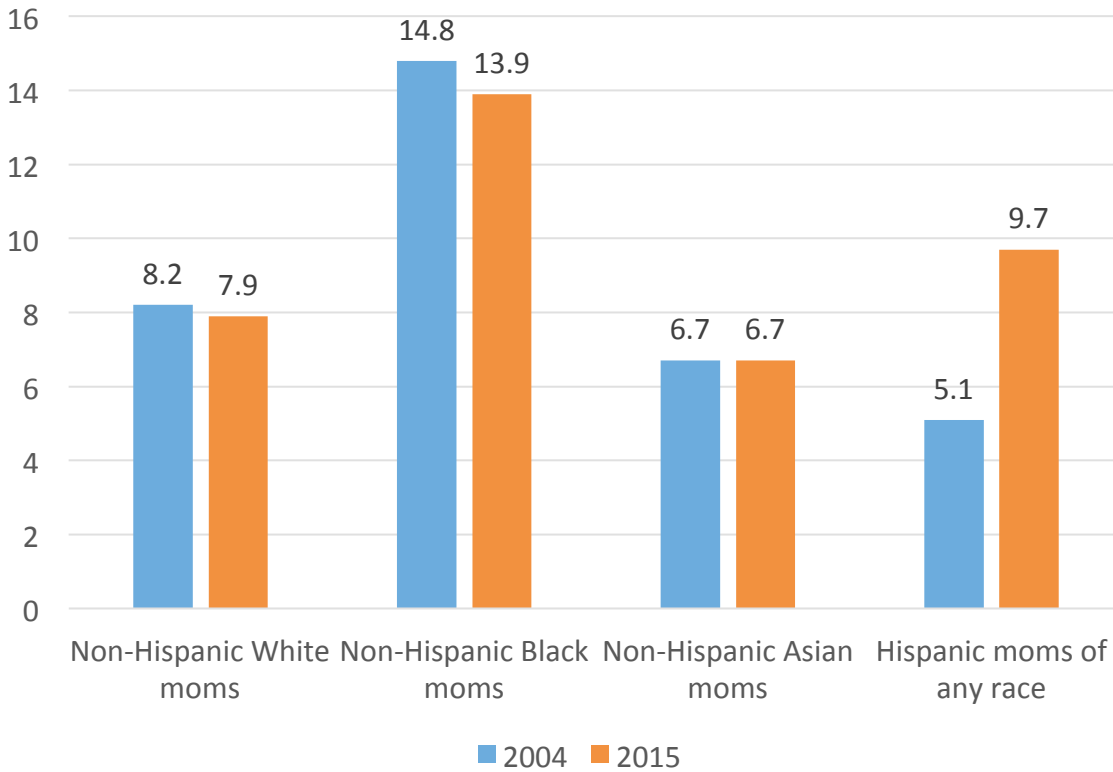
Figure 5: Low birth weight and very low birth weight births in Knox County from 2004 to 2015: Percent of total births



Source: 2004-2015: Health Information Tennessee Website, Tennessee Department of Health

Figure 6 displays the percent of low birth weight babies by the mom’s race/ethnicity in Knox County in 2004 and 2015. In both years, Knox County babies born to non-Hispanic black moms were at the greatest risk for LBW compared to moms of other ethnicities. In addition, low birth weight babies born to Hispanic moms increased from 5.1% in 2004 to 9.7% in 2015, a 90.1% relative increase.

Figure 6: Percent of Low Birth Weight Births by Selected Maternal Race/Ethnicity in Knox County, Tennessee in 2004 and 2015



Source: 2004 and 2015: Knox County birth records provided by the Office of the Policy, Planning and Assessment, Tennessee Department of Health.

Table 4 displays the percentage of low birth weight (LBW) births in Knox County from 2004 to 2015 based on four possible maternal factors: maternal age, level of prenatal care, smoking, and race/ethnicity. Knox County moms who smoked during pregnancy and non-Hispanic black moms tended to have the highest prevalence of LBW births in both years compared to the other ethnic/racial groups.

