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Davidson County Child Death Review

Data Report 2016-2017



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Protecting, Improving, and Sustaining Health

Davidson County Child Death Review Data Report, 2016-2017

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Preface

Mission

The mission of the Davidson County Child Death Review Team (CDRT) is to provide a better understanding of how and why children die in order to find ways to help reduce the number of preventable child deaths. This is accomplished through comprehensive and multidisciplinary reviews of the circumstances surrounding each death.

Background

The CDRT is empowered by State statute (T.C.A. 68-42-101) and Mayoral Executive Order to conduct reviews of deaths to resident children under the age of 18 years in order to achieve the following goals:

1. Ensure an accurate inventory of child fatalities by demographics, geographic locations, causes, and manners.
2. Support adequate child death investigations.
3. Enable multi-agency collaboration, cooperation, and communication at the state and local levels to address child fatalities.
4. Analyze patterns and trends in total and cause-specific child fatalities with greater emphasis on deaths related to abuse and neglect, unsafe sleeping environments, and inadequate medical care or public health services.
5. Enhance community awareness of the epidemiology of childhood mortality, and public understanding of why and how children die.
6. Develop recommendations and community-based prevention initiatives to reduce child fatalities among Davidson County residents.

About This Report

This report first summarizes the key issues, recommendations, and actions resulting from the CDRT's detailed review of each child death occurring in Davidson County during 2016 and 2017. The report then presents quantitative data on the epidemiology of child fatalities with emphasis on describing the cause and manner of death, preventability, context, and modifiable risk factors associated with the death.

Recommendations and Actions Resulting from CDRT Reviews

Each year, based on the findings of child death reviews, the CDRT makes recommendations for policy, infrastructure, and service changes in an effort to prevent future childhood mortality. The Tennessee Department of Health (TDH) State Child Fatality Team consolidates recommendations from all teams across the State and uses them to guide legislative, programmatic, and policy agendas for the State of Tennessee.

At the local level, the Davidson County CDRT facilitates the implementation of recommendations through direct interaction with the agencies and organizations involved, or through contacts and partnerships with appropriate community groups. Recommendations and actions made by the CDRT based on the review of child deaths in 2016 and 2017 are presented in Table 1 below.

Table 1. Recommendations and Actions made by the Davidson County CDRT, 2016-2017

Identified Issue	Recommendation/Action
<ul style="list-style-type: none"> Infant Safe Sleep: Case reviews created concern that the publicity surrounding 'Baby Boxes' might encourage families to use any available box, or use the box inappropriately. Financially, a pack-n-play is a better investment; it provides a safe place to sleep for the first year instead of the first 3 months, and there are systems already in place to provide pack-n-plays to families that need them. 	<ul style="list-style-type: none"> Metro Public Health Department (MPHD) created a position statement highlighting the intent to continue distributing pack-n-plays and portable bassinets, citing the lack of scientific evidence supporting either the safety or efficacy of Baby Boxes.
<ul style="list-style-type: none"> Infant Safe Sleep: Reviews revealed that many sleep-related deaths occurred in overcrowded housing conditions. This is evidenced in the subsequent analysis of quantitative data, which indicates that in 2016 and 2017, 35.7% of sleep-related deaths occurred in overcrowded homes. The Team was concerned that house-sharing might limit safe-sleep options. 	<ul style="list-style-type: none"> MPHD provides Direct On-Scene Education (DOSE) training for Metropolitan Development and Housing Authority (MDHA) staff. This program trains maintenance workers to recognize whether there is a safe place in the home for an infant to sleep, and to make referrals of parents or caregivers to MPHD for safe sleep education and pack-n-play distribution.
<ul style="list-style-type: none"> Drowning Prevention: Reviews revealed that not all State-owned 	<ul style="list-style-type: none"> The Team recommended the State post signage at State-owned lakes and bluffs to

Identified Issue	Recommendation/Action
<p>lakes and bluffs have signage that warns of the dangers of swimming and/or diving in those areas.</p>	<p>warn of the dangers. It was also suggested the State explore other drowning prevention measures that have been successfully adopted in other states such as a life-vest lending program.</p>
<ul style="list-style-type: none"> • Coordination of Care: Team noted that accessing mental health information in medical charts requires an additional step due to an extra level of data protection. As a result, pertinent mental health history can be overlooked and not communicated to the relevant providers. 	<ul style="list-style-type: none"> • It was discovered that the clinic reporting the difficulty in accessing mental health records was an outlier. As a result, the clinic added a flag to records with additional mental health notes that will visibly direct providers to the link containing the detailed mental health records.
<ul style="list-style-type: none"> • Coordination of Care: Case reviews revealed a systemic issue with communication between service agencies and the Department of Children's Services (DCS). 	<ul style="list-style-type: none"> • The CDRT formed a workgroup to explore the issue further. It was concluded that: <ul style="list-style-type: none"> ○ Education is needed for agencies that regularly make referrals to DCS. Prioritization and categorization of cases by DCS is not clearly explained or understood, making it difficult to make a referral that will be flagged for subsequent investigation. Referring agencies also do not have a clear understanding of the criteria DCS uses to close cases which can delay or prevent new referrals when needed. ○ A system of interagency communication should be developed, so all agencies involved with a family are aware of the totality of services a family is receiving, and when each agency closes its case. Presently, there is limited coordination between the multiple agencies that might be involved with a family, including DCS. The lack of coordination and communication creates gaps in services that jeopardize the health and well-being of children and their families. • As DCS is a State agency, the workgroup compiled their findings and forwarded them to the State Child Fatality Team.

Key Findings

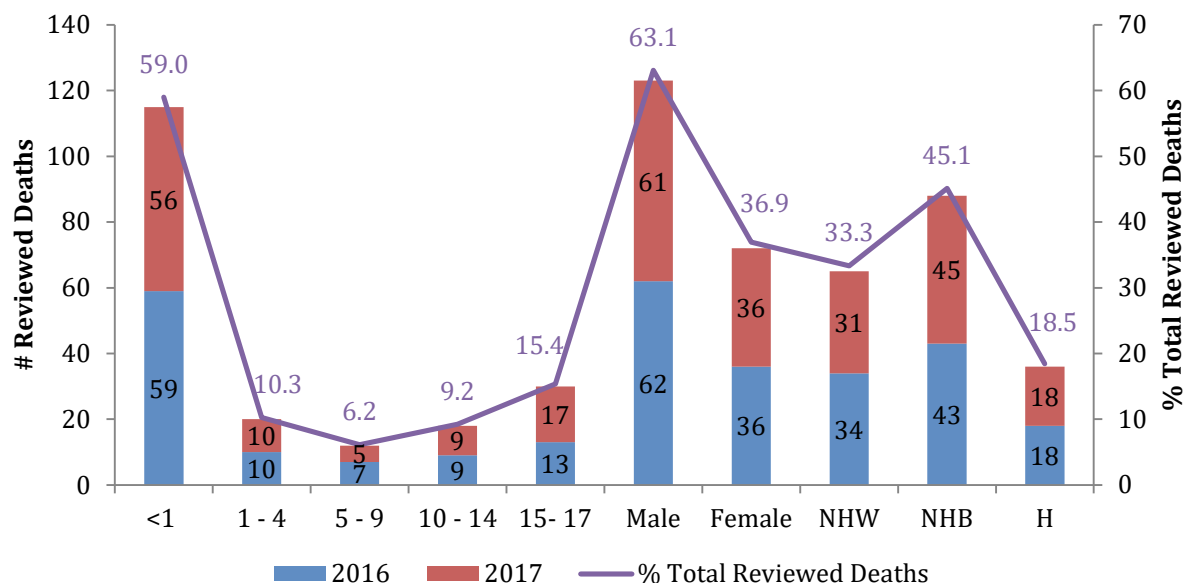
- Between 2016 and 2017, the CDRT reviewed 195 child deaths. The majority of these deaths (115 deaths, 59%) occurred to infants under 1 year of age.
- The overall mortality rates for children aged 0 to 17 years in Davidson County in 2016 (78.6 deaths per 100,000 children) and 2017 (78.9 deaths per 100,000 children) were almost unchanged since 2015, and were significantly higher than the rates for the State of Tennessee and the nation during the same period.
- The CDRT determined that 41.8% of the child deaths reviewed in 2016 and 31.7% in 2017 were preventable. These high percentages of preventable deaths highlight the need for a careful and thoughtful review of each death to understand the risk factors and circumstances leading to death, and to identify opportunities for prevention.
- In the 2 years reviewed, Non-Hispanic Black (NHB) children died at a higher rate when compared to Non-Hispanic White (NHW) children (1.5 times higher in 2016 and 2.6 times higher in 2017). This disparity was both persistent and increasing over the 5-year period from 2013 to 2017.
- Nearly a quarter (28 deaths, 24.3%) of infant deaths reviewed in 2016 and 2017 were sleep-related, of which almost all (27 deaths, 96.4%) occurred when infants were placed to sleep in unsafe bedding.
- Of the total reviewed deaths, 29 deaths (15%) resulted from unintentional injuries, including suffocation (14 deaths), drowning (5 deaths), motor vehicle crashes (4 deaths), and fire, poisoning, and other types of injuries (6 deaths).
- There were 32 deaths (16.4% of total reviewed deaths) related to violence (i.e., homicides and suicides). The majority of these deaths occurred to males (21 deaths) and teens aged 15 to 17 years (18 deaths), and half occurred to NHB children (16 deaths).
- Over a quarter of the reviewed deaths (51 deaths, 26.4%) showed some evidence of abuse, neglect, or negligence. In over 2 thirds of these deaths (36 deaths), the perpetrator of the abuse, neglect, or negligence was the child's biological parent.

