

# Bicyclist Fatalities and Serious Injuries in New York City

1996-2005



A Joint Report from the  
New York City Departments of Health and Mental Hygiene,  
Parks and Recreation, Transportation, and the New York City Police Department



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## Letter from the Commissioners

Dear Fellow New Yorker:

Bicycling is good for New York City! It offers many benefits to many New Yorkers:

- Recreation and sport
- Regular physical activity to improve fitness and health
- An easy and relatively inexpensive way to get to work or school
- A mode of transportation that reduces road congestion and cuts down on pollution
- For messengers and delivery people, a means of employment itself

The City of New York is committed to improving bicycle and traffic safety for all New Yorkers. *Bicyclist Fatalities and Serious Injuries in New York City: 1996–2005* is a collaborative project by the City's health, parks and recreation, transportation, and police departments to better understand, and ultimately improve, bicycle safety for the thousands of New Yorkers who ride on our streets every day.

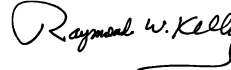
This report identifies specific safety challenges for bicycling in New York City and offers recommendations for motor vehicle drivers, bicyclists, health care providers, and others. It also outlines action steps the City will take to increase bicycling and improve safety. Working together with motorists, bicyclists, bicycle advocacy groups, community groups, health care providers, and other partners, New York City can become an even better place to ride.



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# Key Findings

## 1. While bicyclist injuries declined between 1996 and 2003, fatalities remained steady.

- Between 1996 and 2003, a total of 3,462 NYC bicyclists were seriously injured in crashes with motor vehicles. The annual number of serious bicyclist injuries decreased by 46% during the 8-year period.
- Between 1996 and 2005, 225 bicyclists died in crashes. Bicyclist deaths remained steady during the 10-year period.

## 2. Bicyclist fatality rates in New York City are similar to national rates, though NYC has higher rates of cycling for transportation.

- The bicyclist fatality rate for NYC is similar to the national rate – 2.8 compared to 2.7 per one million residents.
- Census data show that many more NYC adults (11% vs. 3%) walk or bicycle to work compared to the national average.

## 3. Nearly all bicyclist fatalities (92%) occurred as a result of crashes with motor vehicles.

- Most crashes (89%) occurred at or near intersections.
- Although they make up only 5–17% of vehicles on NYC roadways, large vehicles (trucks, buses) accounted for almost one third (32%) of fatalities.
- Nearly all (94%) fatalities involved poor driving or bicycle riding practices, particularly driver inattention and disregarding traffic signals and signs.
- Although there are many more miles of local roads, more than half of fatal crashes occurred on arterial (large, four lane) roads (53%).
- 7% of fatal crashes occurred on limited access highways, where bicycling is prohibited.

## 4. Bicycle lanes and properly used bicycle equipment may reduce the risk of fatalities.

- Only one fatal crash with a motor vehicle occurred when a bicyclist was in a marked bicycle lane.
- Nearly all bicyclists who died (97%) were not wearing a helmet.
- Most fatal crashes (74%) involved a head injury.

## 5. Nine possible fatality clusters were identified.

- Three locations where fatalities occurred in closest proximity were found in the east side of Manhattan north of midtown, Park Slope in Brooklyn, and Hunts Point in the Bronx.
- Locations where injuries occurred in close proximity were found in Midtown Manhattan, the northern sides of Central Park, and Central Bronx.

## 6. Men and children face particular challenges.

- Most bicyclists who died were male (91%), and men aged 45–54 had the highest death rate (8.3 per million) per age group.
- Among children aged 5–14, the death rate for boys was more than five times higher than for girls; Queens had the highest child bicyclist death rate of the five boroughs (3.2 child deaths per million, compared to 2.1 child deaths per million citywide).

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## Introduction

New York City (NYC) is a unique urban environment. Population density, limited parking, and a sophisticated public transportation system all discourage car use. As a result, compared to the rest of the nation, New Yorkers are more likely to take buses and trains, walk and ride bicycles. Of major U.S. cities, NYC has one of the highest proportions of residents who walk or bicycle for basic transportation purposes.

Many New Yorkers ride bicycles to work—bicycling as a means of transportation reduces road congestion and motor-vehicle related pollution. Other New Yorkers ride for recreation and to improve health and fitness. Regular bicycling helps maintain healthy weight and reduces the risk of cardiovascular disease and many other diseases. Increasing bicycling in New York City has many potential health and environmental benefits. Whether for transportation, exercise, or recreation, bicycling is good for New Yorkers. As part of the City's commitment to promote bicycle use and ensure a safe environment for bicyclists, the New York City Departments of Health and Mental Hygiene (DOHMH), Parks and Recreation (DPR), Transportation (DOT), and the Police Department (NYPD) have analyzed fatal bicycle crashes from 1996 through 2005, along with data on traffic-related bicycle crashes resulting in serious injury between 1996 and 2003 (the most recent year for which injury data are available).

This report reviews bicyclist, motorist, and vehicle characteristics, crash locations, and types of injuries. A comprehensive review of available data is an important step towards improving bicycle safety and ultimately increasing bicycling. However, conclusions must be drawn with an understanding of the strengths and limitations of the data sources. Without comprehensive information on crash circumstances and accurate data on the number of bicyclists, it is difficult to know the true risk associated with particular bicycling or motorist practices. Nevertheless, this report summarizes important information on factors that played a role in the deaths of more than 200 bicyclists over the past 10 years and more than 3,000 serious injuries over an eight year period, providing a strong base for recommendations to support a safer environment for bicyclists.

# Methods

## Fatalities

To describe bicyclist fatalities in New York City for the period 1996–2005, several data sources were analyzed. All known bicyclist deaths were included. The primary data source was the NYC DOT Fatality Database. This database is routinely cross-referenced and reconciled with the NYPD Accident and Investigation Squad (AIS) Database. For this study, reconciled deaths from 1996–2005 were then cross-referenced with death certificates maintained by DOHMH to confirm the cause of death and to identify any additional bicyclist fatalities. All fatalities with an underlying cause of death indicating the person to be a bicyclist were included, based on International Classification of Disease (ICD) codes (*for a listing of these codes, please see the Technical Appendix*).