Table 4: Percentage of low birth weight births (<2,500 grams) in Knox County, Tennessee by selected factors: Maternal age, level of prenatal care, tobacco use during pregnancy, and maternal race/ethnicity from 2004 to 2015

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All Knox County moms	8.6	9.7	9.8	8.8	8.9	8.4	8.8	8.6	8.1	8.4	8.3	8.6
Age												
Less than 18 Years	10.8	11.1	11.0	9.0	10.0	14.4	7.8	12.5	4.6	*	13.7	*
18-34 Years	8.4	9.5	9.4	8.7	8.6	8.3	8.6	8.4	7.8	8.3	8.1	8.2
35 or more years	9.3	10.9	9.8	9.5	10.7	5.4	8.8	9.5	9.6	9.3	8.2	10.1
Prenatal care												
Adequate care	7.6	8.4	9.0	8.0	8.8	7.1	6.5	8.4	7.3	7.9	5.5	5.8
Intermediate care	11.9	12.7	12.0	11.4	8.5	11.5	9.2	8.7	10.1	8.7	11.5	10.3
No or inadequate care	8.1	12.4	11.4	10.1	11.0	10.9	10.9	9.9	9.5	10.2	10.5	11.5
Tobacco												
Tobacco use during pregnancy	14.4	16.4	17.4	12.3	13.8	14.9	14.4	15.3	12.4	13.6	13.2	14.5
No tobacco use	7.2	8.2	7.9	8.0	7.7	6.9	7.7	7.4	7.3	7.6	7.7	7.9
Race/Ethnicity of mother												
Non-Hispanic White	8.2	9.1	9.0	8.4	8.8	7.4	8.4	8.3	8.0	7.9	7.8	7.9
Non-Hispanic Black	14.8	16.7	17.2	13.9	12.7	16.7	14.1	12.6	9.0	14.3	14.8	13.9
Non-Hispanic Asian	*	*	*	*	*	*	*	*	*	*	*	*
Hispanic (any race)	*	7.8	7.0	7.3	5.4	8.0	5.5	7.5	7.8	7.3	6.2	9.7

*Too unreliable to report

Source: 2004-2015: Knox County birth records provided by the Office of the Policy, Planning and Assessment, Tennessee Department of Health and the Health Information Tennessee Website, Tennessee Department of Health

Premature births

Premature births are defined as live births before 37 weeks of gestation (WHO, 2016, November 26). Babies born before 37 weeks are believed to be at greater risk for premature mortality, learning and communication delays, asthma and other breathing difficulties, hearing and vision loss, and behavioral and neurological conditions (Saigal & Doyle, 2008).

Table 5 displays the percent of premature births among Knox County moms from 2004 to 2015 by the same set of maternal factors from Table 4: maternal age, level of prenatal care, smoking during pregnancy and maternal race/ethnicity. As seen in Table 5, moms aged 35 years or older, non-Hispanic African-American moms, and moms who reported they smoked during pregnancy tended to have a higher prevalence of premature births compared to the overall county average in most years.

Table 5: Percentage of premature births (<37 weeks gestation time) in Knox County, Tennessee by selected risk factors: Maternal age, level of prenatal care, tobacco use during pregnancy, and maternal race/ethnicity: 2004-2015

