

# **Childhood Injury Deaths in Baltimore City 2002-2006**

A Report from the Office of Epidemiology and Planning  
Baltimore City Health Department

Prepared for the Baltimore City Child Fatality Review Team

February 7, 2008

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### ***Child Fatality Review Team***

Since 2001, the Baltimore City Health Department has chaired a coalition of city and state agencies called the Child Fatality Review (CFR). This multi-disciplinary team meets once a month to discuss preventable deaths of Baltimore City children younger than 18 years old. Through these case-by-case reviews, the CFR identifies factors that contributed to these deaths and develops recommendations for preventing similar deaths in the future. The Maryland Child Fatality Review Team oversees the CFR teams in local jurisdictions, including Baltimore City.

Baltimore City's CFR team members represent many city agencies including: Baltimore City Health Department, Office of the Chief Medical Examiner, Baltimore City Police Department, Baltimore City Fire Department, Baltimore City Department of Social Services, Department of Juvenile Services; State's Attorney Office, and Baltimore City Public School System. The team also includes experts in child health advocacy.

### ***About the Office of Epidemiology and Planning***

This is a new office at the Baltimore City Health Department responsible for overseeing collection and analysis of data to assist with program planning and evaluation and policy development. It is led by Caroline Fichtenberg, a Ph.D. epidemiologist with a joint appointment at the Johns Hopkins Bloomberg School of Public Health. The office reports to the Commissioner of Health.

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## Executive Summary

Injuries are the leading cause of death among children nationwide. Many, if not all of those deaths are preventable. Using data from the Office of the Chief Medical Examiner (OCME) and the Maryland Department of Health and Mental Hygiene's Vital Statistics Administration, this report takes a retrospective look at injury deaths among Baltimore City children aged 1 to 17 from 2002 through 2006.

- **On average, 46 children aged 1 to 17 died from injuries in Baltimore City each year from 2002 to 2006.** The number of deaths ranged from 24 to 64 per year.
- **Children were twice as likely to die in Baltimore as in Maryland or the nation as a whole.** The rate of injuries among children aged 1 to 17 in Baltimore from 2002-2006 was 30.7 per 100,000 children as compared to 14.4 per 100,000 children in Maryland and 14.7 per 100,000 children in the nation as a whole.
- **The majority of injury deaths in children were due to homicides.** From 2002-2006, 59% of deaths among children aged 1 to 17 in Baltimore were due to homicides; while 35% were due to accidents, 4% to suicides, and 2% were of undetermined intent.
- **Motor vehicle-related accidents accounted for almost 40% of accidental child injury deaths.** The next most common cause of accidental child injury death in Baltimore City was thermal injuries sustained in residential fires (27% of accidental child injury deaths).
- **Baltimore children were more than eight times as likely to die from homicide and more than four times as likely to die from residential fires as children nationwide, but a third less likely to die from motor-vehicle related accidents.** Comparing Baltimore to the US as whole, the child homicide rate was 18.1 per 100,000 children as compared to 2.2 per 100,000; the rate of child residential fire deaths was 2.9 per 100,000 as compared to 0.7 per 100,000; and the rate of motor vehicle-related deaths was 4.3 per 100,000 as compared to 6.4 per 100,000.
- **The child injury death rate in Baltimore City declined 29% from 2002 to 2006.** Accidental injury deaths dropped by 52% from 2002 to 2006. Child homicide rates declined by 25% from 2002 to 2006, with a particularly pronounced decline in 2005 followed by an increase in 2006.
- **Older, African American, and male children were more likely to die of injuries in Baltimore in 2002-2006.** Children in the 16-17 year age group had a death rate of 107.4 per 100,000 children; a rate 3 times higher than the age group with the next highest rate of injury deaths (13-15 year olds). African American children were more than twice as likely to die of injuries compared to other children, largely because they were more likely to be victims of homicide. Male children were more than three times more likely to die of injuries than female children. Male injury fatality rates exceeded female rates for all manners of injury.

## **Introduction**

Injuries are the leading cause of death among children in the United States. Many, if not all, of these deaths are preventable. This report from the CFR team takes a retrospective look at injury deaths among Baltimore City children aged 1 to 17 from 2002 through 2006. It examines the causes of these deaths and the demographic characteristics of the victims, presents trends over the past five years, and compares Baltimore City rates to state and national rates.

## **Methods**

Data for this analysis comes from reports on child injury deaths completed by the Office of the Chief Medical Examiner (OCME) and from death certificates maintained by the Baltimore City Health Department. These data were reconciled with information from the Maryland Department of Health and Mental Hygiene's Vital Statistics Administration.

Only injury deaths among children aged 1 to 17 living in Baltimore City were included in this analysis. Deaths were considered to be injury deaths if they included an International Classification of Disease Code consistent with intentional or unintentional injury (see Technical Appendix for details). Injury deaths were further subdivided by manner of death: accidents, homicide, suicide, or undetermined.

Injury death rates were calculated for Baltimore City as a whole, and for the gender, race/ethnicity, and age subgroups using population estimates from the National Center for Health Statistics. These rates were aggregated to the census tract level and mapped using ArcGIS software.

Rates for Maryland and the US were obtained from the Web-based Injury Statistics Query and Reporting System (WISQARS), which is maintained by the National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention (CDC). (See Technical Appendix for details).