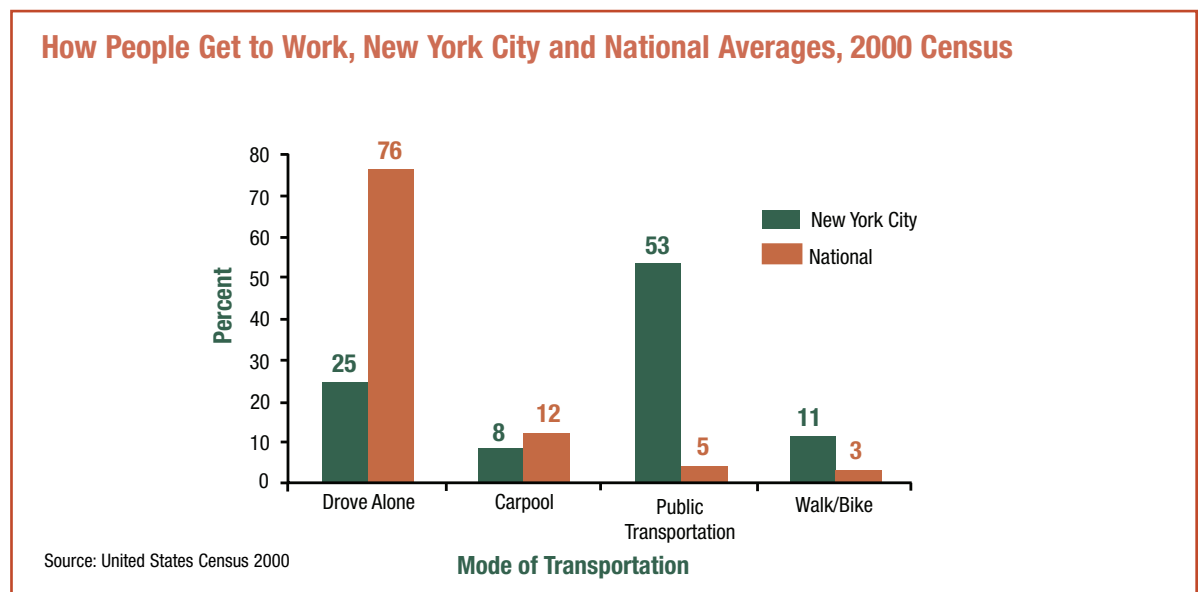
Through a match with NYC death certificates, an additional 46 possible bicyclist deaths were identified. Records at the Office of the Chief Medical Examiner (OCME) for each of these possible additional deaths were reviewed by a team of three DOHMH investigators. Thirteen of the 46 possible deaths were deemed to be bicyclist fatalities occurring in NYC and were added to the NYC DOT Fatality and NYPD AIS databases (*for additional details, please see the Technical Appendix*).

## Serious Injuries

Information on serious bicycle crashes was obtained from the New York State (NYS) DOT Safety Information Management System (SIMS), which compiles data from Accident Information System (AIS) reports submitted to the NYS Department of Motor vehicles by NYPD. For this report, we analyzed serious bicyclist injuries from 1996 through 2003, the last year for which data are available. Serious (but non-fatal) bicyclist injuries are defined by the NYS Department of Motor Vehicles as injuries that require the bicyclist to be taken to the hospital. Serious injuries include amputation, concussion, internal bleeding, severe burns, fracture, and dislocation. NYS Department of Motor Vehicles only collects information on serious bicyclist injuries that are associated with a motor vehicle crash.

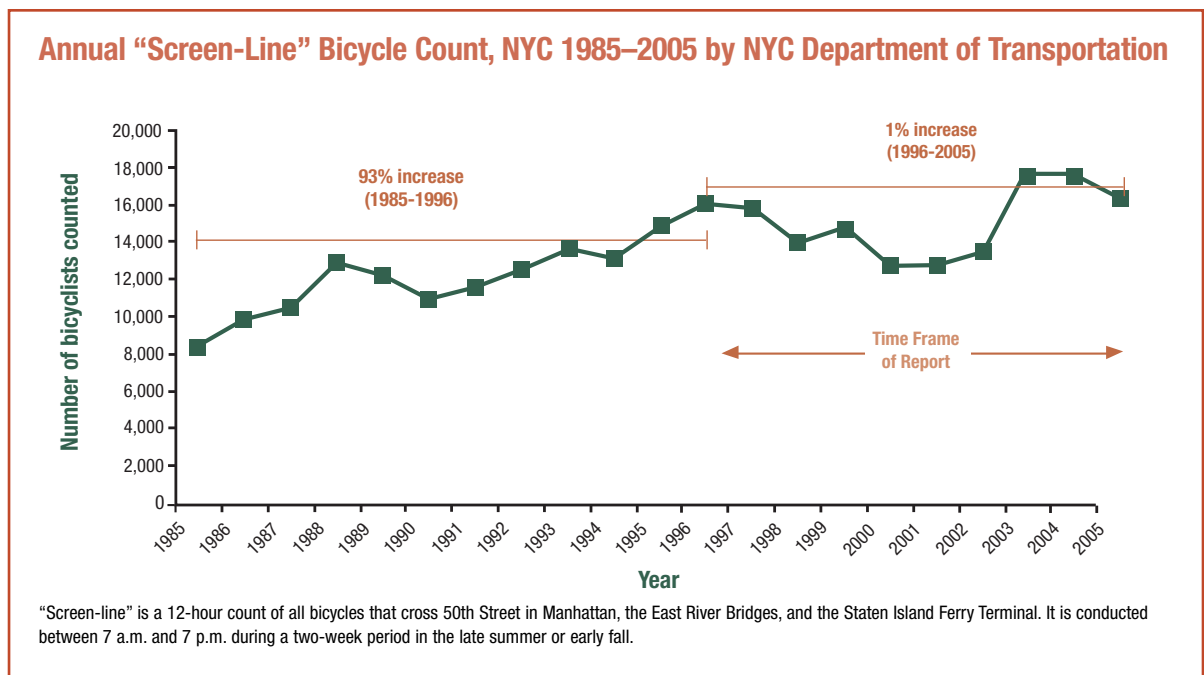
# Bicycling in New York City

According to census information about how people travel to work, levels of walking and bicycling in NYC are above the national average. In 2000, 11% of New York City residents walked or biked to work compared to 3% of Americans overall.



While these data suggest that bicycling in NYC is a popular mode of transportation, it's difficult to estimate how many New Yorkers bicycle each year. One source of information is an annual count of bicyclists conducted each year by the City's Department of Transportation. This count, known as the "screen-line" count, uses a common method of counting road users to estimate the number of people or vehicles on streets at a given location. The annual screen-line count records the number of bicyclists entering or leaving the Manhattan Midtown business district and specific locations in lower Manhattan between 7 a.m. and 7 p.m. on a single day, usually during the late summer or early fall. Because the count is concentrated in central Manhattan, it does not provide information about the total number of bicyclists in the city. Even so, the data are routinely collected the same way at roughly the same time each year, providing some useful information on bicycling trends over time.

