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Center for Urban Child Policy

VARIATIONS IN 2006 INFANT MORTALITY IN TENNESSEE

As a follow-up to the recent release of the 2009 edition of The State of Children in Memphis and Shelby County: Data Book IV, we offer the following policy brief on infant mortality in Tennessee. The infant mortality rate (IMR) – the number of deaths in the first year of life per 1,000 live births – is a widely recognized indicator of access to health care, quality of care, and the overall health of a community. By this measure, there is a long-standing social problem in Shelby County, where the IMR is the highest in the state. In addition, there are persistent gaps between IMRs of racial and ethnic groups across Tennessee, representing significant inequities in health and health care.

Because there is no universally used method for calculating IMRs, the ways in which counties collect and report data on birth outcomes affect our ability to make meaningful comparisons of their IMRs. For instance, if two counties use differing methods, then some of the discrepancy between their IMRs may be "artificial" – that is, due to variations in data collection rather than actual differences in infant mortality. These artificial differences may also distort racial and ethnic gaps.

In this brief we examine the differences in IMRs among four Tennessee counties (Davidson, Hamilton, Knox and Shelby) as well as differences in the IMRs of racial and ethnic groups within each county. We also discuss existing national and international guides which could be used to make the collection and reporting of relevant data more consistent across the state, and explain the changes that would result from the implementation of these standards in Tennessee.

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2006 INFANT MORTALITY RATES (IMRS) SHOW MARKED VARIATION BY COUNTY ACROSS TENNESSEE.**

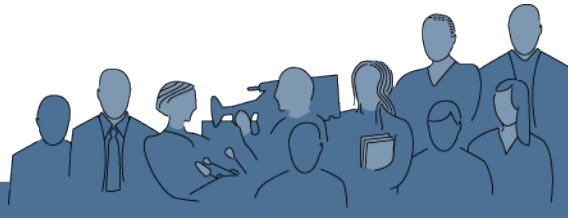
Table 1: Infant Mortality in Selected Tennessee Counties.

County	Total Births	Total Infant Deaths	IMR/1,000 Births
Davidson	9,966	83	8.33
Hamilton	4,267	47	11.02
Knox	5,387	35	6.5
Shelby	15,167	210	13.85

Shelby County has disproportionately higher numbers of infants who die within the first year of life (relative to total number of births) than each of the other counties (Table 1).

- *Shelby County had 1.5 times more babies born than Davidson County and lost 2.5 times more infants* (Table 1).
- *The total number of births in Shelby County is 3.5 times greater than Hamilton County and the number of infant deaths was almost 4.5 times larger* (Table 1).
- *Shelby County had 2.8 times more births than Knox County and 6 times as many infant deaths* (Table 1).

The IMR of Shelby County is more than double that of Knox County (Table 1).



Racial disparities in infant mortality are evident across each of the four counties.

Table 2: Infant Mortality in Tennessee by Race/Ethnicity.

County	White IMR	Black IMR	Hispanic IMR
Davidson	6.14	12.70	7.69
Hamilton	8.02	20.37	6.93
Knox	5.33	8.96	12.16
Shelby	5.29	19.31	8.34

Across the state, the black IMR is higher than the white IMR (Table 2).

» The black IMR is twice as high as the white IMR in Davidson County, more than twice as high in Hamilton County and about three and a half times higher in Shelby County (Table 2).

» The Hispanic and "other" IMRs are each higher than the white IMR in Davidson, Knox and Shelby counties (Table 2).

» Both Davidson and Knox counties report higher IMRs among "others" than among blacks (Table 2).

Birth weight and gestational age are important indicators of infant mortality.

"The more premature an infant is, the greater the risk of death" (TUCI, 2009, p. HE5).

» "Almost one-fifth of all infants born at less than 32 weeks gestation do not survive the first year of life, whereas about 1 percent of infants born at between 32 and 36 weeks of gestation and 0.3 percent of infants born at 37 to 41 weeks of gestation do not survive the first year of life" (Behrman & Butler, 2006, p. 31).

» "While low birth weight does not correlate exactly with gestational age, it is frequently used as a measurement of premature birth, because determining exact gestational age is often difficult" (TUCI, 2009, p. HE5).