Executive Summary

Overall Child Mortality

The CDRT reviewed 195 deaths that occurred to children in Davidson County in 2016 and 2017. These included 98 deaths (78.6 deaths per 100,000 children) in 2016 and 97 deaths (78.9 deaths per 100,000 children) in 2017. During these two years, the first year of life appears to be the most vulnerable for Davidson County's children, accounting for 59% of all deaths under the age of 18 years (Figure 1). Children aged 15-17 years and 1-4 years had the next highest percentages of deaths at 15.4% and 10.3%, respectively. Male children contributed a significantly higher percentage of total child fatalities compared to females (63% vs. 37%, respectively).

Figure 1. Distribution of Reviewed Deaths by Age, Sex, and Race/Ethnicity, Davidson County, TN, 2016-2017



Data Source: MPHD, Child Fatality Review Database System

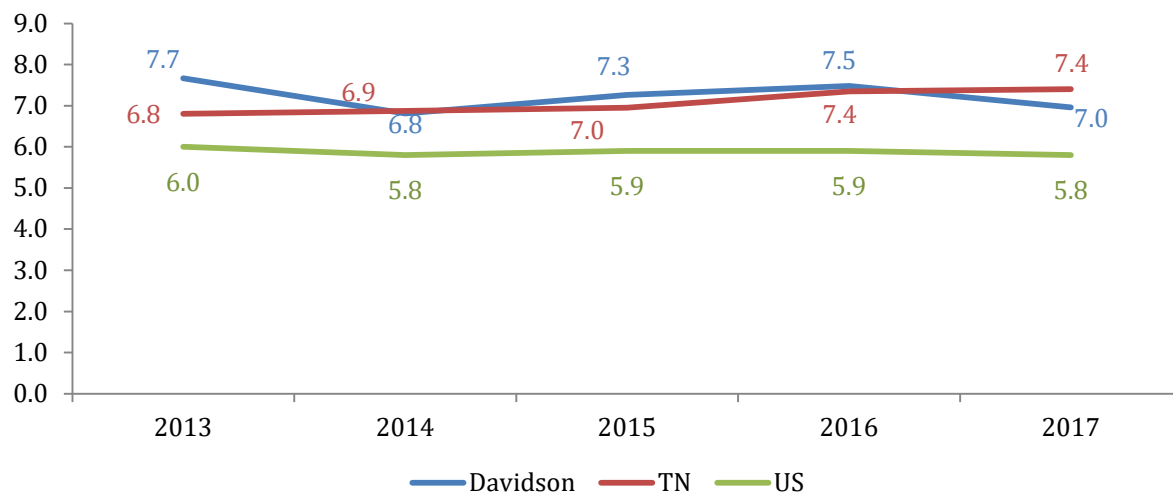
In the 2 years under review, there were persistent racial and ethnic disparities in child fatalities within the county (Figure 1). NHB children contributed a disproportionately higher percentage of the total reviewed deaths compared to NHW children (45% vs. 33%, respectively).

Between 2013 and 2017, the overall annual mortality rates for NHB children were 1.5 to 2.6 times higher when compared to NHW children. In addition, the mortality rate among NHW children showed a small decline (5%) between 2013 (53.7 per 100,000) and 2017 (51.0 per 100,000), whereas the rate among NHB children increased 24.5% during this period, from 105.2 per 100,000 in 2013 to 131.0 per 100,000 in 2017.

Infant Mortality

In 2017, the infant mortality rate was 7.0 deaths per 1,000 live births, which represented a small reduction from 7.5 deaths per 1,000 live births in 2016. The five-year (2013-2017) trend in infant mortality rates in Davidson County was fairly stable, and rates were similar to those for the State of Tennessee. However, during this period, infant mortality rates in Davidson County were consistently higher than national rates. In 2017, for example, the infant mortality rate in Davidson County (7.0 per 1,000 births) was 20.7% higher than the rate for the nation (5.8 per 1,000 births) (Figure 2).

Figure 2. Infant Mortality Rates per 1,000 Live Births, Davidson County, Tennessee, and the US, 2013-2017



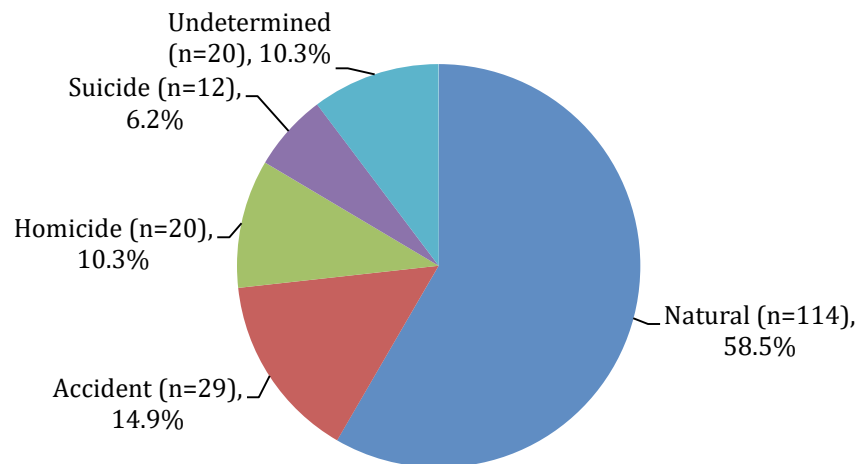
Data Sources: Vital records provided by Tennessee Department of Health; Tennessee and US rates from CDC Wonder.

Between 2013 and 2017, mortality rates among NHB infants showed a 13.4% increase (from 11.2 to 12.7 deaths per 1,000 live births), while the rates among NHW infants demonstrated a 40.4% decrease (from 5.7 to 3.4 per 1,000 live births). Additionally, the NHB infant mortality rate increased from a level that was 2.0 times higher than that for NHW infants in 2013, to a level that was 3.7 times higher in 2017. These contrasting trends indicate growing disparities in infant mortality during this period.

Manner of Death

In 2016 and 2017, the majority of reviewed deaths in Davidson County resulted from natural causes (58.5%), followed by accidents (14.9%), homicides (10.3%), and suicides (6.2%). Additionally, 10.3% of deaths were categorized as undetermined because their cause and manner remained unknown after an extensive autopsy and death scene investigation (Figure 3).