According to the screen-line results, bicycling in NYC has increased substantially since 1985. Between 1985 and 2005, the number of bicyclists counted in the annual NYC screen-line count increased by nearly 100%. The increase in bicyclists is larger than the increase in the general population of the city during the same time, which grew approximately 15% (from 7.2 million in 1985 to 8.2 million in 2005). These figures suggest that more New Yorkers are bicycling. Most of the increase in bicycling (93%) appears to have occurred in the late 1980's and early 1990's. Increases in the years which correspond to this study time period are smaller.



An alternative source of information on bicycle ridership is available from survey data, although it is limited to teenagers. Beginning in 1997, a health behavior survey has been conducted at New York City public high schools every two years. In this survey a representative sample of teens are asked how often they wore a helmet when riding a bicycle during the last 12 months; one response option is: "I did not ride a bike in the past 12 months." Survey responses to this question indicate that bicycling has declined among teens. In 1997, 73% of public high school students reported riding a bicycle in the past 12 months, while in 2005, only 63% reported riding a bicycle. Data are not available before 1997.

# Bicycling Infrastructure, Promotion and Safety Initiatives in New York City

To support bicycling and promote a more bicycle-friendly environment, New York City works routinely with partners to provide four important services:

- (1) Provision of bicycle paths, striped lanes and signed routes.
- (2) Installation of bicycle parking racks.
- (3) Annual publication and distribution of free maps showing bicycle routes in New York City.
- (4) Traffic safety programs for children and adults.

Each of these initiatives is tracked and coordinated through the Bicycle Program at the Department of Transportation, with the help of other agencies, including the Department of Parks and Recreation, the Department of City Planning, the New York City Economic Development Corporation and the New York State Department of Transportation. The four initiatives are described in more detail below.

## (1) Bicycle Paths, Striped Lanes, and Signed Routes

As of March 2006, New York City had approximately 420 lane miles of bicycle paths, striped lanes, and signed routes in place. The oldest paths, along Eastern and Ocean Parkways in Brooklyn, were established in the late 19th century. In 1993, the City's Department of City Planning published "A Greenway Plan for New York City," which called for the completion of a 350 mile network (700 lane miles) of two-way paths and shared roadways for bicyclist and pedestrian use. This document was followed by the "New York City Bicycle Master Plan," produced jointly by the Department of City Planning and DOT in 1997. The master plan established a more comprehensive citywide network of 900 miles (1,800 lane miles) of bicycle-friendly streets and paths. Today, the bicycle master plan is about 23% complete.

<b>Fiscal year</b>	<b>Miles Added for Bicyclists</b>
1997 (July 1, 1996–June 30, 1997)	16.3 miles
1998	15.3
1999	19.7
2000	46.8
2001	16.2
2002	32.7
2003	32.2
2004	23.5
2005	13.6
<b>Total miles added: 216.3</b>	

Source: NYC DOT Bicycle Program

Greenways – usually linear parks that contain bicycle and pedestrian paths separated from motor vehicle traffic – are an essential component of the overall bicycle network. Greenways often run parallel to major roadways or bodies of water, providing continuous stretches of off-street paths for bicyclists. Prominent examples are the Hudson River Greenway and Pelham Parkway. In coordination with other City and State agencies, the Department



of Parks and Recreation (DPR) works to increase the amount of greenway miles available to New Yorkers as laid out in the NYC Bicycle Master Plan and the Greenway Plan.

Often bicycle routes are a combination of greenways and striped lanes or signed routes. DPR focuses efforts on increasing the proportion of dedicated greenway space on many combination routes. Current projects include:

- The Bronx River Greenway: 8 miles of combined greenways, striped lanes and signed routes
- The Queens East River & North Shore Greenway: a 10.6 mile combined route with several dedicated greenway portions
- The Greenbelt Greenway: a 3.25 mile greenway providing safe east-west access for bicyclists in the center of Staten Island

## **(2) Bicycle Parking**

In the last ten years, the City has increased the number of bicycle parking racks by more than 500%. There are currently 4,000 bicycle racks citywide, compared to approximately 600 in 1996.

## **(3) Bicycle Maps**

The City has produced and distributed free bicycling maps since 1997. By the end of 2006, the City will have distributed close to 1 million maps. The map was initially produced in five versions, one per borough. In order to encourage people to bicycle across the city, a single citywide map has been produced and distributed since 2002. Maps show on-street routes, bicycle lanes, existing and planned off-street routes, bicycle shops, parks, schools, landmarks, museums, and other sites of interest. The maps also contain information on proper safety equipment, a list of cycling organizations, and guidelines for taking bicycles on the subway and other forms of mass transit. The citywide bicycle map is updated annually by Department of City Planning, Department of Transportation and Department of Parks and Recreation in order to reflect bikeway segment upgrades and improvements.

## **(4) Safety Programs**

In 1989, NYC's DOT established a program known as *Safety City*. The program operates six facilities that provide traffic safety instruction to third grade students. *Safety City* uses both interactive classroom lessons and hands-on practice at a simulated city street intersection. Instructors stress the importance of bicycle helmet use and each site includes a helmet fitting station. In 2005, *Safety City* staff provided nearly 51,000 training sessions to children and adults.

The *Safety City* "On the Road" program and the Apple Corps Theater also present theatrical productions that include bicycle safety information to schools in neighborhoods with high rates of child injuries. In 2005, 37,459 students attended performances. Overall, students made 134,207 visits to DOT's various safety education programs during 2005, representing a 17% increase since 2000. Additional bicycle safety information is shared at community health fairs.