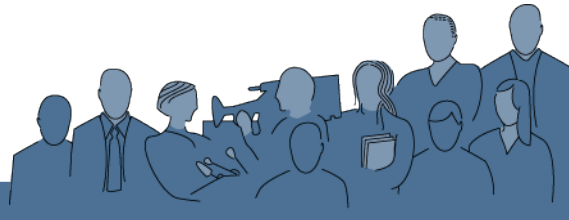
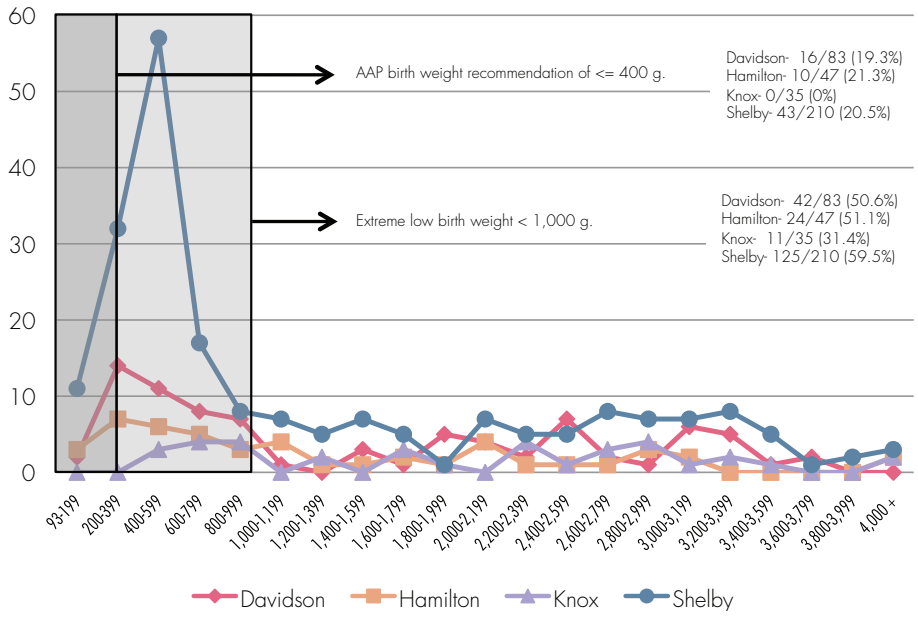
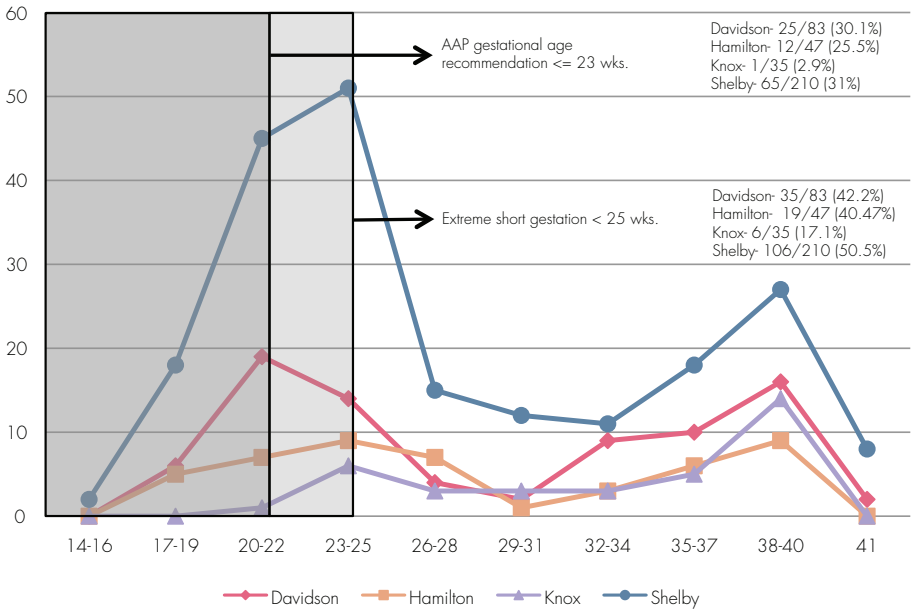


Figure 1: Infant Mortality by Birth Weight.

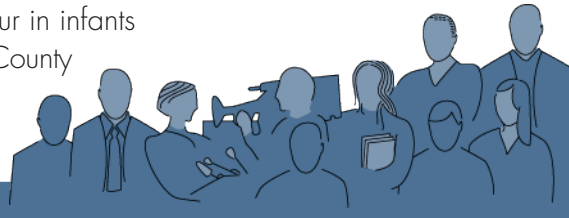


Extremely low birth-weight babies (less than 1,000g.) account for approximately 50% of infant losses in Davidson and Hamilton counties, 30% of infant deaths in Knox County, and nearly 60% of infant deaths in Shelby County (Figure 1).