Figure 3. Percent of Reviewed Deaths by Manner of Death, Davidson County, TN, 2016-2017



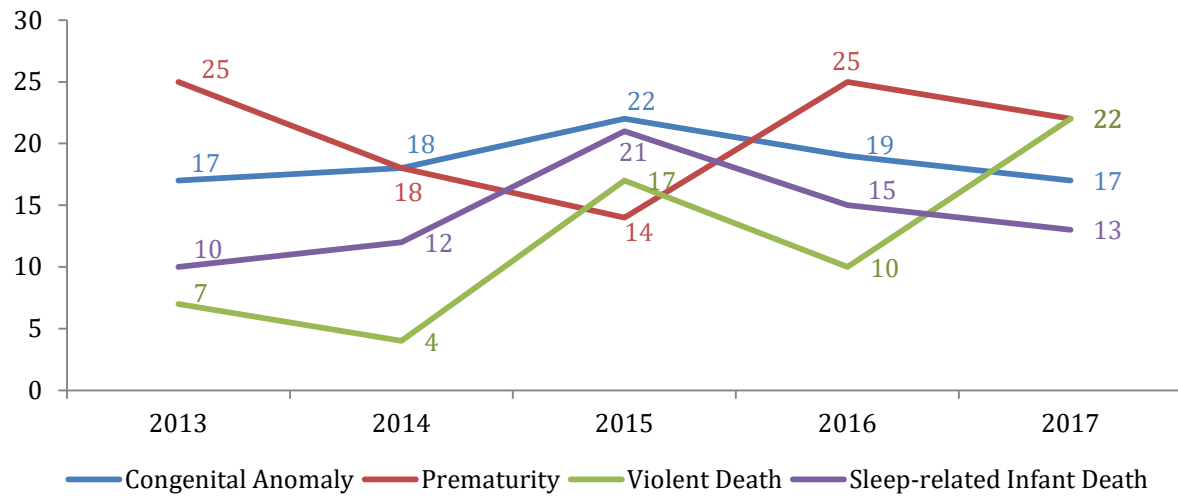
Data Source: MPHD, Child Fatality Review Database System

Cause of Death

During 2016 and 2017, of the 114 deaths classified as natural, prematurity (39.5%) accounted for the highest percentage, followed by congenital anomalies (31.6%), and cancer (8.8%). Among the 29 deaths categorized as accidental, suffocation was the leading cause (48.3%), drowning (17.2%) was the second, and motor vehicle crashes (13.8%) was the third leading cause of death. Firearms were the leading cause of death for both suicides (5 of 12 deaths, 41.7%) and homicides (13 of 20 deaths, 65.0%).

Figure 4 displays the 5-year trend in the number of infant and child deaths for major causes of death from 2013 through 2017. During this period, the number of deaths attributable to violence (suicides and homicides together), congenital anomalies, and sleep-related factors increased to a peak in 2015, while the number of deaths due to prematurity declined to the lowest level. **Since 2015, the number of sleep-related deaths decreased 38.1%, and the number of deaths due to congenital anomalies decreased 22.7%.** On the other hand, the number of deaths due to prematurity and deaths related to violence both fluctuated. **Of special note is the 3-fold increase in the number of violent deaths from 7 deaths in 2013 to 22 deaths in 2017.**

Figure 4. Number of Reviewed Deaths for Selected Causes, Davidson County, TN, 2013-2017



Data Source: MPHD, Child Fatality Review Database System

Introduction

The Child Death Review process brings together a multidisciplinary team to discuss child deaths in the community in order to understand why children die and decide what actions should be taken to prevent future deaths. Information on each death is collected from a wide-range of agencies and medical providers and carefully reviewed. The process allows for the identification of inefficiencies and gaps in medical care and social support systems, as well as understanding of broader issues in the community and modifiable risk factors associated with the deaths.

Data Sources and Data Analyses

This report is primarily based on 2016 and 2017 child death review data for Davidson County. Child mortality is defined as the death of a child between 0 and 17 years of age. Infant mortality is defined as a death occurring within the first 12 months of life.

For the current analysis, the death of a child was reviewed if:

- The child resided in Davidson County at the time of death;
- The child was aged between 0 and 17 years; and
- The death occurred in the State of Tennessee.

In addition, infant deaths were reviewed if they were born on or after 23 weeks gestation, or were born at a weight equal to or greater than 500 grams.

On average, 84% of all child deaths occurring in Davidson County meet the above criteria and are reviewed. As such, data presented in this report might be slightly different from the data in other published reports based on different data sources (e.g., vital records).

Data from child death review were descriptively analyzed to provide the frequency distribution of deaths by demographic characteristics (i.e., age, gender, race/ethnicity), and by the manner and cause of death.

In addition, mortality rates per 100,000 children and infant mortality rates per 1,000 live births were based on total deaths recorded in the mortality and natality files for Davidson County. The rates for the two years under review were compared with the rates for 2013, 2014, and 2015 to examine the 5-year trend from 2013 through 2017. The geographic distribution of child deaths was also analyzed to determine where the deaths were concentrated within Davidson County.

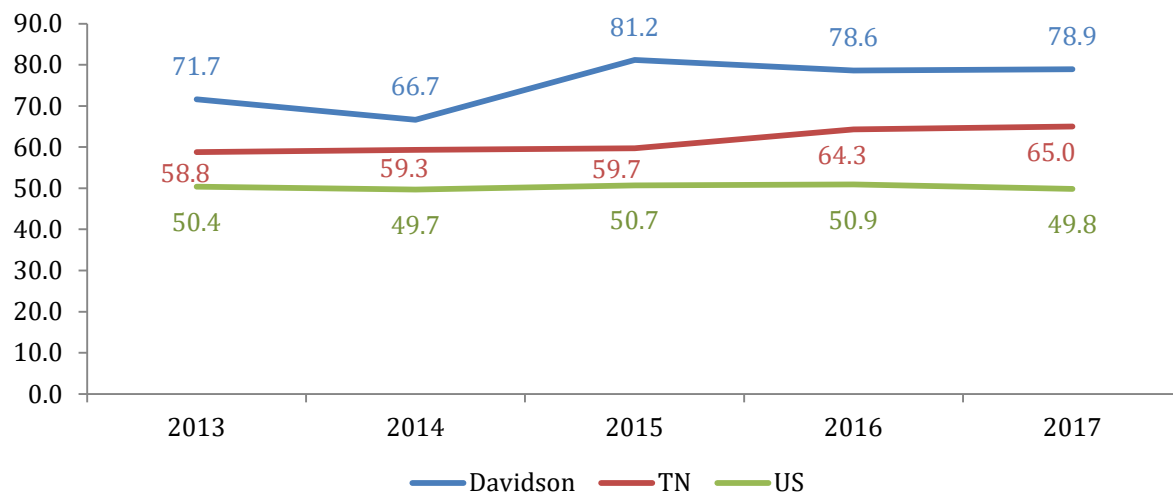
Further details regarding the analysis can be found in the Technical Notes section of this report.

Child Mortality

Overall Mortality

The overall mortality rates for children aged 0 to 17 years in Davidson County in 2016 (78.6 deaths per 100,000 children) and 2017 (78.9 deaths per 100,000 children) were almost unchanged since 2015 and were 10% higher than the rate in 2013 (Figure 5). For the 5-year trend from 2013 to 2017, Davidson County consistently experienced a higher child mortality rate when compared to the rates for the State of Tennessee and the nation. In 2017, for example, the rate for Davidson County was 21.4% higher than the rate for Tennessee and 58.4% higher than the national rate.

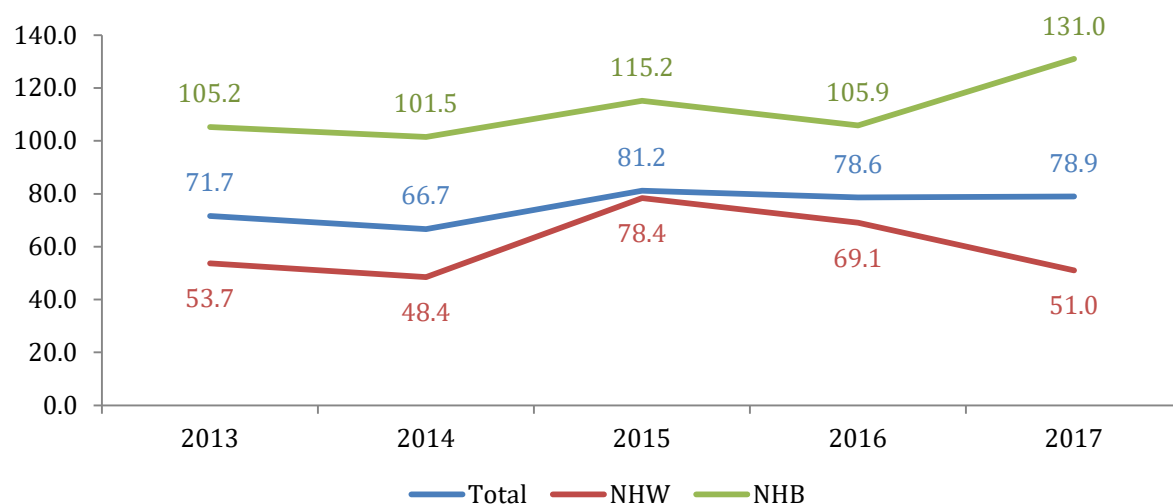
Figure 5. Mortality Rates per 100,000 Children Aged 0-17, Davidson County, Tennessee, and the US, 2013-2017



Data Sources: Vital records provided by Tennessee Department of Health; Population based on American Community Survey 1-year estimates; Tennessee and US rates from CDC Wonder.