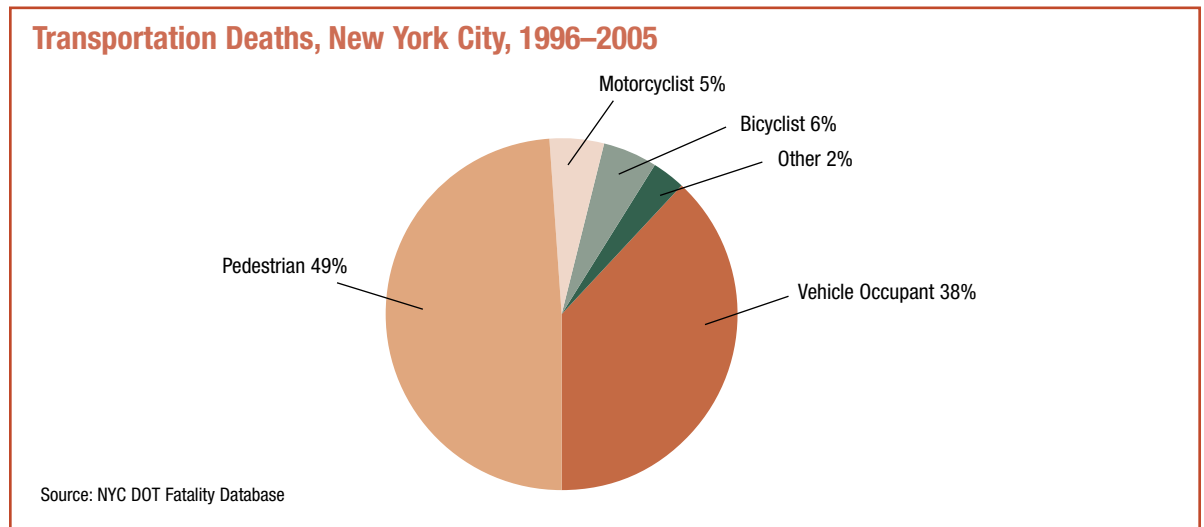
The City's Department of Parks and Recreation (DPR) also has a bicycle safety program – the Bicycle Safety Education Campaign. DPR distributes bicycle maps and promotional safety brochures to bicyclists in park areas with high rates of bicycle traffic, such as Central, Riverside, Carl Schurz, and Hudson River parks, as well as at 28 recreation centers across the city. The brochure was developed by the Central Park Conservancy and has been endorsed by many of the City's bicycle advocacy groups. DPR officers also set up seasonal checkpoints inside selected major parks at peak riding times and locations. At these checkpoints, bicyclists are stopped and provided with bicycle route maps and wallet-size cards explaining the laws and regulations governing bicycle riding in New York City, as well as park maps that show points of interest and service features (water fountains, restrooms). The seasonal program is carried out in two phases – education only is provided for one month, followed by education combined with enforcement.

## Results

The findings in this report are divided into two sections. The first section presents findings on bicyclist deaths and is comprehensive in scope, using information compiled from crash investigator reports, AIS police reports, and in some instances, medical examiner files. The second section describes serious bicyclist injuries. Data on these injuries are less complete, but they provide an important additional perspective on non-fatal crashes.

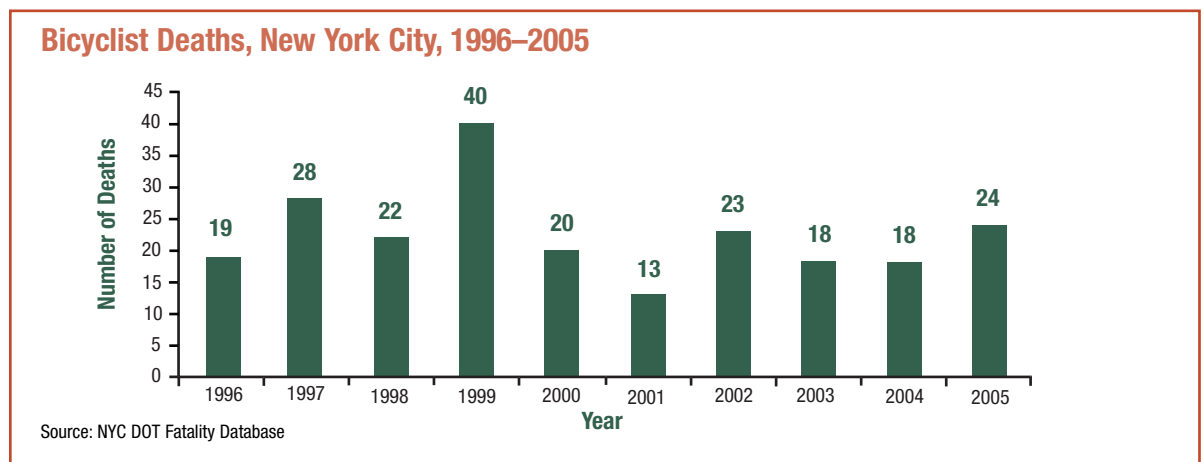
## Bicyclist Fatalities

According to the NYC DOT Fatality Database, there were 3,964 transportation-related deaths in New York City from 1996 through 2005. Almost half of these deaths (49%) were pedestrians (n=1,944). Slightly more than one-third (38%) were drivers or passengers (occupants) in motor vehicles (n=1,510). A total of 225 deaths (6%) were bicyclists.