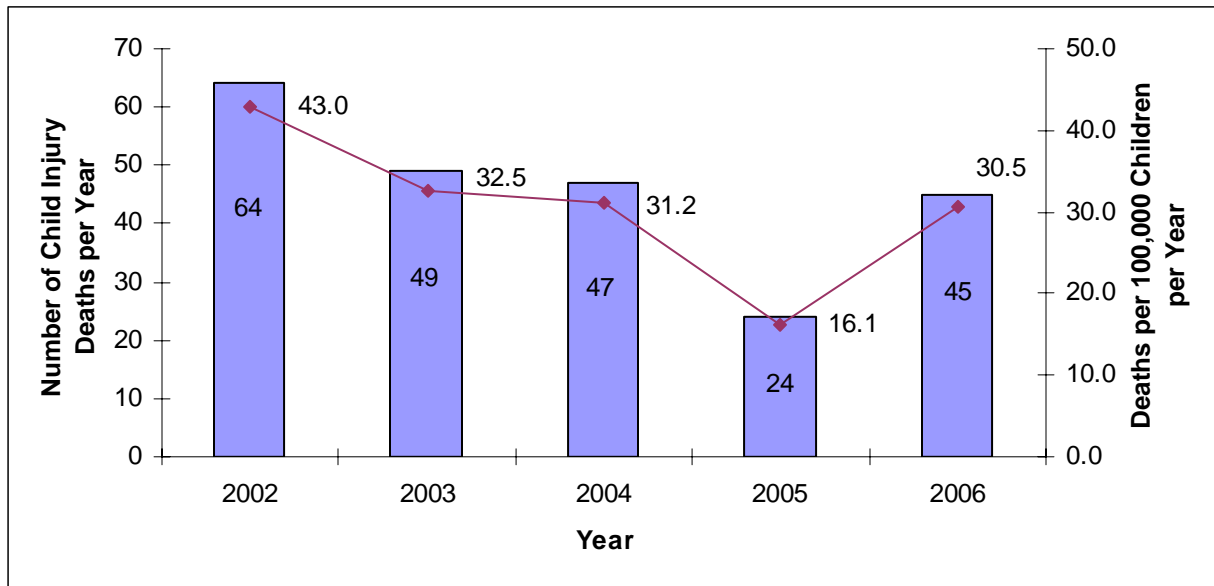
## **Results**

### ***Trends in childhood injuries over time***

Between 2002 and 2006 a total of 229 children aged 1-17 died in Baltimore of intentional or unintentional injuries, for an average of 46 deaths per year. This corresponds to an injury death rate of 30.7 per 100,000 children.

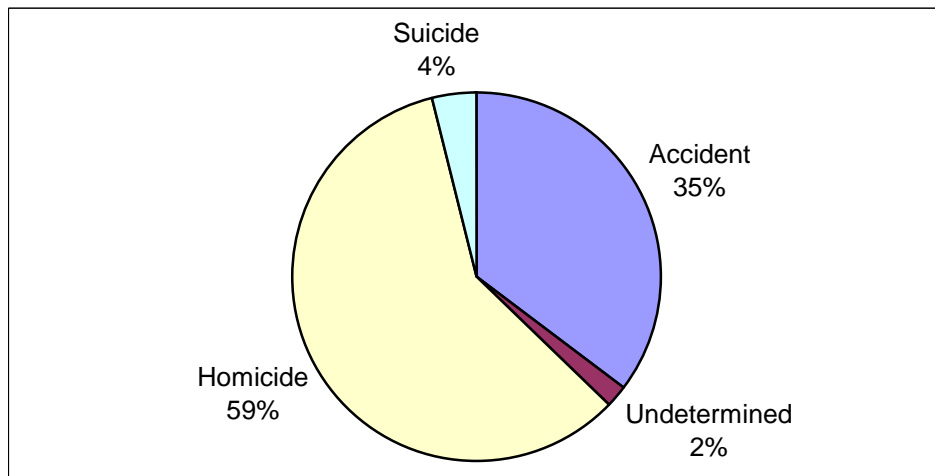
The injury death rate declined 29% from 2002-2006: from 43.0 deaths per 100,000 children in 2002 to 30.5 deaths in 2006 (Figure 1).

**Figure 1. Injury Death Rates among Children (1-17 years), Baltimore City, 2002-2006**



***Manner of child injury deaths***

Homicides were by far the most common type of fatal injury among Baltimore City children during the study period, accounting for 59% of the injury deaths. Accidents (including but not limited to motor vehicle accidents) accounted for 35% of the injury deaths, 4 % were suicides, and 2% were deaths of undetermined manner (Figure 2).

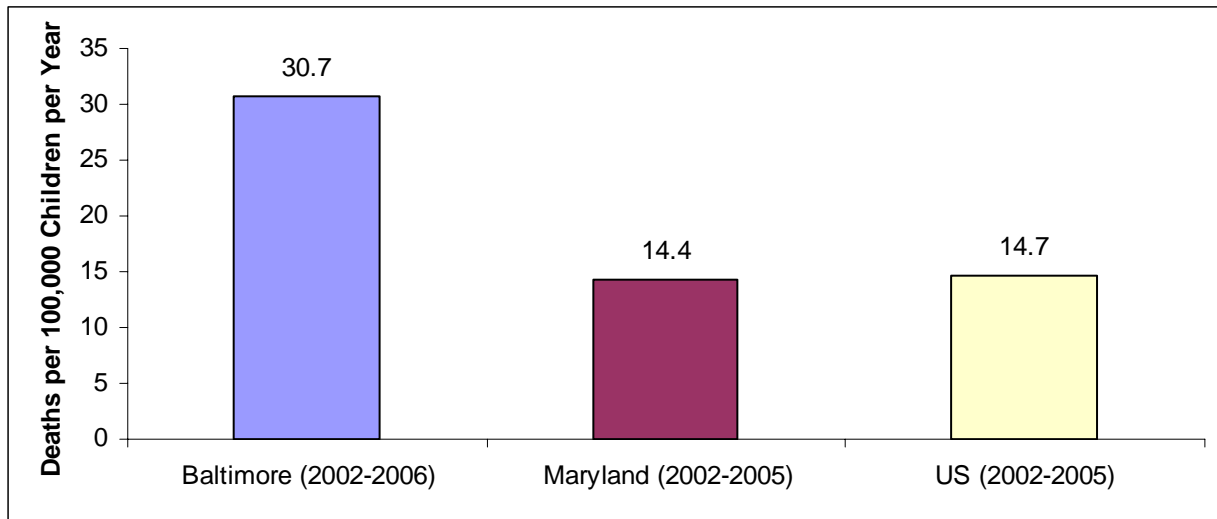


**Figure 2. Percent of Injury Deaths due to Homicide, Accident, Suicide, or Injury of an Undetermined Manner among Baltimore City Children (1-17 years), 2002-2006**

***Comparisons to Maryland and the US***

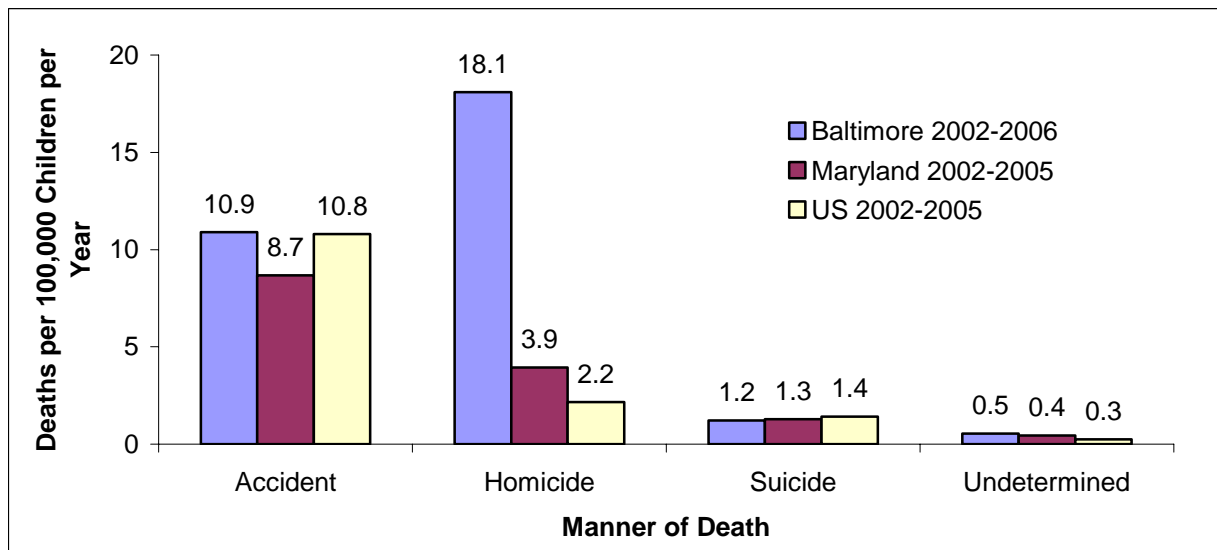
In this time period, Baltimore City children aged 1 to 17 years suffered fatal injuries about twice as frequently as in Maryland or the United States as a whole (Figure 3).