Figure 2: Infant Mortality by Gestational Age.

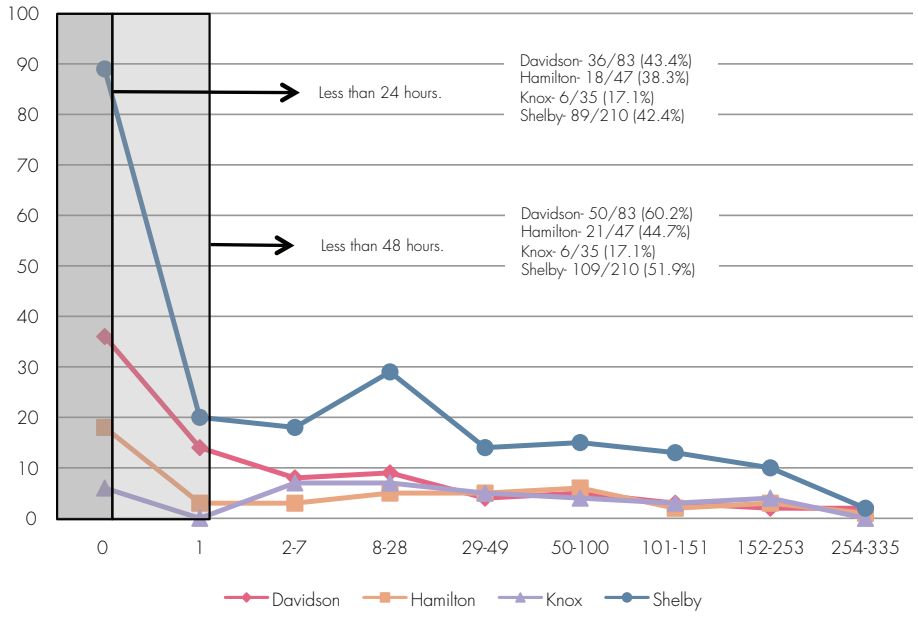


In Davidson and Hamilton counties 2 in 5 infant deaths occur in infants born before 25 weeks gestation, as do about 17% in Knox County and 50% Shelby County (Figure 2).



Deaths occurring within the first 24 hours account for a large portion of infant deaths.

Figure 3: Infant Mortality by Number of Days Alive.

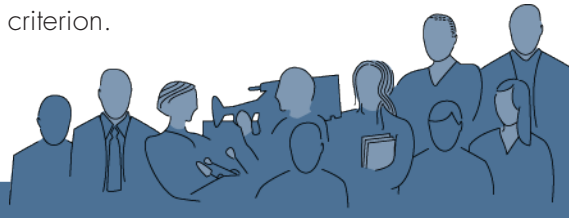


» In Davidson, Hamilton and Shelby counties more than 1 in 3 infant deaths occurred within the first 24 hours, whereas only 17% of infant deaths in Knox County occurred within the same period (Figure 3).

» Most of these very early deaths are of infants weighing less than 1,000g (Davidson 75%; Hamilton 78%; Knox 67%; Shelby 94%) (not shown).

DIFFERENCES IN IMRs BY TENNESSEE COUNTIES MAY REFLECT INCONSISTENCIES IN HOW DATA IS REPORTED.

In the new Data Book, we note that there is no universally used method of calculating the infant mortality rate. The way that a city, county or state distinguishes an infant death from a fetal death will have an effect on that area's IMR. For example, an extremely premature and low birth-weight infant who dies immediately after birth despite showing some sign of life (such as breathing or moving) may be counted by one county as a fetal death, while another county would consider it a live birth followed by an infant death. The first county, because it uses some threshold of gestational age or birth weight to distinguish between fetal death and infant death, will tend to have a lower IMR than the second, which uses an "any sign of life" criterion.



The use of the "any sign of life" criterion reflects recent changes in attitudes toward the viability of premature and low birth-weight infants. Since the 1980s, there have been marked improvements in the availability and effectiveness of neonatal intensive care; many newborns that once would have been considered beyond hope are now saved. However, aggressive efforts to save even very premature babies can affect the IMR. This is because when a baby dies after attempts at resuscitation have been made, the death is usually recorded as an infant death rather than a fetal death. This may result in an artificially high IMR, especially if different procedures are used elsewhere.