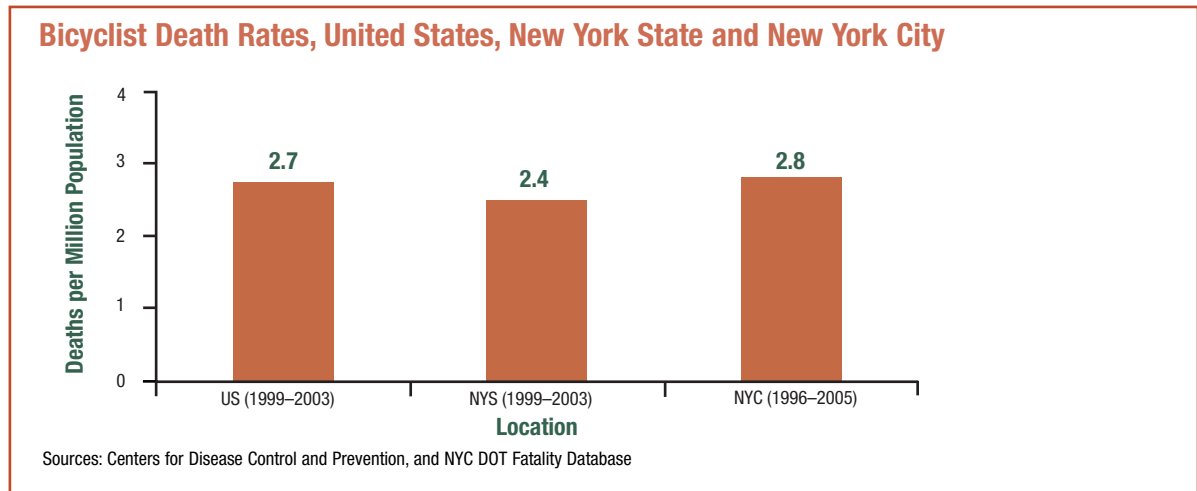


### Overview

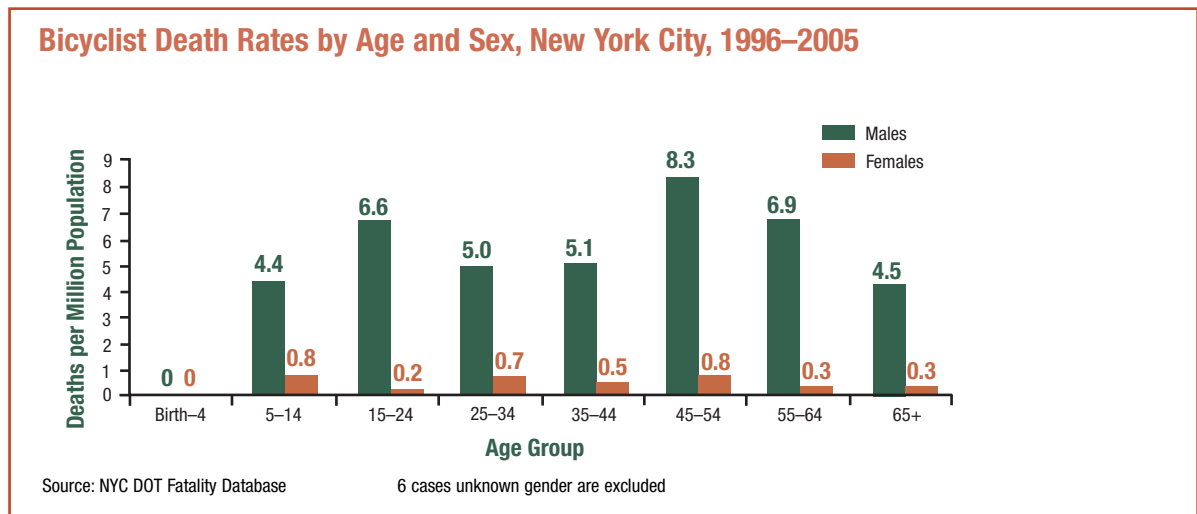
Between 1996 and 2005, there were 225 bicyclist deaths in New York City. An average of 23 bicyclists died per year, at an average annual rate of 2.8 deaths per 1 million New Yorkers. While the number of bicyclist deaths varied from year to year, the changes did not suggest an upward or downward trend in deaths during the report period; bicyclist deaths appeared to remain stable. However, in one year, 1999, the number of bicyclist deaths was significantly higher than other years. The annual number of deaths ranged from a low of 13 in 2001 to a high of 40 in 1999.



A comparison of bicyclist death rates between the nation, New York State, and New York City for the 1999-2003 period shows similar levels of bicyclist deaths. All rates were between 2 and 3 bicyclist deaths per million population.



Bicyclists who died in New York City ranged in age from 5 to 85 years, with an average age of 37 years. There were no deaths among children younger than 5 years old. Almost all of the bicyclists involved in fatal crashes were males (91%, or 199), with males having higher death rates than females in all age groups; 45-54 year old men had the highest death rate. This gender and age distribution of bicyclist fatalities is similar to the profile of bicyclist fatalities in the United States: nationally, men accounted for 89% of bicyclist fatalities. Scant information exists on the gender breakdown of bicyclists nationally or locally. A 2000 survey conducted by the US DOT estimated 61% of bicyclists to be male. While the majority of bicyclists in NYC and nationwide may be male, the fact that they account for approximately 90% of all bicyclist deaths suggests that they are at greater risk for having a fatal accident.



From 1996 through 2005, almost all (92% or 207) bicyclist deaths were “traffic-related,” which is defined as occurring as a result of a crash with a moving motor vehicle. The remaining 8% (18) of deaths were “non-traffic” deaths. Non-traffic deaths can occur anywhere—on streets, driveways, parking lots, or sidewalks—and do not involve a moving motor vehicle. Bicyclists may fall off their bicycles or hit fixed objects such as trees or parked cars.

## Non-Traffic Deaths

A total of 18 non-traffic bicyclist deaths occurred between 1996 and 2005. Fourteen of the deaths were bicycle-only deaths where the bicyclist did not come into contact with a motor vehicle. Four of the crashes were with parked motor vehicles.

### Non-Traffic Deaths

#### The bicyclists

- Ranged in age from 13 to 75 years old
- Average age, 41 years old

#### Crash circumstances

- 14 bicycle-only deaths
- 4 bicycle deaths from hitting parked motor vehicles, 3 of which were unoccupied  
*(for more information about deaths caused by contact with motor vehicle doors, see page 14)*

#### Crash location

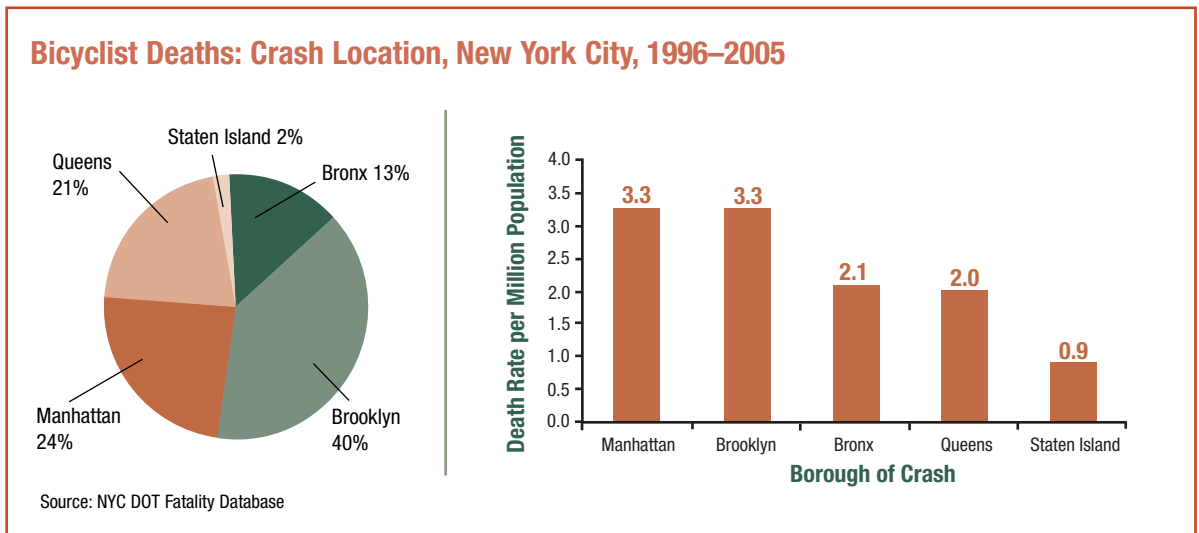
- Deaths occurred in all boroughs, but most were in Manhattan (6 or 33%)
- Sixteen occurred on city streets, and two in parks or on bicycle paths

## Traffic Deaths

### Location of Fatal Crashes

#### Borough

More than one-third (40%) of the 207 traffic-related fatal crashes took place in Brooklyn, and 24% were in Manhattan. Bicyclist death rates were highest in Brooklyn and Manhattan with 3.3 deaths per million. However, because many bicyclists ride beyond the borough in which they live, these rates may not accurately reflect the burden on residents of a particular borough.