Racial and ethnic disparities in childhood mortality in Davidson County were persistent and increasing during the 5 years from 2013 to 2017 (Figure 6). For NHW children, there was a notable spike in mortality rates in 2015; however, the rate in 2017 reduced to the 2013 level. In contrast, the rate for NHB children in 2017 increased 24.5% when compared to the rate in 2013. Additionally, the NHB child mortality rate increased from a level that was 1.5 times higher than that for NHW children in 2013, to a level that was 2.6 times higher in 2017. These contrasting trends indicate a growing disparity in childhood mortality in Davidson County during the 2013-2017 period.

Figure 6. Mortality Rates per 100,000 Children Aged 0-17 Years by Race/Ethnicity, Davidson County, TN, 2013-2017



Data Sources: Vital records provided by Tennessee Department of Health; Population based on American Community Survey 1-year estimates; Hispanic rates not included due to small numbers.

Manner of Death

Manner of death is a way of categorizing deaths based on the circumstances under which a death occurred. This is assigned by either the physician certifying the death or the medical examiner conducting the autopsy. Each death is classified as one of the following manners: Natural, Accident, Homicide, Suicide, or Undetermined.

Of the 195 deaths reviewed in 2016 and 2017, the manner of 114 deaths (58.5%) was classified as natural and 29 deaths (14.9%) were identified as accidental. The manner of death was determined to be homicide for 20 deaths (10.3%) and suicide for 12 deaths (6.2%), respectively. When data were stratified by sex, age, and race/ethnicity, natural causes remained the leading manner of death in every subgroup, except for teens aged 15 to 17 among whom homicide and suicide were the leading manners of death, each accounting for 30% of all reviewed deaths (Table 2).

Table 2. Number of Reviewed Deaths by Manner of Death among Children Aged 0-17 Years, Davidson County, TN, 2016-2017

Manner of Death						
	Natural (n=114)	Accident (n=29)	Suicide (n=12)	Homicide (n=20)	Undetermined (n=20)	Total (n=195)
Age Group						
<1 yr	82	15	0	2	16	115
1-4 yrs	10	5	0	2	3	20
5-9 yrs	8	1	0	2	1	12
10-14 yrs	8	2	3	5	0	18
15-17 yrs	6	6	9	9	0	30
Race/Ethnicity						
NHB	49	13	2	14	10	88
NHW	38	9	7	3	8	65
Asian	4	1	0	0	1	6
Hispanic	23	6	3	3	1	36
Sex						
Male	75	18	8	13	9	123
Female	39	11	4	7	11	72
Data Source: MPH.D, Child Fatality Review Database System						

Data Source: MPHD, Child Fatality Review Database System

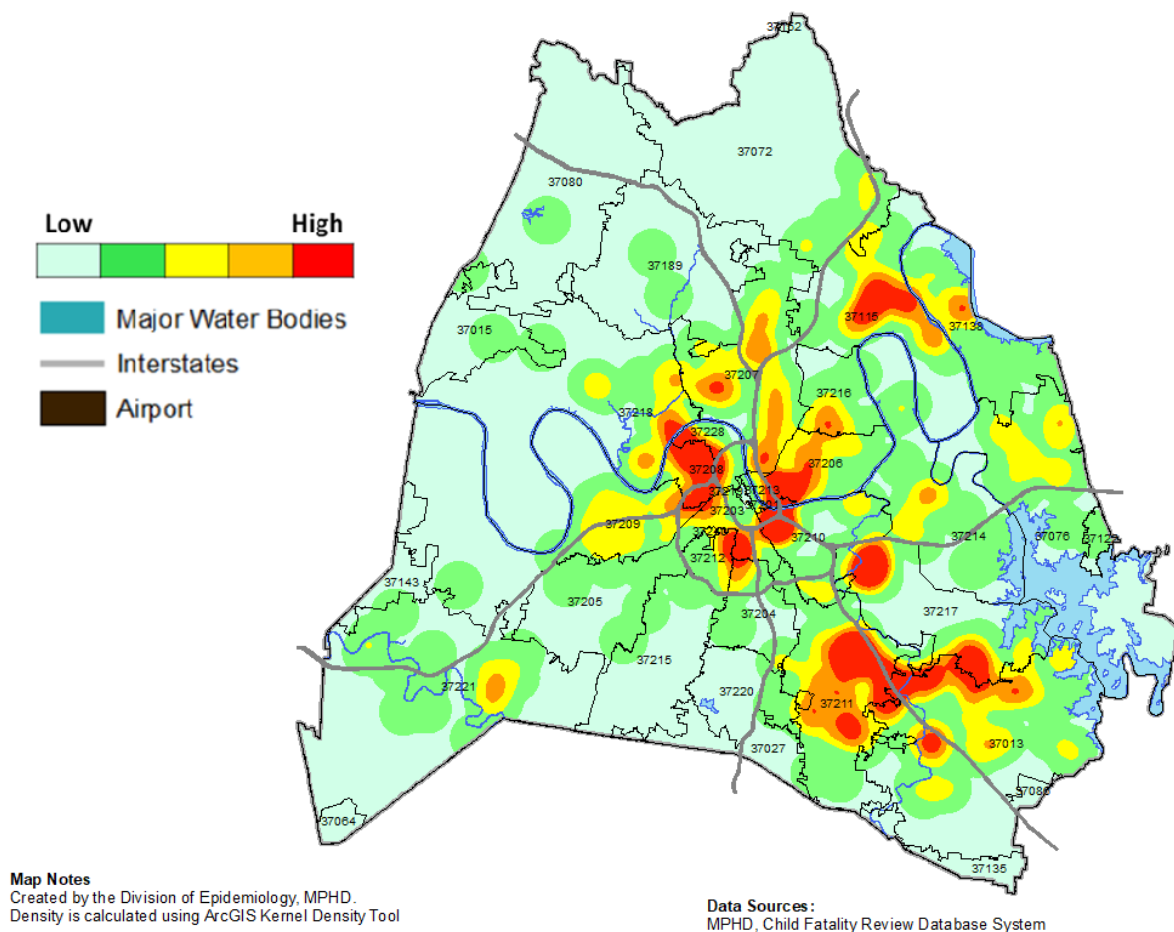
As shown in Table 2, there were marked differences in the demographic distribution of child fatalities by manners of death. While infants accounted for the highest percentage of accidental deaths (15 of 29 deaths, 51.7%), teens aged 15 to 17 years contributed the highest percentage to suicide (9 of 12 deaths, 75%) and homicide deaths (9 of 20 deaths, 45%). Except for deaths due to suicide, NHB children consistently had the highest number of deaths when compared to other racial/ethnic groups irrespective of the manner of death.

Deaths classified as undetermined are ones in which the cause and manner of death is unknown after a thorough autopsy and extensive investigation. These deaths accounted for 10.3% of all deaths reviewed in 2016 and 2017. Infants comprised the greatest number of deaths with an undetermined manner (16 of 20 deaths, 80%), most of which were related to unsafe sleeping environments (14 of 16 deaths, 87.5%; data not shown).

Geographic Distribution of Child Mortality

The burden of child mortality is not uniformly distributed across the county. Figure 7 displays the incident density of child fatalities in Davidson County based on 5-year aggregate data from 2013 to 2017. Areas with the highest concentrations of child deaths are shaded in red, while those with the lowest are shaded in light green. As the map indicates, areas with the highest density of child mortality were located in the center and southeast parts of the county. In addition, another smaller area with high density of child mortality is found in the northeastern part of the county.