**Figure 3. Child Injury Death Rates in Baltimore City, Maryland and the United States<sup>1</sup>**



This disparity was largely due to the higher rate of child homicides in Baltimore City – the child homicide rate in Baltimore City was almost five times higher than the Maryland rate and over eight times higher than the national rate for comparable periods of time (Figure 4). The rate of fatal accidents, suicides and deaths of undetermined manner were comparable to state and national rates.

**Figure 4. Comparison of Injury Deaths among Children (1-17 years) by Manner of Death, Baltimore City vs. Maryland and the United States**

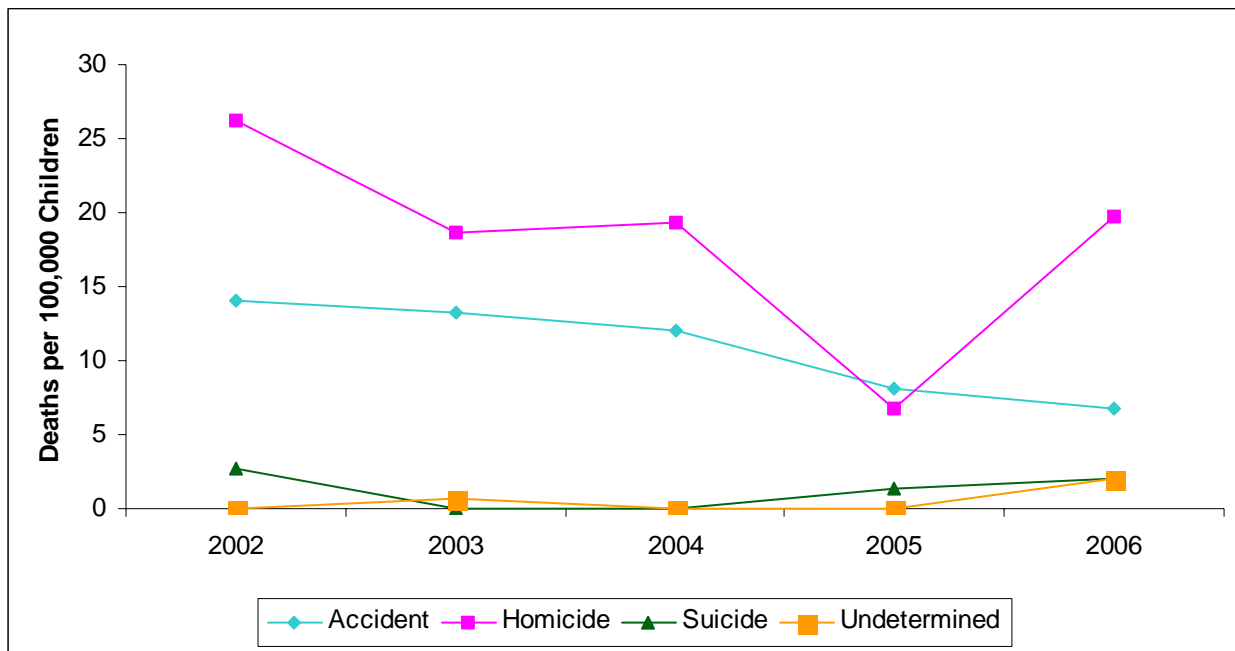


<sup>1</sup> Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [accessed January 28, 2008]. Available from URL: [www.cdc.gov/ncipc/wisqars](http://www.cdc.gov/ncipc/wisqars)

**Trends by manner of death**

In Baltimore City, both homicide and accidental injury death rates decreased between 2002 and 2006 (Figure 5). The child homicide rate dropped sharply in 2005, followed by an increase in 2006. Overall, from 2002 to 2006, rates of child homicide in Baltimore City decreased from 26.2 per 100,000 to 19.7 per 100,000 children, a decline of 25%. The accidental injury death rate decreased 52% from 14.1 per 100,000 in 2002 to 6.8 per 100,000 children in 2006. Rates of child suicide and injury deaths of an undetermined manner were low and remained relatively constant over the study period.

**Figure 5. Trends in Injury Death Rates among Children (1-17 years) by Manner of Death and Year, Baltimore City**



**Age**

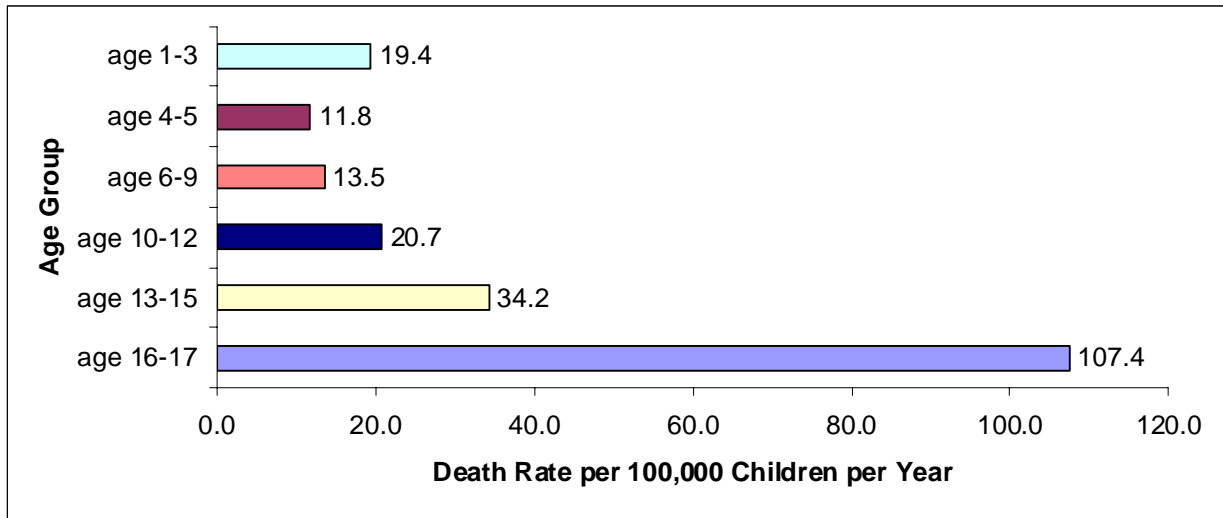
Suicide and homicide deaths occurred most frequently among older children—the median ages of death were 14 and 16 years, respectively (Table 1). The majority of child homicide deaths (82%) were among children 14 years and older. Undetermined deaths occurred among younger children (median age of 4.5 years) and accident deaths occurred more often among adolescents (median age of 11 years).