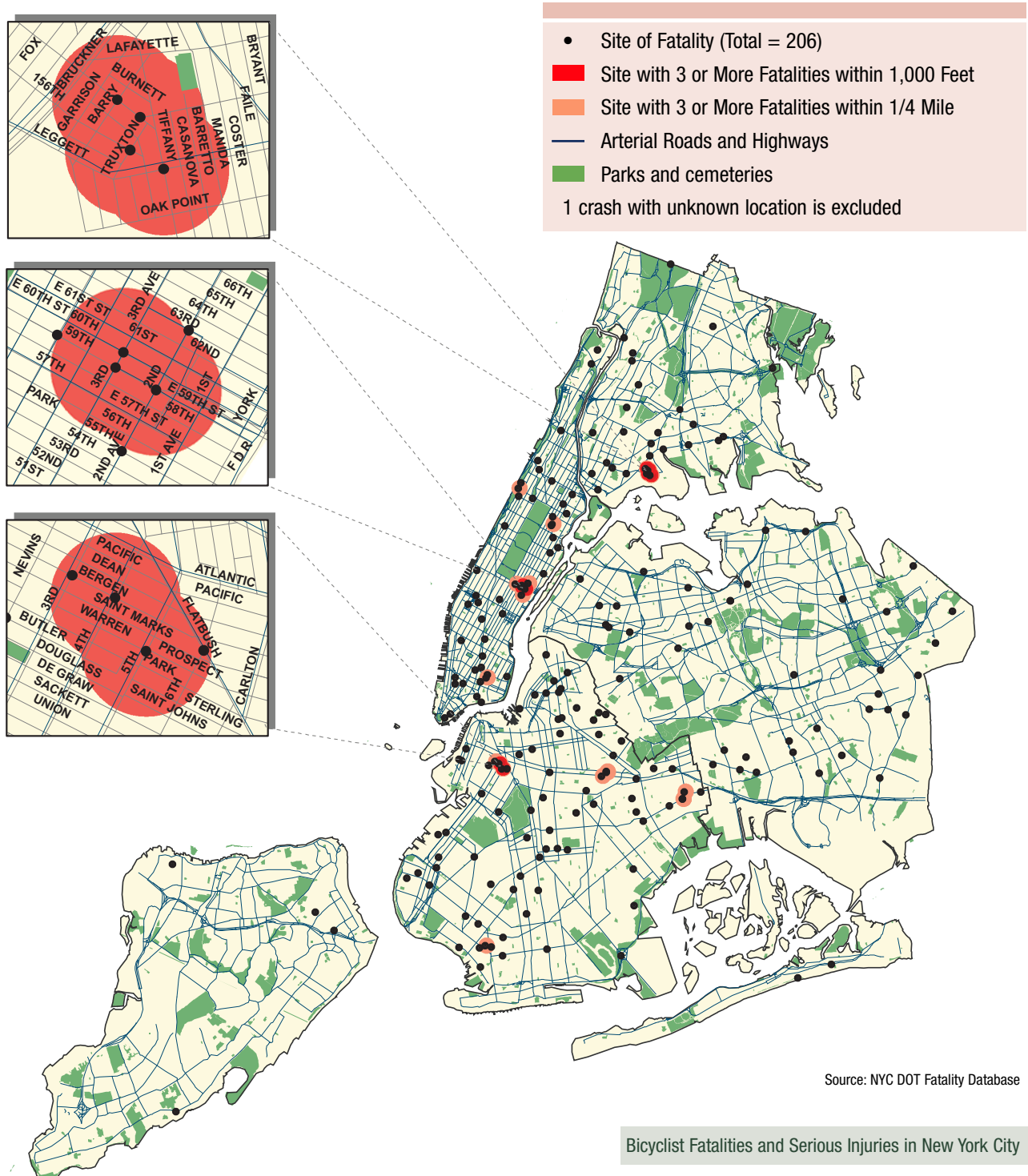


**Figure 1** shows the location of traffic-related fatal bicycle crashes from 1996 through 2005. The 9 highlighted areas show locations where 3 or more fatalities occurred within a quarter-mile during the 10-year time period. The highest concentration of bicyclist fatalities (per area) occurred in Manhattan, followed by Brooklyn.

The 3 densest clusters (3 or more accidents within 1,000 feet, shown in red) were in the east side of Manhattan north of midtown, Park Slope in Brooklyn, and Hunts Point in the Bronx.

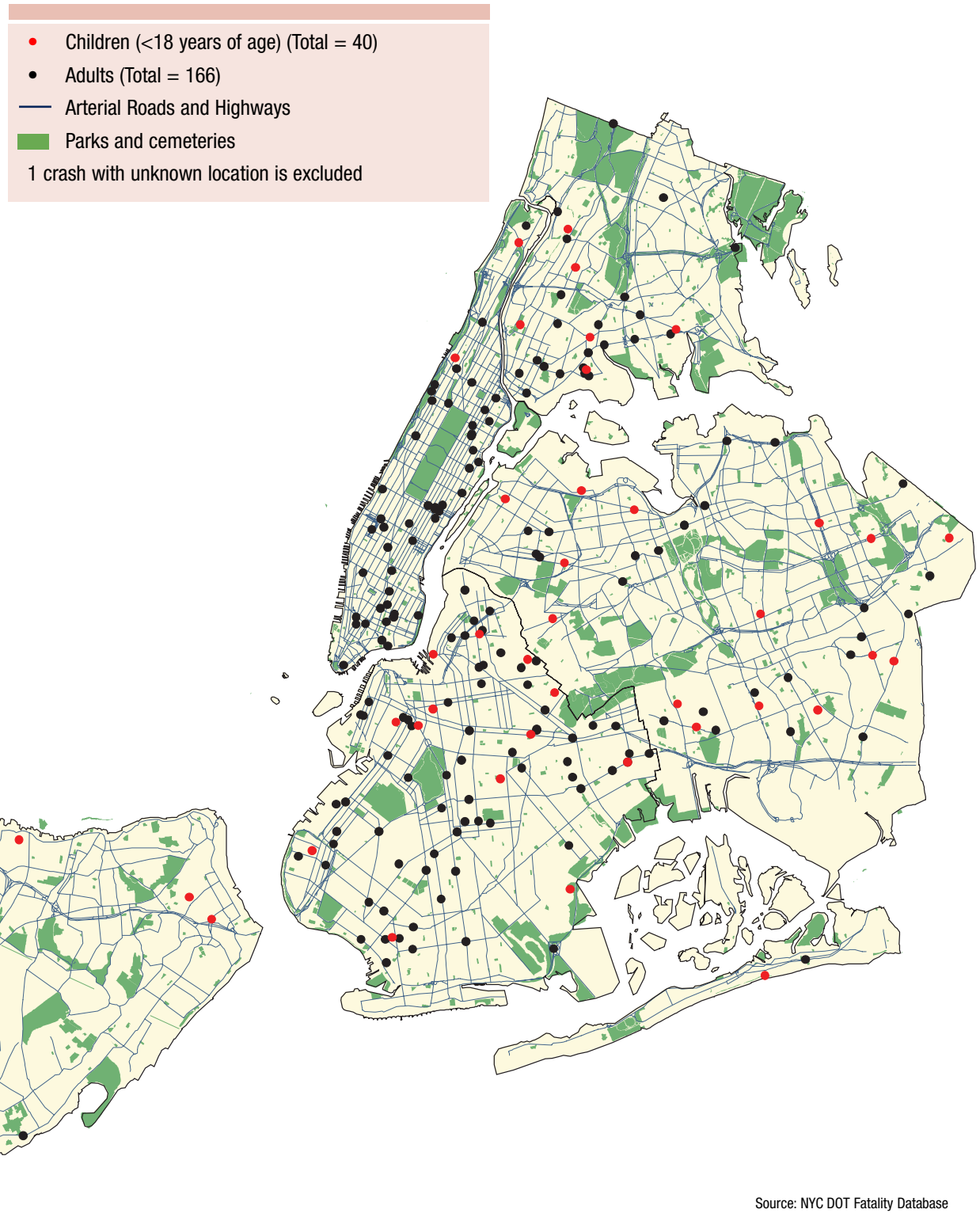
Of New York City's 59 community districts, those with the highest number of fatalities were Greenpoint/Williamsburg (11), East New York (11), and Bensonhurst (9) in Brooklyn.