Figure 7. Map of Incident Density of Child Deaths According to Resident Address at the Time of Death, Davidson County, TN, 2013-2017



Infant Mortality

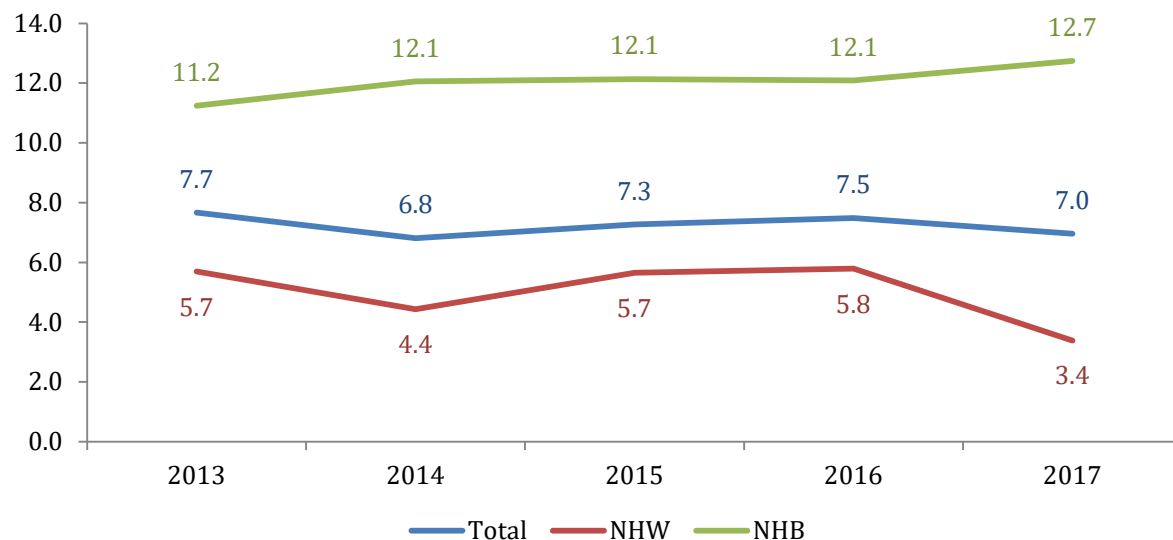
Overall Infant Mortality

The CDRT reviewed 59 infant deaths in 2016 and 56 infant deaths in 2017, totaling 115 infant deaths, which accounted for 59% of all deaths reviewed in these 2 years. As presented in Figure 2, the infant mortality rate in Davidson County was 7.0 per 1,000 live births in 2017, which showed a small reduction when compared to the rate of 7.5 per 1,000 live births in 2016.

From 2013 to 2017, infant mortality rates in Davidson County were fairly stable and similar to the rates for the state of Tennessee, but the rates consistently exceeded the national rates during this 5-year period. In 2017, for example, Davidson County's rate was 20.7% higher than the national rate (Figure 2, page 12).

As shown in Figure 8, between 2013 and 2017, racial and ethnic disparities in infant mortality persisted and tended to increase, similar to the trend in disparities for overall child mortality as described earlier. During this period, the infant mortality rate for NHB infants increased 13.4% (from 11.2 to 12.7 per 1,000 live births), while the rate for NHW infants decreased 40.4% (from 5.7 to 3.4 per 1,000 live births). As a result, the NHB infant mortality rate increased from a level that was 2.0 times higher than that for NHW infants in 2013, to a level that was 3.7 times higher in 2017.

Figure 8. Infant Mortality Rates per 1,000 Live Births by Race/Ethnicity, Davidson County, TN, 2013-2017



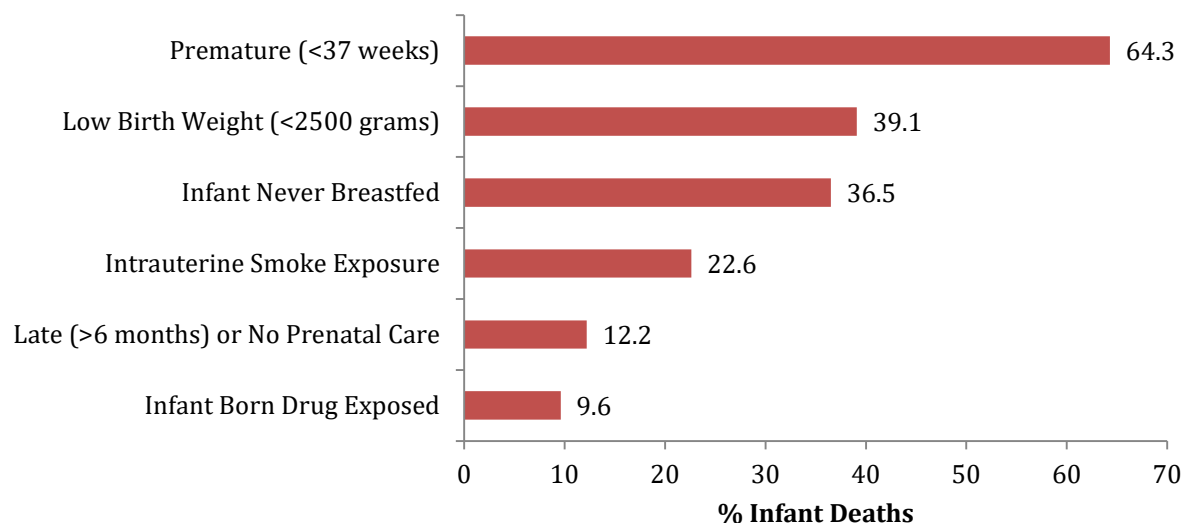
Data Sources: Vital records provided by Tennessee Department of Health. Hispanic rates not included due to small numbers.

Factors Associated with Infant Deaths

It is well established that infant vitality is influenced by a range of factors such as maternal health and behaviors, maternal substance use (e.g., smoking, drug abuse), access to pre- and post-natal care, issues related to labor and delivery, and housing conditions. This section of the report presents data on factors associated with infant deaths based on information obtained from CDRT reviews, irrespective of the cause and manner of death.

As shown in Figure 9, prematurity and low birth weight were the predominant risk factors, which occurred in 64.3% and 39.1% of the total reviewed infant deaths, respectively. In comparison, among all infants born in Davidson County during 2016 and 2017, 10.4% were preterm and 8.7% were low birth weight. Additionally, 22.6% of reviewed infant deaths were associated with intrauterine smoke exposure (Davidson County overall, 6.3%), and 9.6% were born drug-exposed (overall data not available). Having late or no prenatal care was noted among 12.2% of mothers with infant deaths, which was higher than the percentage of mothers in Davidson County overall who have late or no prenatal care access (7.6%). Also, 36.5% of infants who died in 2016 and 2017 were never breastfed, compared to 7.9% of all infants born in Davidson County during the same period.

Figure 9. Risk Factors Associated with Infant Deaths, All Causes, Davidson County, TN, 2016-2017



Data Source: MPHD, Child Fatality Review Database System

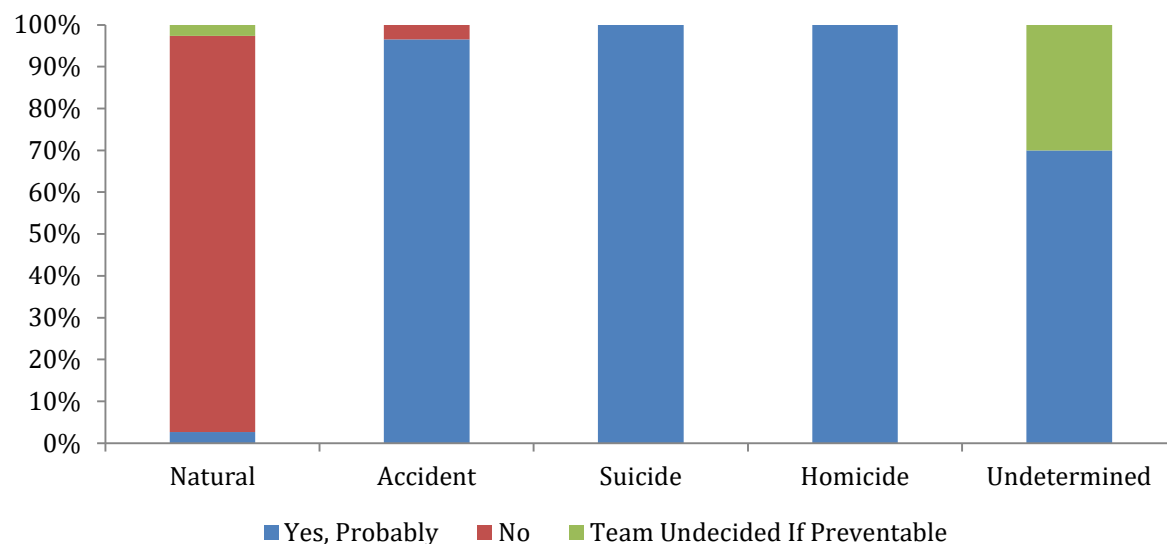
Approximately a quarter (24.3%) of total infant deaths in 2016 and 2017 in Davidson County were sleep-related (2016: 15 deaths; 2017: 13 deaths). These deaths were primarily due to exposure to risk factors in the sleeping environment such as co-sleeping and sleeping in soft bedding. Practicing safe sleep habits for infants should be a key component of future interventions to reduce infant mortality. A more detailed examination of sleep-related infant deaths is provided later in this report.