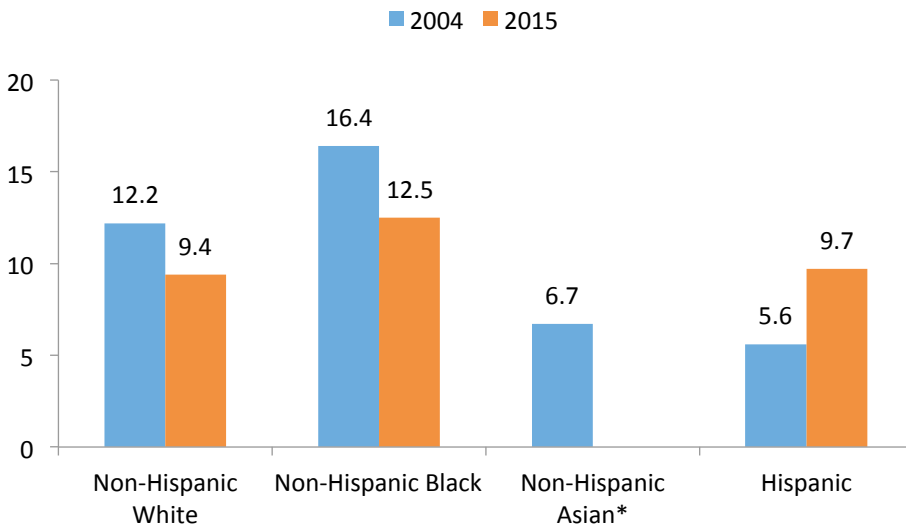
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All Knox County moms	12.1	13.2	13.7	12.4	12.3	10.9	11.4	11.5	10.1	10.8	10.4	9.7
Maternal age												
<18 Years	9.6	12.8	11.5	14.5	10.6	17.8	8.5	12.5	10.2	*	15.8	13.6
18-34 Years	12.0	13.0	13.8	11.8	11.8	10.7	11.1	11.3	9.9	10.3	10.0	9.2
35+ Years	14.6	14.8	15.2	14.6	14.3	14.2	13.6	13.1	13.4	12.7	13.1	14.1
Prenatal care												
Adequate care	7.3	7.5	13.4	12.2	12.1	10.1	11.2	11.5	9.6	10.4	7.7	6.9
Intermediate care	26.3	28.1	13.6	12.5	12.3	12.1	10.9	10.7	11.1	10.9	12.1	8.4
No care/inadequate care	13.0	17.3	16.5	13.4	14.3	14.7	15.4	13.1	13.2	12.3	13.2	13.9
Tobacco												
Tobacco use during pregnancy	13.7	16.6	18.8	12.9	14.2	13.9	14.2	16.4	13.0	12.9	12.6	12.2
No tobacco use	11.8	12.4	12.5	12.3	11.8	10.2	10.8	10.6	9.7	10.5	10.2	9.4
Race/Ethnicity of mother												
Non-Hispanic White	12.2	12.8	13.6	12.0	12.4	10.1	11.5	11.4	10.3	10.7	10.0	9.4
Non-Hispanic Black	16.4	18.8	17.6	18.3	13.1	17.1	13.4	14.3	10.6	14.1	13.4	12.5
Non-Hispanic Asian	*	*	*	*	11.3	*	*	*	*	*	13.6	*
Hispanic (any race)	*	9.7	10.3	9.6	10.5	10.1	7.9	8.7	8.3	*	9.7	9.7

**Too unreliable to report.*

Source: 2004-2015: Knox County birth records provided by the Office of the Policy, Planning and Assessment, Tennessee Department of Health and the Health Information Tennessee Website, Tennessee Department of Health

Figure 7 displays the percentage of live births that were premature (<37 weeks gestation time) in Knox County from 2004 to 2015. Non-Hispanic black moms were at greatest risk for having a premature baby compared to other race/ethnic groups in this analysis.

Figure 7: Percent of premature births by selected maternal race/ethnicity in Knox County, Tennessee in 2004 and 2015



**The number of premature births to non-Hispanic Asian moms in 2015 was too low to report a reliable percentage
 Source: 2004 & 2015 Knox County birth records provided by the Office of the Policy, Planning and Assessment, Tennessee Department of Health.*

Caesarian section (C-section) births involve an incision into the mother’s abdomen and uterus. The percent of Knox County babies delivered using C-sections from 2004 to 2015 are displayed in Table 7. As seen in Table 7, approximately one out of three babies in Knox County were delivered by C-sections, except for babies born to Hispanic moms which average closer to one out four babies delivered in this manner (24.5% of Hispanic births in 2015).

Table 6 shows the percent of Knox County births that were delivered by C-sections in Knox County, Tennessee by the mom’s race or ethnicity from 2004 to 2015. Approximately one-third of babies born in Knox County were born by C-sections.

Table 6: Percent of births born using C-sections in Knox County, Tennessee by maternal race/ethnicity from 2004 to 2015

	Total	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Asian	Hispanic (any race)
2004	29.2	29.2	32.6	34.5	21.3
2005	33.8	33.9	36.2	34.2	28.3
2006	33.3	33.6	33.3	33.7	29.2
2007	35.2	35.6	38.5	29.1	28.2
2008	35.9	36.8	36.4	33.0	29.3
2009	34.2	35.0	33.1	33.3	27.9
2010	34.6	34.9	37.8	36.1	27.5
2011	32.8	33.2	34.4	33.7	26.4
2012	32.2	32.9	29.5	30.9	26.7
2013	31.1	31.3	32.0	36.1	25.7
2014	31.2	30.8	34.3	32.7	26.3
2015	31.3	31.3	32.8	27.5	24.5

Source: 2004-2015: Knox County birth records provided by the Office of the Policy, Planning and Assessment, Tennessee Department of Health.