Manner of Injury Death	Median Age (years)
Homicide	16
Accident	11
Suicide	14
Undetermined	4.5
<b>All Injury Deaths</b>	<b>15</b>

**Table 1. Median Age of Occurrence by Manner of Child Injury Deaths, Baltimore City, 2002-2006**

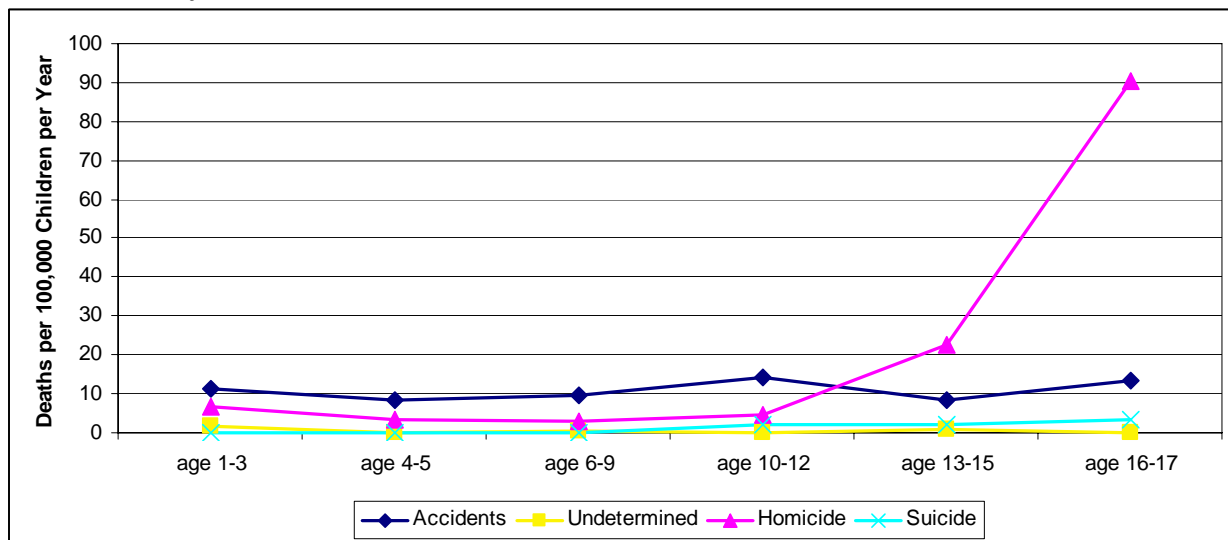
From 2002 to 2006, Baltimore City children in the oldest age group (16-17 years) had a death rate of 107.4 per 100,000 children (Figure 6). This rate is 3 times higher than the group with the next highest rate (children 13-15 years, who had a rate of 34.2 per 100,000 children). The lowest rate of injury deaths was among children ages 4-5 years (11.8 per 100,000 children).

**Figure 6. Injury Death Rates of Children (1-17 years) by Age Group, Baltimore City, 2002-2006**



The high rate of injury deaths among children ages 16 to 17 was driven by homicides (figure 7).

**Figure 7. Injury Death Rates of Children (1-17 years) by Manner of Death and Age Group, Baltimore City, 2002-2006**

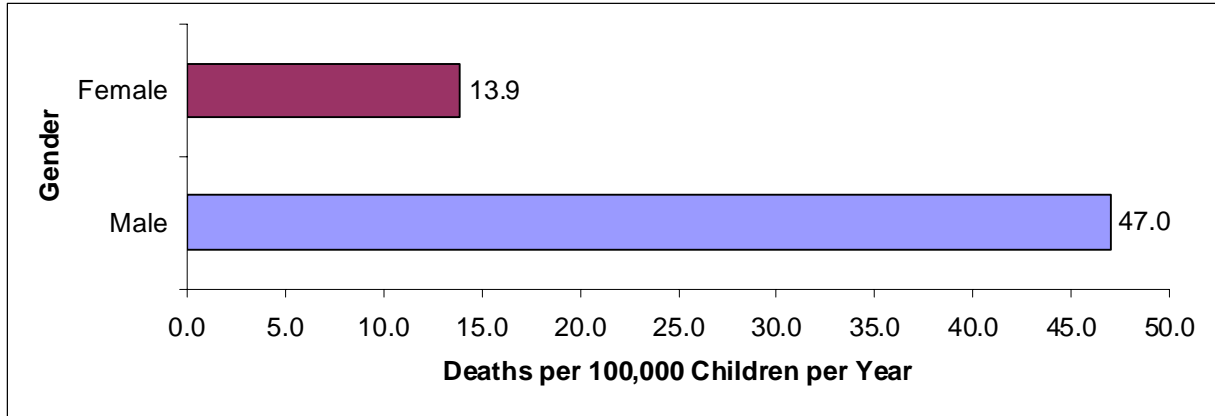


**Trends by gender**

Between 2002 and 2006, a total of 178 male children and 51 female children died from injuries. Male children were more than three times as likely to die from injuries than female children;