**Figure 1: Traffic-Related Bicyclist Fatalities in New York City, 1996 to 2005**



**Figure 2** depicts fatal crashes of children (under 18) and adults separately. Queens had the highest number (16) of the City's bicyclist fatalities among children and Brooklyn had the second highest number (13). In Queens, the child bicyclist death rate was 3.2 per million children, 52% higher than the city wide average of 2.1 deaths per million children.

**Figure 2: Traffic Bicyclist Fatalities by Age in New York City, 1996 to 2005**

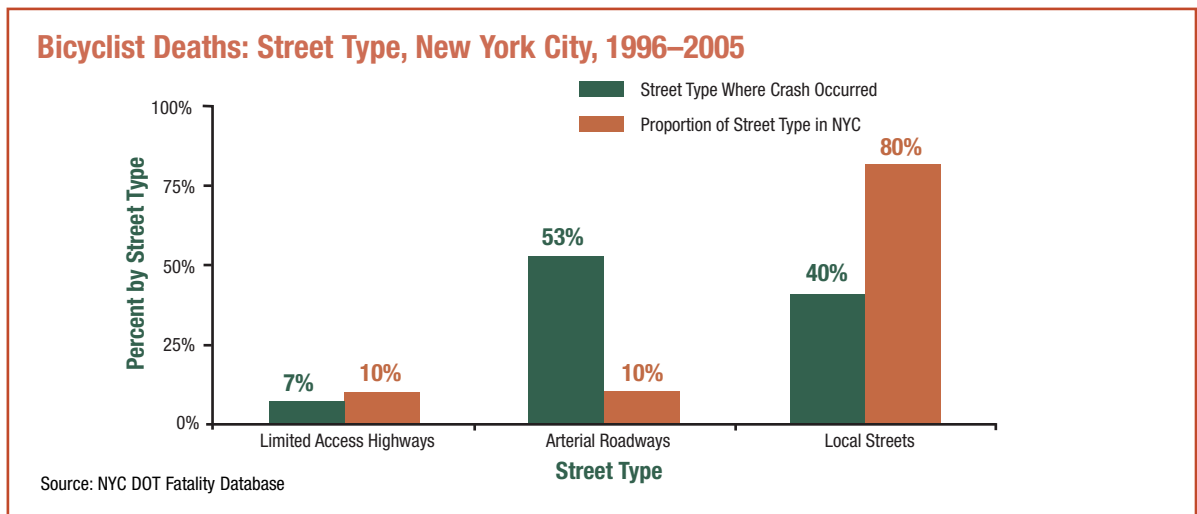


Source: NYC DOT Fatality Database



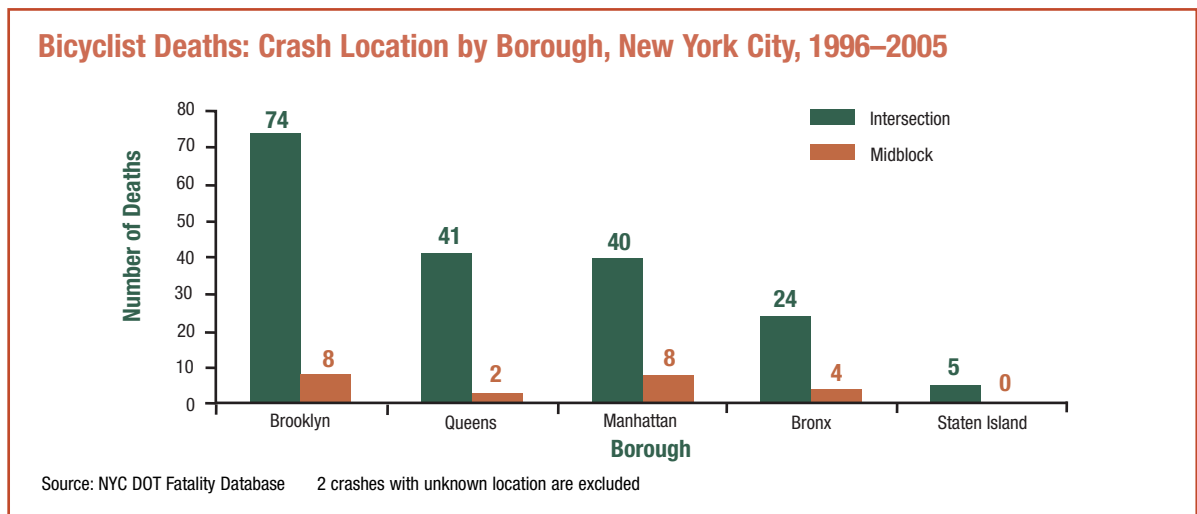
## Street Type

Approximately half (53%) of bicyclists' deaths occurred on or in the vicinity of an arterial street. An arterial street is a main road or "through corridor" with several lanes for each direction of traffic. Arterial streets make up 10% of all NYC roadways. Examples of arterial streets include Metropolitan Avenue in Queens, Ocean Parkway in Brooklyn and 57th Street in Manhattan. Local streets, which make up 80% of NYC roadways, were the scenes of 41% of bicyclist deaths. The remaining 7% of fatal bicycle crashes occurred on limited access highways, where bicycling is prohibited. Limited access highways make up 10% of NYC roadways and can only be accessed at limited locations, such as entrance and exit ramps with no crossing intersections. Examples of limited access highways are the Cross Bronx Expressway and the Long Island Expressway.