In Tennessee, there are wide variations in infant mortality rates among counties. It is not clear, however, whether this reflects actual differences in mortality or differences in how counties record and report information on birth outcomes. Without statewide standards for calculating IMRs, meaningful comparisons cannot be made between counties, and such comparisons are essential to identifying effective policies.

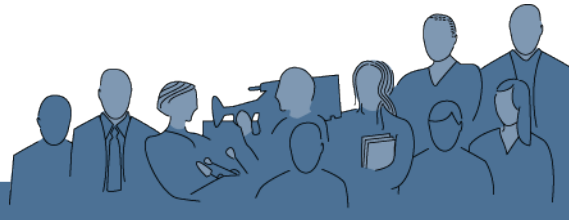
HOW SHOULD WE DISTINGUISH AN INFANT DEATH FROM A FETAL DEATH?

» When a baby dies soon after birth, determining whether it is an infant death or a fetal death depends upon whether it is considered to have been a live birth.

» The **World Health Organization (WHO)** suggests a live birth is characterized by a birth weight of 500 grams, a gestational period of 22 weeks, **and** a body length of 25 centimeters. WHO also includes an "any sign of life" criterion; this may include heartbeat, breathing, or movement of voluntary muscles (Gourbin, C. & Masuy-Stroobant, 1995).

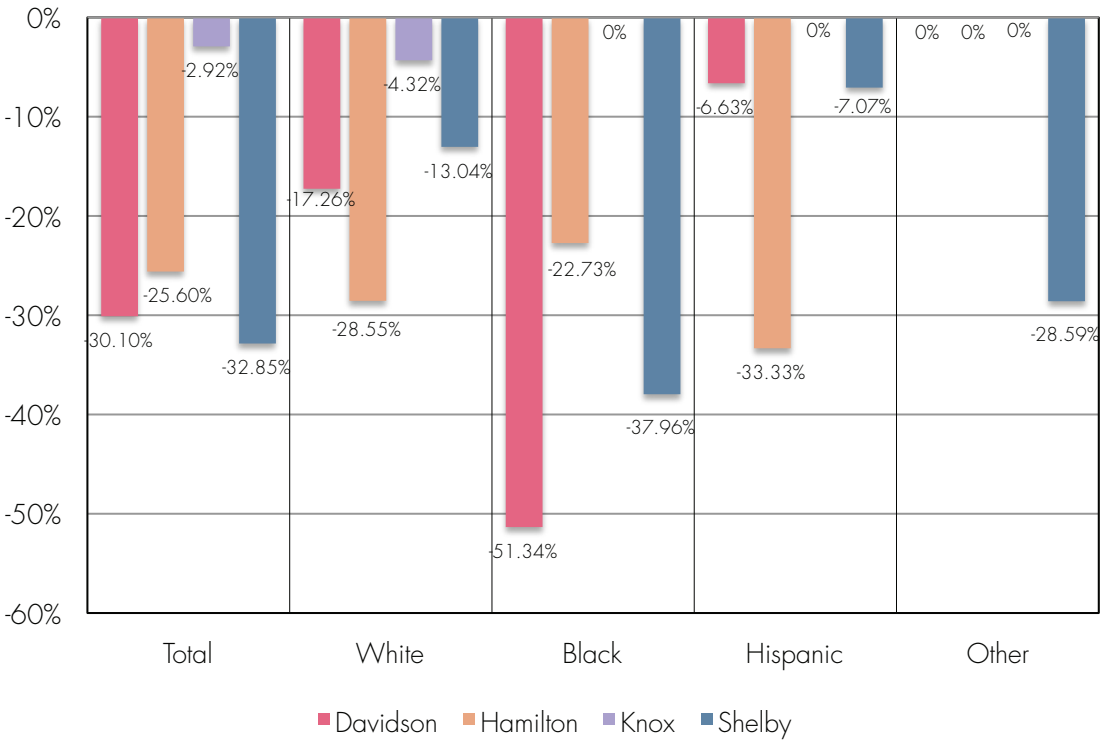
» The U.S. Congress follows the 2002 **Born-Alive Infant Protection Act (BAIPA)*** guidelines which consider "any sign of life" sufficient to define a live birth (107th Congress 2d Session).

» The **American Academy of Pediatrics (AAP)** suggests that an appropriate threshold for live births is a minimum birth weight of 400 grams **or** a minimum gestational age of 23 weeks (2005 American Heart Association, 2006).



If AAP guidelines were applied across Tennessee, the IMRs of Davidson, Hamilton and Shelby counties would decrease dramatically.