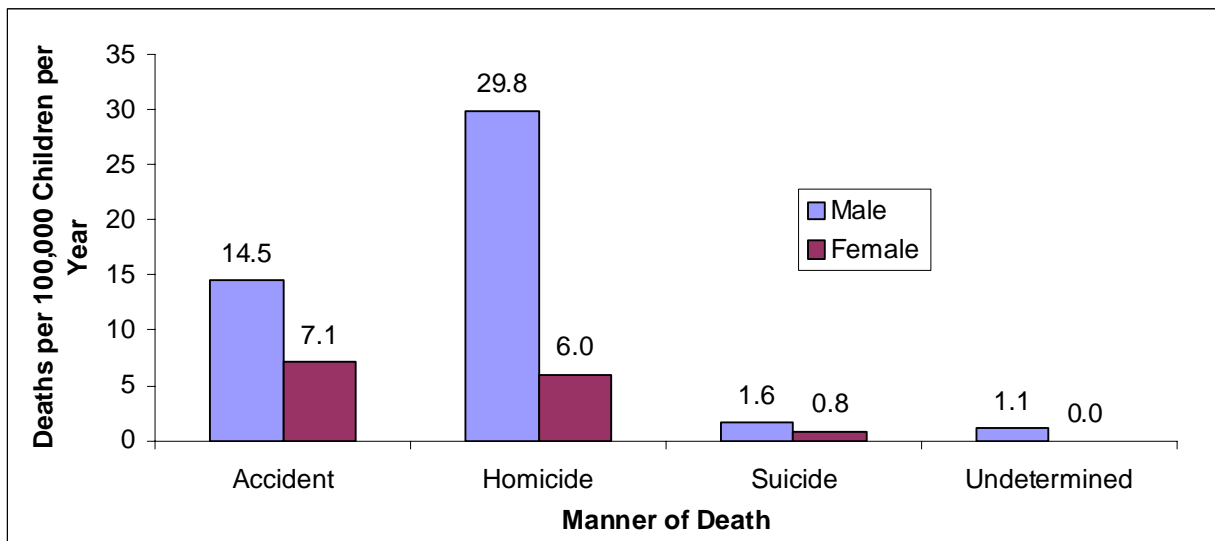
male deaths occurred at a rate of 47.0 per 100,000 male children, compared to 13.9 deaths per 100,000 female children (Figure 7).

**Figure 7. Injury Death Rates of Children (1-17 years) by Gender, Baltimore City, 2002-2006**



For every manner of injury, males had a higher rate of death than females (Figure 8). Males were 5 times more likely than females to be a victim of homicide, and were 2 times more likely to suffer fatal accidents.

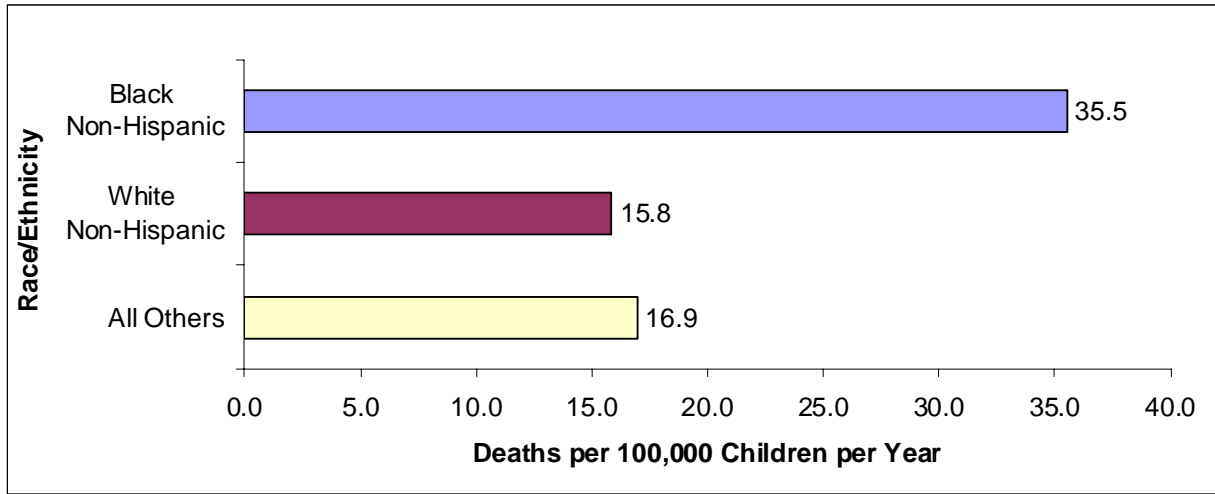
**Figure 8. Injury Death Rates of Children (1-17 years) by Manner of Death and Gender, Baltimore City, 2002-2006**



***Trends by race/ethnicity***

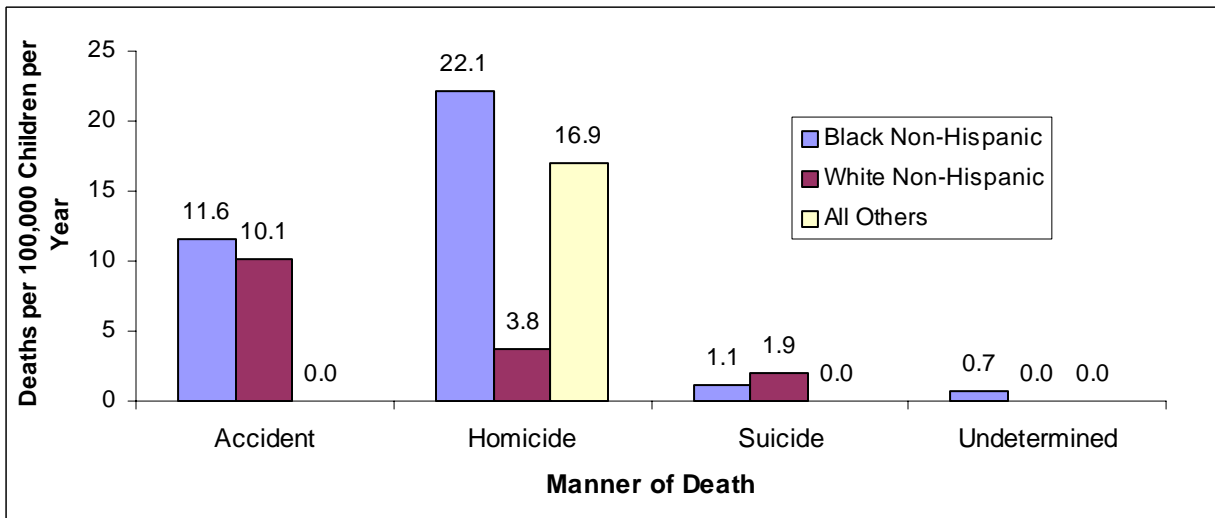
Between 2002 and 2006, the injury death rate of non-Hispanic black children was more than twice that of other children (Figure 9). In this period, there were few injury deaths among Hispanic children and children of other races. All of the deaths among these children were due to homicide.