Preventability

The CDRT carefully reviewed each death in order to determine if the death was preventable. A death is deemed preventable if an individual or a community could have identified and modified risk factors and reasonably changed the circumstances leading to death.

The CDRT determined that 77 (39.5%) of the total 195 deaths reviewed in 2016 and 2017 were probably preventable (2016: 41 deaths; 2017: 36 deaths). Figure 10 displays the proportion of preventable deaths by manner of death. Most preventable deaths were injury-related such as suicides, homicides, motor vehicle crashes, fires, poisonings, and drownings. Additionally, sleep-related infant deaths are also regarded as preventable, for which the manner of death is often classified as accidental or undetermined.

Figure 10. Reviewed Child Deaths by Manner of Death and Preventability, Davidson County, TN, 2016-2017



Data Source: MPHD, Child Fatality Review Database System

Detailed Review of Deaths by Manner and Cause

As stated previously in this report, certifying physicians or medical examiners classify deaths into 1 of 5 manners of death: natural, accident, homicide, suicide, or undetermined. The frequency distribution of deaths by manner is discussed earlier in this report (Figure 3, Table 2). The following sections describe the specific causes of death within each manner.

Deaths Due to Natural Causes

A total of 114 deaths reviewed by the CDRT in 2016 and 2017 were due to natural causes (2016: 58 deaths; 2017: 56 deaths). As shown in Table 3, 71.9% of those deaths occurred to infants. The majority (65.8%) were males. NHB children accounted for the highest percentage (43%) of deaths by natural causes when compared to other race/ethnic groups. The leading causes of deaths were prematurity (45 deaths, 39.5%) and congenital anomalies (36 deaths, 31.6%), although these two conditions only occurred to infants under one year of age. Cancers contributed 8.8% (10 deaths). Other conditions (23 deaths) contributed 20.2% and included neurological conditions (3.5%), infections (3.5%), and asthma (1.8%).

Table 3. Number of Reviewed Deaths Due to Natural Causes by Specific Cause, Summary for Children Aged 0-17 Years, Davidson County, TN, 2016-2017

Natural Causes of Death						
	Total (n=114)	% of Reviewed Deaths	Congenital Anomaly (n=36)	Prematurity (n=45)	Cancer (n=10)	Other Causes (n=23)
Age Group						
<1 yr	82	71.9	30	45	1	6
1-4 yrs	10	8.8	2	0	3	5
5-9 yrs	8	7.0	1	0	5	2
10-14 yrs	8	7.0	1	0	1	6
15-17 yrs	6	5.3	2	0	0	4
Race/Ethnicity						
NHB	49	43.0	7	24	3	15
NHW	38	33.3	14	14	6	4
Asian	4	3.5	4	0	0	0
Hispanic	23	20.2	11	7	1	4
Sex						
Male	75	65.8	25	29	7	14
Female	39	34.2	11	16	3	9

Data Source: MPHD; Child Fatality Review Database System

Deaths Due to Unintentional Injuries

The CDRT identified 29 deaths due to unintentional injury in 2016 and 2017 (2016: 19; 2017: 10), representing 14.9% of the total reviewed deaths. The leading causes of deaths due to unintentional injury were suffocation (14 deaths, 48.3%), followed by drowning (5 deaths, 17.2%), and motor vehicle crashes (4 deaths, 13.8%) (Table 4). The remaining 20.7% (6 deaths) resulted from fire, poisoning, environmental exposure, and other accidents. Male children (18 deaths, 62.1%), infants under 1 year of age (15 deaths, 51.7%), and NHB children (13 deaths, 44.8%) had the highest percentages of unintentional injury-related deaths compared to other subgroups.

Table 4. Number of Reviewed Deaths Due to Unintentional Injury by Cause, Summary for Children Aged 0-17 Years, Davidson County, TN, 2016-2017

Deaths Due to Unintentional Injury						
	Total (n=29)	% of Reviewed Deaths	Suffocation (n=14)	Drowning (n=5)	Motor Vehicle (n=4)	Other Causes (n=6)
Age Group						
<1 yr	15	51.7	13	0	1	1
1-4 yrs	5	17.2	1	1	1	2
5-9 yrs	1	3.4	0	0	0	1
10-14 yrs	2	6.9	0	1	0	1
15-17 yrs	6	20.7	0	3	2	1
Race/Ethnicity						
NHB	13	44.8	9	2	1	1
NHW	9	31.0	3	2	1	3
Asian	1	3.4	0	0	1	0
Hispanic	6	20.7	2	1	1	2
Sex						
Male	18	62.1	9	4	2	3
Female	11	37.9	5	1	2	3

Data Source: MPHD; Child Fatality Review Database System

Motor Vehicle

There were 4 motor vehicle accidents involving children 0-17 years. Of these deaths, the child was driving the car in 1 incident, was the passenger in 2 incidents, and was a pedestrian in 1 incident. A detailed review of incident records indicated that incorrect use of a child safety seat, speeding, driver inexperience, poor line of sight, racing, failure to yield, and poor weather conditions were cited as factors contributing to the accidents. Driving without a license or driving on a suspended license was cited in 2 incidents.

Drowning

Of the 5 drowning deaths reviewed, 2 occurred in lakes, 2 in swimming pools, and 1 in a bathtub. Analysis of the deaths occurring in lakes and swimming pools revealed that none of the children were using flotation devices even though none of them were reportedly able to swim. One of the children who drowned in a lake was positive for marijuana. In 1 of the pool incidents, the child was not properly supervised.

Suffocation

The CDRT reviewed 14 child deaths due to accidental suffocation in 2016 through 2017. Thirteen of these deaths were sleep-related and are discussed in a later section of this report. The remaining case resulted from mechanical asphyxia.

Fire

The CDRT reviewed 2 fire-related deaths involving children 0-17 in 2016 and 2017. Both deaths resulted from a residential fire started by an overloaded electrical outlet. It was noted that, in both cases, the home was equipped with working smoke detectors.

Poisoning

One death was due to poisoning occurring in a child who experimented with a drug. The parents were noted to have a drug history, and 1 parent was incarcerated at the time of the incident. Additionally, the child was noted to have issues in school, but had not received any services.

Exposure

One child died of heat exposure after extended strenuous physical exertion in 93°F weather conditions.

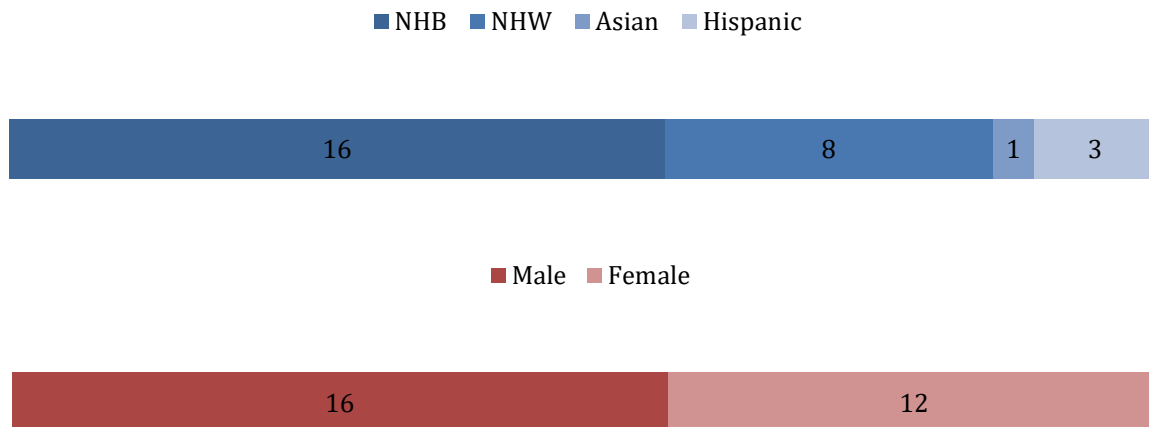
Other Accidents

One child died of a seizure disorder that resulted from an accidental fall earlier in life. A second child died of complications due to prematurity in a motor vehicle crash.