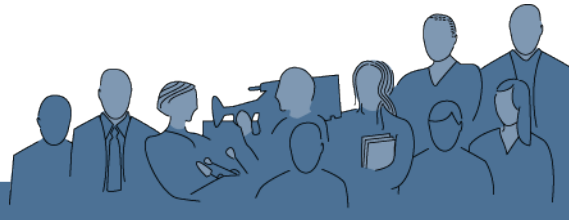
Figure 4: IMR Change Using AAP Guidelines



Shelby County demonstrates the greatest improvement in total IMR of all four counties when AAP standards are applied (Figure 4).

In Davidson and Shelby counties, the black IMR decreases more dramatically (51% and 38% decreases respectively) than the white, Hispanic, or "other" IMRs (Figure 4).

The marginal changes in Knox County indicate that there may be a county-wide policy that is similar to AAP guidelines (Figure 4).



Using AAP guidelines also reduces racial disparities in IMRs in some counties.

Table 3: Infant Mortality Rates in Tennessee Using AAP Guidelines

County	Total IMR	White IMR	Black IMR	Hispanic IMR	Other IMR
Davidson	5.82	5.08	6.18	7.18	17.24
Hamilton	8.2	5.73	15.74	4.62	7.30
Knox	6.31	5.10	8.96	12.16	16.39
Shelby	9.3	4.60	11.98	7.75	9.19

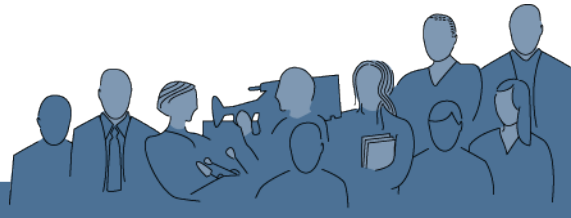
Under AAP guidelines (using either of the two thresholds) the Davidson County black IMR would decline from twice the white rate to only 20% higher (Table 3).

The Hamilton County black IMR would remain about two and a half times higher than the white rate (Table 3).

The Shelby County black IMR would fall from three and a half to two and a half times the white rate (Table 3).

The black IMR in Knox County would remain about one and a half times the white IMR (Table 3).

Knox County hospitals may already use AAP guidelines to define a live birth.

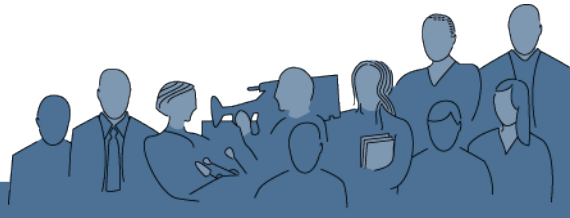


POLICY IMPLICATIONS

Infant mortality and fetal death are important indicators of child well-being and of the overall health of communities. Racial disparities in infant mortality rates indicate enduring child and health care disparities in our community. Currently, 47% of all children under age five in the U.S. are racial and ethnic minorities, and half of all children in the U.S. will be from a minority group by 2040. At the same time, there continue to be dramatic racial and ethnic disparities in children's health and healthcare in this country, (Flores, 2009).

In order to accurately compare IMRs across different areas it is necessary to have shared definitions of fetal death, live birth, and infant death. Our findings suggest that there are no such definitions in place. Establishing standard definitions will provide a more realistic picture of infant mortality in Tennessee and will allow us to make more meaningful comparisons among counties, which will in turn make it easier to identify effective policies for reducing infant mortality and racial/ethnic differences in mortality.

The Tennessee Office of Vital Records already collects birth and death records and could implement a set of criteria, such as the AAP minimums for birth weight or gestational age, to differentiate fetal deaths from live births and infant deaths, allowing for consistent records. In other words, if a baby under 400 grams or less than 23 weeks old dies, the death will be recorded as a fetal death rather than an infant death, even if attempts at resuscitation have been made. These recommendations do not involve a change in medical practices regarding the viability of newborns, only a change in how information is collected and reported.



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* The BAIPA defines live births as "the complete expulsion or extraction from his or her mother of that member, at any stage of development, who after such expulsion or extraction breathes or has a beating heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, regardless of whether the expulsion or extraction occurs as a natural or induced labor, cesarean section, or induced abortion."

** 2006 birth data were provided by the Tennessee Department of Health, Office of Policy, Planning and Assessment, Division of Health Statistics.

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The Urban Child Institute (TUCI) promotes optimal brain development for children from conception to age three.

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