**Figure 9. Injury Death Rates of Children (1-17 years) by Race/Ethnicity, Baltimore City, 2002-2006**



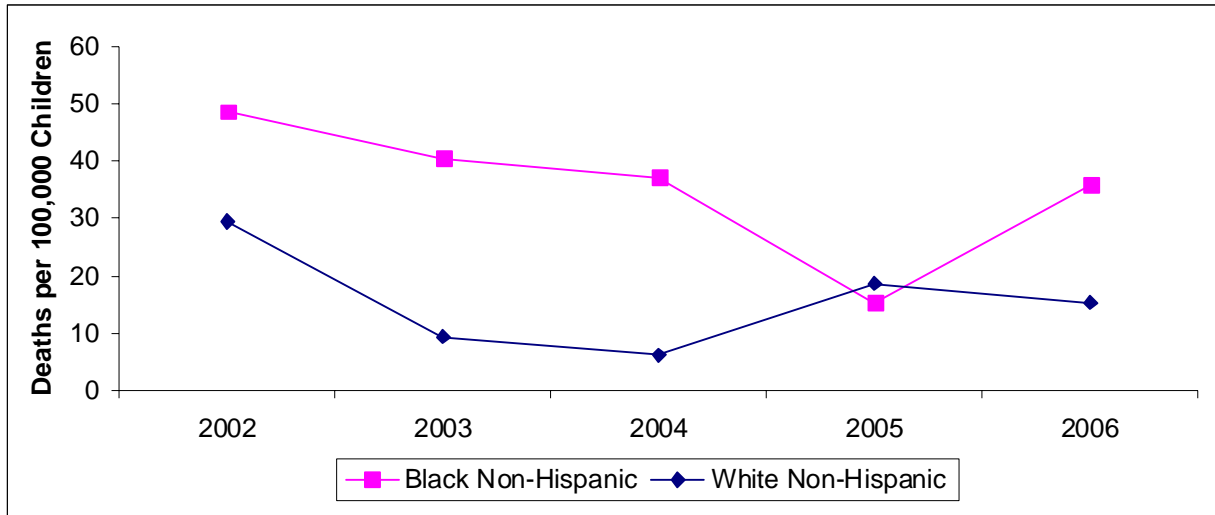
Black non-Hispanic children had higher death rates than white non-Hispanic for every manner of fatal injury except suicide (Figure 10). Black non-Hispanic children were almost 6 times more likely than white non-Hispanic children to be the victim of a homicide, and were slightly (1.2 times) more likely to suffer a fatal accident.

**Figure 10. Injury Death Rates of Children (1-17 years) by Manner of Death and Race/Ethnicity, Baltimore City, 2002-2006**



In 2005, the year that the overall child homicide rate dropped sharply, the disparity between the black and white injury death rates disappeared (Figure 11). This finding suggests that homicides account for much of the disparity between the injury death rates of black and white children.

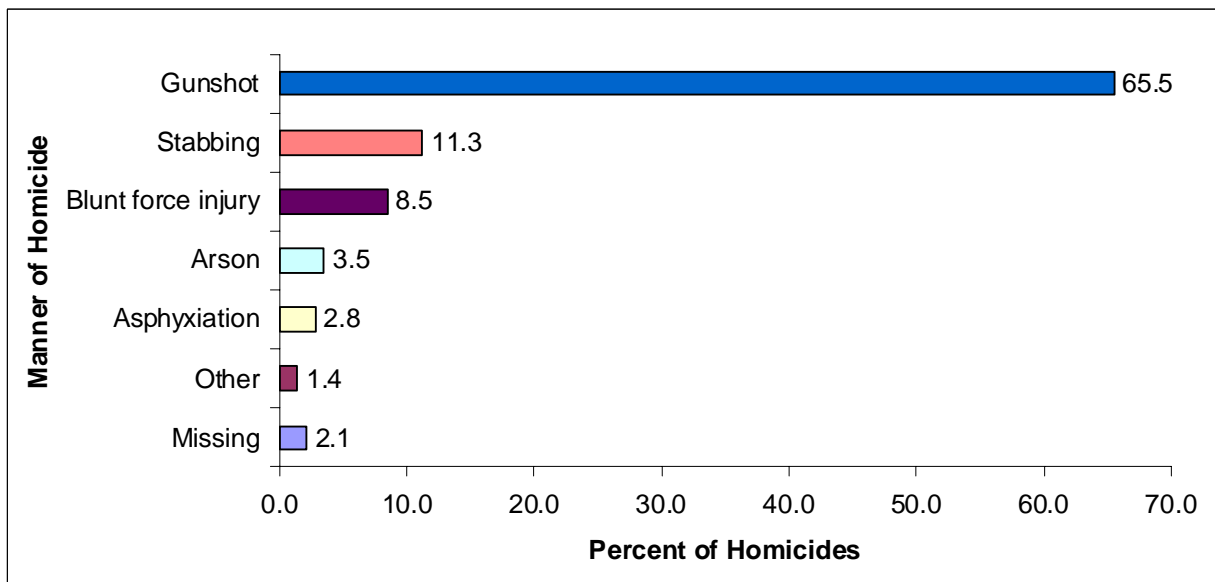
**Figure 11. Trends in Injury Death Rates of Children (1-17 years) by Race/Ethnicity and Year, Baltimore City, 2002-2006**



**Homicide**

Homicide accounted for almost 60% of injury deaths among Baltimore City children from 2002-2006. Of the 135 child homicides that occurred during this period, 93 (66%) occurred by gunshot (Figure 12).

**Figure 12. Homicides Deaths among Children (1-17 years) by Manner, Baltimore City, 2002-2006**



**Cause of Accident Deaths**

Accidents were the most common type of injury deaths among children in Maryland and the United States during 2002-2005. Motor vehicle-related deaths accounted for nearly half of all

child injury deaths nationwide during this period.<sup>1,2</sup> In Baltimore City during 2002-2006, 35% of child injury deaths were the result of accidents. Among these accidental child injury deaths, almost 40% were motor vehicle-related (Table 2). The rate of motor vehicle-related child deaths in Baltimore City from 2002-2006 was below the national rate during the time period from 2002-2005 (4.3 per 100,000 vs. 6.4 per 100,000).

Over a quarter of the accidental child injury deaths during this period were the result of thermal injuries sustained in residential fires. The rate of child residential fire deaths for the years 2002 to 2006 in Baltimore City was over 4 times the national rate during the time period from 2002 to 2005 (2.9 per 100,000 vs. 0.7 per 100,000 children). Young children were at greatest risk—all thermal injury deaths occurred among children between the ages of 1-13 and 73% occurred among children between the ages of 1-7. The majority (72%) of these deaths occurred among boys and 82% of thermal injury deaths occurred in black non-Hispanic children.