Infant Deaths Due to Sleep-Related Factors

Of the 115 infant deaths reviewed by the CDRT in 2016 and 2017, 28 (24.3%) were determined to be sleep-related (2016: 15 deaths; 2017: 13 deaths). Of these 28 deaths, over half (16 deaths) occurred to NHB infants, and 8 deaths occurred to NHW infants. The majority (16 deaths) occurred to male children (Figure 11).

Figure 11. Demographic Distribution of Sleep-Related Infant Deaths, Davidson County, TN, 2016-2017



Data Source: MPHD, Child Fatality Review Database System

Table 5 displays the frequency of selected sleep-related factors that contributed to the deaths. **In nearly all (96.4%) of the sleep-related deaths, the infants were placed to sleep in unsafe bedding**, and 78.6% of these deaths occurred when the child was sleeping somewhere other than a crib or bassinette. The most frequent place where infants were laid to sleep was the adult bed (67.9%; data not shown). However, a crib was present in the home in 53.6% of cases. In 35.7% of cases, the home was overcrowded, which may hinder adequate space being available for a crib or pack-n-play placement.

Table 5. Selected Factors Involved in Sleep-Related Infant Deaths, Davidson County, TN, 2016-2017

Factors Involved in Sleep-Related Infant Deaths		
	Total (n=28)	% of Reviewed Deaths
Sleeping in unsafe bedding	27	96.4
Not in a crib or bassinette	22	78.6
Not sleeping on the back	16	57.1
Sleeping with other people	16	57.1
Crib present in the home	15	53.6
Exposed to second-hand smoke	15	53.6
Residence overcrowded	10	35.7
Supervising adult was drug-impaired	5	17.9

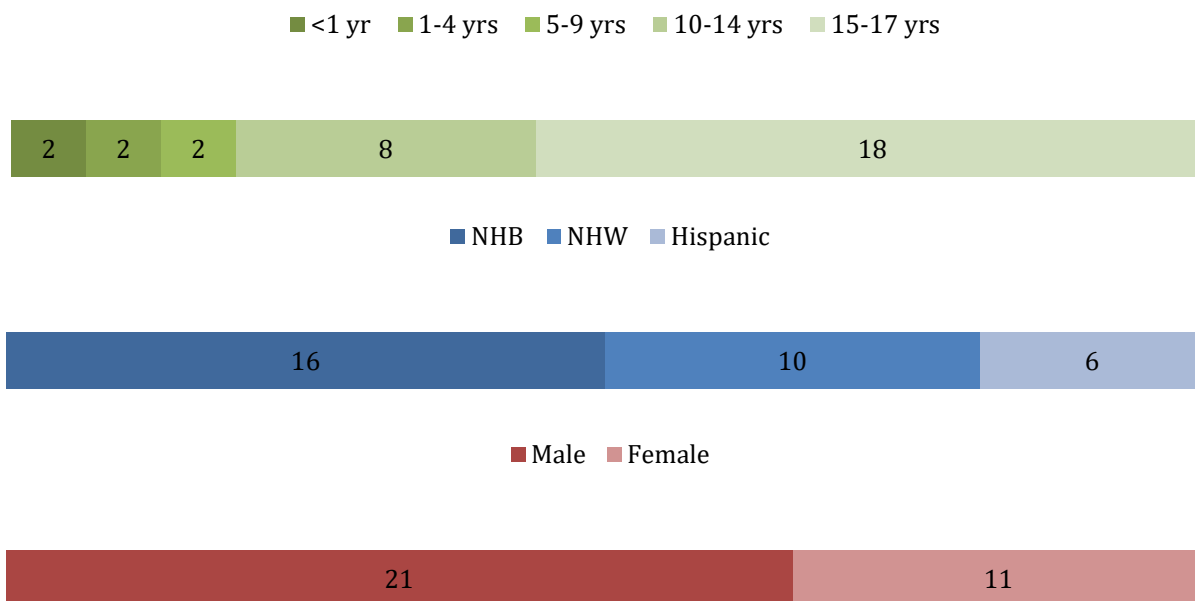
Categories are not mutually exclusive
Data Source: MPHD; Child Fatality Review Database System

Additionally, 57.1% of infants were not sleeping on their backs, and an equal percentage were sleeping with other people at the time of death. Approximately 17.9% of infants were under the care of a drug-impaired adult at the time of death. Over half (53.6%) of the reviewed infants were often or regularly exposed to second-hand smoke in the home.

Deaths Due to Violence—Homicides and Suicides

The CDRT identified 32 deaths that occurred to children in Davidson County in 2016 and 2017 (2016: 10 deaths; 2017: 22 deaths) as the result of violence. These represented 16.4% of all deaths reviewed in this 2 year period. Over half of the violence-related deaths occurred to teens aged 15 to 17 years (18 deaths). Most of the deaths occurred to males (21 deaths), and half of the deaths occurred to NHB children (16 deaths) (Figure 12). Violence-related deaths fall into two categories, homicides and suicides, which are described in detail below. A single death may have multiple contributing factors; therefore, the categories are not mutually exclusive.

Figure 12. Demographic Distribution of Violent Deaths for Children Aged 0-17, Davidson County, TN, 2016-2017



Data Source: MPHD, Child Fatality Review Database System

Homicides

In 2016 and 2017, 20 deaths were due to homicide, representing 62.5% of deaths due to violence and 10.3% of all reviewed deaths. The majority of these deaths occurred to NHB (14 deaths), and males (13 deaths). Nearly half (9 deaths) occurred to youth aged 15 to 17 years.

Firearms were used in 13 incidents, physical violence in 4 incidents, fire in 2 incidents, and strangulation in 1 incident. Motives for the homicides included arguments (5 deaths), gang-related activity (4 incidents), playing with the weapon (3 incidents), and jealousy (1 incident). Two deaths resulted from drive-by shootings, 1 death occurred during random violence, and in 1 incident the victim was an innocent bystander. In 5 incidents the detailed

review indicated that the perpetrator of the homicide had a history of previous weapon offenses.

Most of the homicides were committed by someone known to the victim. Acquaintances were cited most frequently (7 incidents), followed by the biological parent (5 incidents), friends of the victim (4 incidents), rival gang members (2 incidents), the parent's partner (1 incident), and other relatives (1 incident). Strangers to the victim were cited in 3 incidents.

Weapon use was commonly noted to occur during the commission of another crime (14 incidents). The most frequently cited crimes were robbery, interpersonal violence, and gang conflict (4 incidents each). Additional crimes included arson (2 incidents), drug trafficking (2 incidents), and sexual assault (1 incident).

Detailed reviews indicated that the victims were often experiencing 1 or more behavioral or school-related issues prior to death. The victim was noted to have problems in school in 12 deaths. Behavioral issues were mentioned most frequently (10 incidents) followed by suspension (11 incidents), truancy (8 incidents), and academic issues (5 incidents). In 2 incidents the victim had a history of expulsion from school. Additional issues cited included substance abuse (8 incidents), a history of child maltreatment (8 incidents), a history of criminal or delinquent activity (6 incidents), and juvenile detention (2 incidents).

In 12 (60%) of the 20 homicide deaths, the victims and/or their families were receiving services from public agencies prior to death: 8 had received mental health services, and DCS was noted to be involved with 4 families (e.g. investigating allegations of child abuse and neglect, providing foster-care or family preservation services, or ensuring child safety).

Suicides

There were 12 deaths involving children 0-17 years that were due to suicide in 2016 and 2017 (2016: 8 deaths; 2017: 4 deaths), representing 37.5% of all deaths due to violence and 6.2% of all deaths reviewed. The majority of suicide deaths occurred to teens aged 15 to 17 years (9 deaths), NHW (7 deaths), and males (8 deaths).