Neonatal Abstinence Syndrome

Babies diagnosed with Neonatal Abstinence Syndrome (NAS) were exposed to opioids taken by the mother during pregnancy and exhibit drug withdrawal symptoms after they are born (Ko et al., 2016, August 12). Common symptoms exhibited by NAS babies include central nervous system sensitivities such as tremors, high-pitched crying, seizures, and feeding difficulties. Beginning in 2014, NAS births became a reportable condition in Tennessee in the same manner that certain infectious diseases such as chlamydia or hepatitis must be reported. Since 2014, there have been approximately 100 babies diagnosed with NAS reported in Knox County every year (Table 7).

Table 7. Number and rate per 1,000 births of babies born with Neonatal Abstinence Syndrome in Knox County, Tennessee from 2014 to 2016

	#NAS births	Rate per 1,000 births
2014	103	20.2
2015	116	22.1
2016	97	18.1

Source: Neonatal Abstinence Syndrome Update Archive Website, Tennessee Department of Health

Infant Mortalities

Infant mortality rates are determined by the number of deaths in a population divided by the number of live births within a given year. Infant deaths are studied as part of birth outcomes as an overall measure

of maternal health within a community. As seen in Table 8, infant mortality rates from 2004 (rate = 4.5 per 1,000 live births) to 2015 (rate = 8.0 per 1,000 live births) have been increasing in Knox County. Causes of infant death often include sleep-related problems, congenital conditions, cardiovascular issues, preterm birth, complications from pregnancy, Sudden Infant Death Syndrome, and injuries (such as motor vehicle accidents).

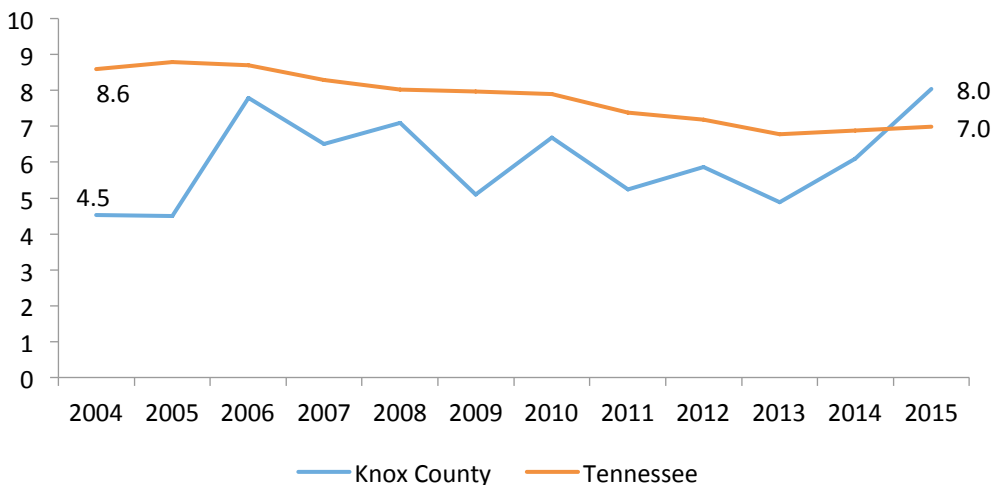
Table 8: Frequency and rate per 1,000 live births for infant mortalities in Knox County, Tennessee from 2004 to 2015

Year	# Knox County infant deaths	Rate per 1,000 live births
2004	23	4.5
2005	23	4.5
2006	39	7.8
2007	35	6.5
2008	39	7.1
2009	27	5.1
2010	34	6.7
2011	27	5.2
2012	31	5.9
2013	25	4.9
2014	32	6.1
2015	43	8.0

Source: Health Information Tennessee website, Tennessee Department of Health

The Knox County infant mortality rates have remained lower than Tennessee’s infant mortality rates until 2015, as seen in Figure 8.

Figure 8: Infant mortality rates per 1,000 births for Knoxville, Tennessee and Tennessee from 2004 to 2015



Source: Health Information Tennessee website, Tennessee Department of Health

This report may be viewed at: http://www.knoxcounty.org/health/epidemiology/reports_data.php

For more information or data requests regarding the 2014 Knox County Behavioral Risk Factor Survey, please contact:

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Phone: 865-215-5185

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