<i>Cause of Accident Deaths</i>	<i>Count</i>	<i>Percent</i>	<i>Rate*</i>
<b>Motor Vehicle-Related Deaths</b>	<b>32</b>	<b>39%</b>	<b>4.3</b>
--Pedestrian/Pedal Cyclist Struck	19	23%	2.5
--Motor Vehicle and Other Transportation	13	16%	1.7
<b>Residential Fires</b>	<b>22</b>	<b>27%</b>	<b>2.9</b>
<b>Drowning</b>	<b>11</b>	<b>14%</b>	<b>1.5</b>
<b>Asphyxia</b>	<b>5</b>	<b>6%</b>	<b>0.7</b>
<b>Other</b>	<b>11</b>	<b>14%</b>	<b>1.5</b>
<b>Total</b>	<b>81</b>	<b>100</b>	<b>10.9</b>

**Table 2. Accidental Deaths among Children age 1-17 years, Baltimore City, 2002-2006**

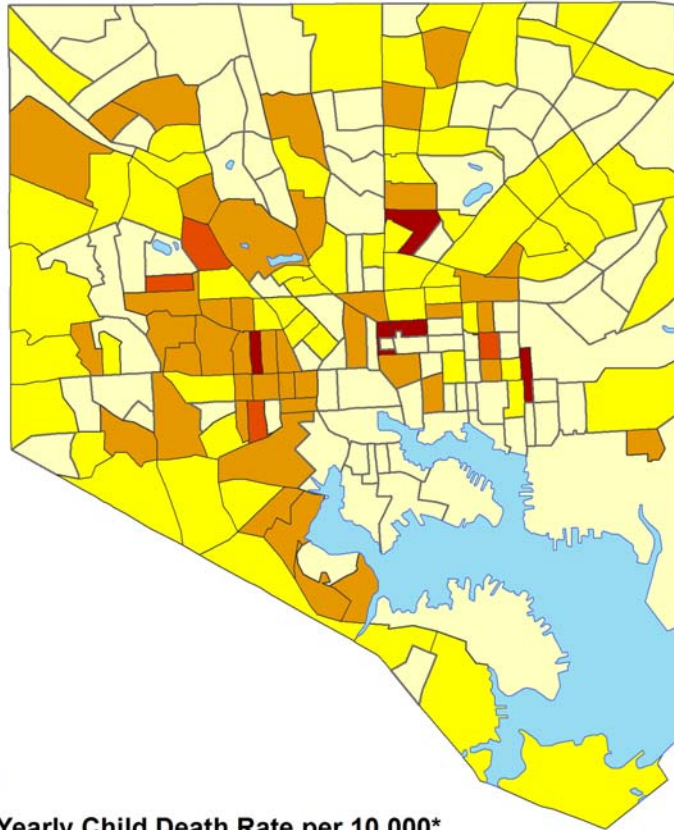
\* per 100,000 Children per year

### ***Location of Injury Deaths***

The following maps display rates of child injury deaths from 2002-2006 aggregated by census tract in Baltimore City.

<sup>2</sup> Miniño AM, Anderson RN, Fingerhut LA, Boudreault MA, Warner M. Deaths: Injuries, 2002. National vital statistics reports; vol 54 no 10. Hyattsville, Maryland: National Center for Health Statistics. 2006.

# Injury Related Death Rate Among Children Age 1-17 by Census Tract (Baltimore City, 2002-2006)



## Legend

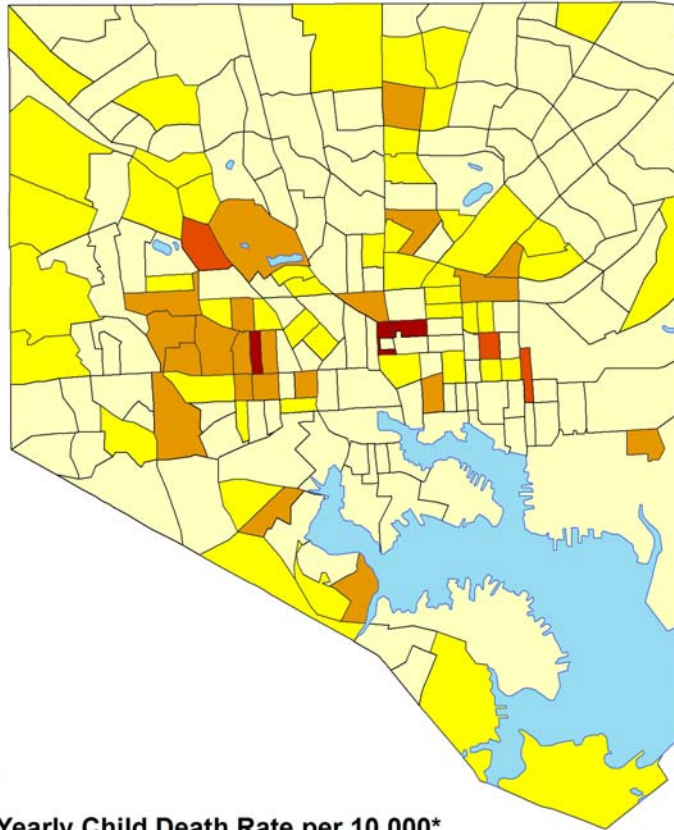
### Average Yearly Child Death Rate per 10,000\*

- None Recorded
- Less than 4
- 4-8
- 8-12
- 12-16

0 0.5 1 2 3 4 Miles

\*Census tract population denominators (children aged 1-17) are based on 2000 census

# Death Rate due to Homicide Among Children Age 1-17 by Census Tract (Baltimore City, 2002-2006)



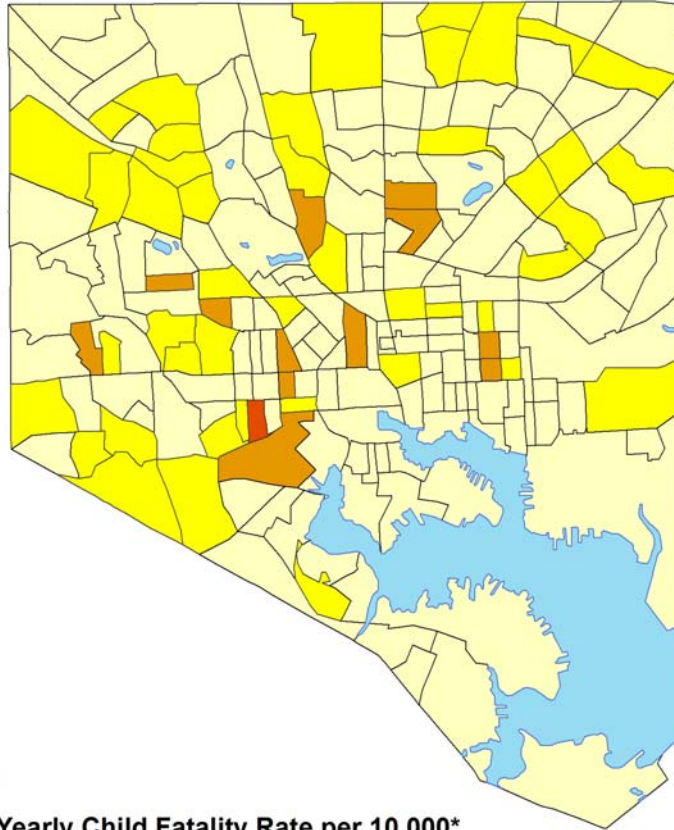
N  
Legend

Average Yearly Child Death Rate per 10,000\*





- None Recorded
- Less than 4
- 4-8
- 8-12
- 12 - 16

\*Census tract population denominators (children aged 1-17) are based on 2000 census

# Fatality Rate due to Accidents Among Children Age 1-17 by Census Tract (Baltimore City, 2002-2006)



### Average Yearly Child Fatality Rate per 10,000\*

-  None Recorded
-  Less than 4
-  4-8
-  8-12
-  12 - 16

0 0.5 1 2 3 4 Miles

\*Census tract population denominators (children aged 1-17) are based on 2000 census

## **Summary**

Despite declining by 30% from 2002 to 2006, injury death rates among Baltimore City children aged 1 to 17 years were twice as high over that period as those in Maryland and the United States. Most of this disparity was due to the high rate of child homicide in Baltimore. Deaths due to homicide accounted for 60% of injury deaths among Baltimore children, and the rate of death in Baltimore was more than eight times higher than in the U.S. as a whole.