Firearms were the most common method of suicide (5 deaths), followed by strangulation (4 deaths), poisoning (2 deaths), and use of a motor vehicle (1 death). Most of the victims had talked about suicide prior to death (7 deaths), while 4 victims had a history of prior suicide threats, and 2 had attempted suicide previously. Additionally, in 5 deaths, the victim had a history of self-mutilation. Family and friends reported that the suicide was completely unexpected in 5 deaths.

Possible motives for the suicide varied, but break-up with a significant other was cited most frequently (4 incidents). Other motives included family discord (3 incidents), bullying (3 incidents), parental divorce (2 incidents), problems with the law (2 incidents), and an argument with a parent (1 incident). A detailed review indicated that some of the suicide victims had also been victims of physical or sexual abuse.

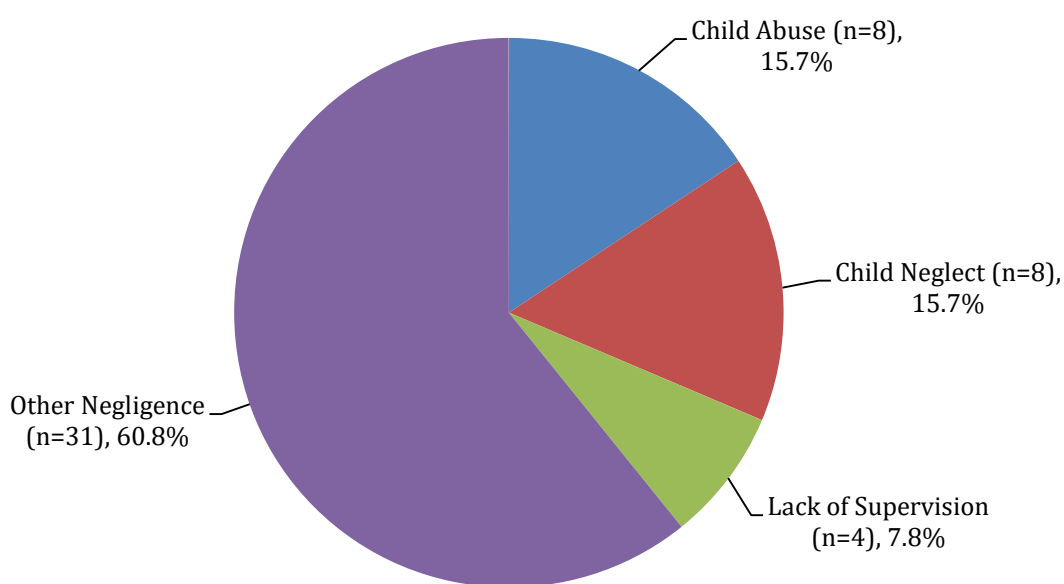
Similar to homicide victims, suicide victims were noted to have problems in school prior to death. Truancy was noted most frequently (7 incidents), followed by behavioral issues (4 incidents), suspension from school (3 incidents), and academic issues (1 incident). The victim had previously been expelled from school in 1 incident. Additional issues cited included substance abuse (4 incidents), homelessness (1 incident), a history of running away (1 incident), a history of child maltreatment (1 incident), and a history of delinquency (1 incident).

In all 12 suicide deaths, the victims and their families were receiving services provided by public agencies: 10 had received mental health services, and DCS was noted to be involved with 2 families prior to the death of the child.

Child Abuse and Neglect

In reviewing child deaths occurring in 2016 and 2017, the CDRT found 51 deaths (26.2%) having some evidence of abuse, neglect, or some other form of negligence. Of those deaths, 15.7% involved child abuse, 15.7% involved child neglect, 7.8% involved a lack of proper supervision for the child, and 60.8% involved other negligence such as having an unsecured firearm in the home or placing an infant to sleep in unsafe bedding (Figure 13).

Figure 13. Percentage of Deaths with Evidence of Maltreatment by Type, Davidson County, TN, 2016-2017



Data Source: MPHD, Child Fatality Review Database System

Table 6 displays the demographic information for reviewed deaths associated with child abuse, child neglect, lack of supervision, or other negligence. The majority of these deaths occurred to infants (70.6%), NHB (58.8%), and males (62.7%).

Table 6. Number of Reviewed Deaths with Evidence of Child Maltreatment among Children Aged 0-17 Years, Davidson County, TN, 2016-2017

Deaths with Evidence of Maltreatment (n=51)		
	Total	% of Reviewed Deaths
Age Group		
<1 yr	36	70.6
1-4 yrs	8	15.7
5-9 yrs	2	3.9
10-14 yrs	4	7.8
15-17 yrs	1	2.0
Race/Ethnicity		
NHB	30	58.8
NHW	15	29.4
Asian	0	0.0
Hispanic	6	11.8
Sex		
Male	32	62.7
Female	19	37.3

Data Source: MPHD, Child Fatality Review Database System

In nearly 71% of the deaths, the perpetrator of the abuse, neglect, or negligence was one of the child's biological parents. Other perpetrators cited included the child's primary caregiver (9.8%), the child's supervisor at the time of death (9.8%), and friends or acquaintances (7.8%). In 11.8% of the deaths, the caregiver of the child at the time of death was drug-impaired. DCS was involved with the family prior to death in 29.4% of the deaths (Data not shown).

Conclusion

The CDRT strives to understand both the magnitude and the causes of death among Davidson County's children in order to identify strategies and systems changes that might help prevent future tragic outcomes. The data contained in this report highlights several key areas that warrant further attention and indicate a need for the community to prioritize childhood mortality as a strategic focus. For example, the child mortality rate in Davidson County was almost unchanged since 2015 and was consistently higher than the rate for the State of Tennessee and the nation. Additionally, disparities in overall child mortality and infant mortality between NHB and NHW children increased over time. Lastly, over a third of total reviewed deaths were determined to be preventable, including approximately a quarter of all infant deaths related to unsafe sleep environments or practices.

Reviews have also identified key areas for future interventions to reduce the number of preventable deaths. These include, but are not limited to, efforts to increase first-trimester prenatal care utilization, interventions to increase the utilization of safe sleep practices among infants, and support of programs, policies, and practices in the community aimed at reducing violent deaths.

Technical Notes

Data Sources

The data presented in this report are compiled from many different sources and as such, errors in the data are more readily identified and corrected through the review process. For this reason, the data presented in this report might differ from data published from other sources.

Data from reviews are abstracted into a standard data collection form and entered into a database hosted by The National Center for Fatality Review and Prevention.

National and State level comparison data are from the National Vital Statistics System Database, CDC WONDER, and reports from the Tennessee Child Fatality Review Team.

Childhood and infant mortality rates were calculated from the Davidson County vital records files; those estimates include deaths excluded from CDRT review. Population estimates are from the American Community Survey; single-year estimates are used to calculate child mortality rates where appropriate. Infant mortality rates are calculated from the total number of infant deaths divided by the total number of live births.

Data Limitations

The indicators in this report are based on county-level data, and as such the numbers can be small. Rates based on counts less than 20 are considered unstable and should be interpreted with caution; percentages or rates may change drastically from year to year.

Data Interpretation

Death is the final outcome of a continuum of circumstances, and the data collected by the CDRT represents this extreme. Therefore, caution should be used when extrapolating these results to the general population. However, the data collected by the CDRT illustrates areas where the systems, policies, and practices of a community fail to adequately protect children. As such, this information provides valuable evidence to promote and advocate for systems change.

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Appendix

Appendix 1. Organizations and Agencies Serving on the Child Death Review Team

Participating Organizations	
Metro Public Health Department	Monroe Carrell Jr. Children's Hospital at Vanderbilt
Metro Nashville Police Department	Vanderbilt University Medical Center
Metro Nashville Public Schools	St. Thomas Midtown Hospital
Metro Office of Family Safety	TriStar Centennial Medical Center
Office of the District Attorney Nashville	Metro Nashville General Hospital
Juvenile Court of Metropolitan Nashville and Davidson County	Children's Clinic East
Nashville Fire Department	Mednax
Davidson County Medical Examiner's Office	Nurses for Newborns
Department of Children's Services	Prevent Child Abuse Tennessee
Tennessee Suicide Prevention Network	Child Protective Investigative Team