Although deaths due to fires accounted for only 10% of all injury deaths among children in the city, proportionally to the population size these deaths occurred more than four times more frequently in Baltimore than in the nation as a whole. In contrast, Baltimore children were less likely than children nationwide to die from motor vehicle-related accidents.

Older male African American children were the most likely to die from injuries, largely because they were the most likely to be victims of homicide. As evidenced by what happened in 2005, decreasing the homicide rate would likely reduce or eliminate racial/ethnic disparities in childhood injury deaths. Identifying the causes of the reduction in child homicides in 2005 requires further investigation.

The Baltimore City Child Fatality Review team supports further data analysis to characterize the causes of preventable child fatalities and to develop interventions to prevent these deaths.

## Data Appendix

**Appendix Table 1: Child injury deaths and death rates per 100,000 children by manner and year, Baltimore City 2002-2006**

<i>Manner of Death</i>		<i>Year of Death</i>					
		2002	2003	2004	2005	2006	2002-2006
<i>Accident</i>	Deaths	21	20	18	12	10	81
	Rate	14.1	13.3	12.0	8.1	6.8	10.9
<i>Homicide</i>	Deaths	39	28	29	10	29	135
	Rate	26.2	18.6	19.3	6.7	19.7	18.1
<i>Suicide</i>	Deaths	4	0	0	2	3	9
	Rate	2.7	0.0	0.0	1.3	2.0	1.2
<i>Undetermined</i>	Deaths	0	1	0	0	3	4
	Rate	0	0.7	0	0	2.0	0.5
<i>All Manners</i>	Deaths	<b>64</b>	<b>49</b>	<b>47</b>	<b>24</b>	<b>45</b>	<b>229</b>
	Rate	<b>43.0</b>	<b>32.5</b>	<b>31.2</b>	<b>16.1</b>	<b>30.5</b>	<b>30.7</b>

**Appendix Table 2: Child injury deaths and death rates per 100,000 children by gender and year, Baltimore City 2002-2006**

<i>Gender</i>		<i>Year of Death</i>					
		2002	2003	2004	2005	2006	2002-2006
<i>Male</i>	Deaths	47	44	35	20	32	178
	Rate	62.4	57.6	45.8	26.4	42.7	47.0
<i>Female</i>	Deaths	17	5	12	4	13	51
	Rate	23.1	6.7	16.2	5.5	18.0	13.9

**Appendix Table 3: Child injury deaths and death rates per 100,000 children by race/ethnicity and year, Baltimore City 2002-2006**

<i>Race/Ethnicity</i>		<i>Year of Death</i>					
		2002	2003	2004	2005	2006	2002-2006
<i>Black Non-Hispanic</i>	Deaths	55	46	42	17	39	199
	Rate	48.6	40.5	37.3	15.4	35.9	35.5
<i>White Non-Hispanic</i>	Deaths	9	3	2	6	5	25
	Rate	29.5	9.5	6.2	18.6	15.4	15.8
<i>All Others</i>	Deaths	0	0	3	1	1	5
	Rate	0	0	52.2	16.6	16.0	16.9

## Technical Appendix

### *Data sources*

#### **Child Injury Deaths**

The Baltimore City Child Fatality Review Team reviews all preventable deaths among Baltimore City children under the age of 18. Data for this analysis come from reports on child injury deaths completed by the Office of the Chief Medical Examiner (OCME) and from death certificates maintained by the Baltimore City Health Department. Death certificates for resident children

who die in the city are collected and maintained by the Baltimore City Health Department. A staff nosologist assigns a code for the underlying cause of death recorded on each death certificate, using the International Classification of Diseases, Tenth Revision (ICD-10). If the child died outside of Baltimore City, the underlying cause of death is recorded by the Maryland Department of Health and Mental Hygiene's Vital Statistics Administration. In order to identify any child injury deaths that may have been excluded from review by the CFR, the data were compared with the death database maintained by the Vital Statistics Administration. Only 8 children were added (most of these deaths occurred in 2002) and 6 deaths were excluded because they were determined not to be residents of Baltimore City.

Both the cause and the manner of a child are important in classifying injury deaths. For the years 2002-2006, injury deaths of children 1-17 years of age were identified by ICD-10 codes corresponding to deaths from injuries and other external causes (this includes codes V01-V99, W00-W99, X00-99, and Y00-Y89). In general, the manner of injury death is categorized as either intentional (homicides or suicides), unintentional (i.e. motor vehicle accidents), or of undetermined intent.

Demographic and injury information for this analysis were abstracted from OCME reports and death certificates. Data on race and ethnicity were analyzed in three categories: Black non-Hispanic, white non-Hispanic, and other. The latter category includes children of other races (including Asian, American Indian or Alaska Native, and Native Hawaiian and Other Pacific Islander) as well as children of Hispanic ethnicity.

### **Population Denominators**

Injury death rates were calculated using postcensal bridged-race population estimates produced by the CDC's National Center for Health Statistics (NCHS) in collaboration with the U.S. Census Bureau. These population estimates were obtained through the CDC's Wide-Ranging Online Data for Epidemiologic Research (WONDER) system, Bridged-Race Population Estimates (Vintage 2006) database (<http://wonder.cdc.gov/Bridged-Race-v2006.html>). Data accessed January, 2008.

### **Maryland and United States Comparison Data**

State and national data on child injury deaths for the years 2002-2005 were obtained from the Web-based Injury Statistics Query and Reporting System (WISQARS, <http://webappa.cdc.gov/sasweb/ncipc/mortrate.html>), National Center for Injury Prevention and Control (NCIPC), Centers for Disease Control and Prevention (CDC). Data accessed January, 2008.

### ***Data analysis***

CFR data collected by the Baltimore City Health Department are stored in a Microsoft Excel spreadsheet. Analyses were performed using Microsoft Excel 2003 and STATA 10. Maps were produced using ESRI's (Environmental Systems Research Institute) ArcMap v9.2.