## Crash Location: Intersection vs. Mid-block

Details on the locations of fatal crashes are documented in police records. From 1996 to 2005, nearly all fatal bicycle crashes (89%) occurred at or within 25 feet of intersections. The remaining 11 percent of crashes occurred mid-block. While most crashes occurred at or near intersections, data suggest that Manhattan had a higher proportion of mid-block fatalities (8 out of 48, or 17%) than other boroughs.



## Marked Bicycle Lanes

Marked bicycle lanes are areas on roadways that are clearly delineated for use by bicyclists. Bicycle lanes are located on city streets, and in parks where the lanes are shared with pedestrians. Using the NYC DOT's database of bicycle lanes, fatal crashes were examined for their proximity to marked bicycle lanes.

Only one fatal crash with a motor vehicle occurred in a marked bicycle lane. This fatality occurred in Prospect Park, as a result of a motor vehicle colliding with a bicyclist. A total of 10 other fatal crashes occurred in or near a marked bicycle lane. Six fatal bicycle crashes with motor vehicles occurred in close proximity to, but not inside of, a marked bicycle lane. One fatality occurred on a city street near a bicycle lane, but did not involve a motor vehicle. The last three fatalities occurred inside a marked bicycle lane located within a park, but did not involve a motor vehicle.

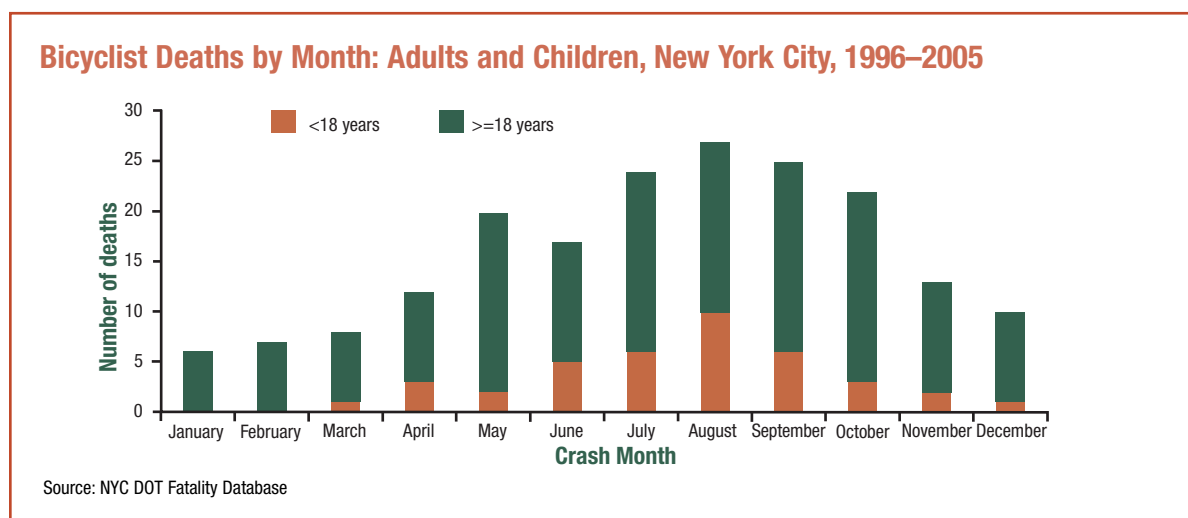
## Deaths involving motor vehicle doors (dooring)

A total of 7 fatal crashes occurred as a result of a bicyclist hitting a motor vehicle door or trying to avoid one. Four occurred in Manhattan and 3 in Brooklyn. In one case, a bicyclist hit the open door of a motor vehicle that was parked (one of the 18 deaths described on page 10). Four of the 7 deaths occurred when a bicyclist swerved to avoid an open vehicle door and was then struck by another moving vehicle. In the remaining two cases, the bicyclist fell after colliding with an open door and was then struck by a different moving vehicle.

## Time of Fatal Crashes

### Month

When bicyclist deaths were examined by time of year, slightly more than half (52%) occurred during summer and early fall months, from July through October. This seasonal effect was most pronounced among younger riders. The proportion of deaths that were younger bicyclists (<18 years old) was higher in warmer months, especially June (26% of deaths) and August (37% of deaths) compared to the colder months of January and February where none of the deaths with known age were among younger bicyclists.



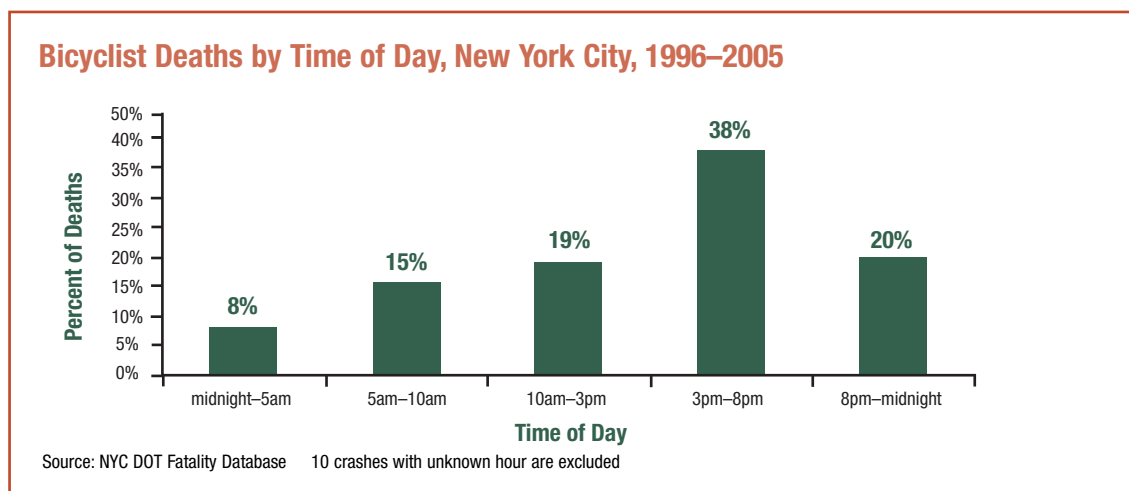
### Day of Week

When fatal bicycle crashes were examined by day of the week, no major differences were noted between weekdays and weekends. The largest number of crashes occurred on Wednesday (38 or 18%) and the lowest number occurred on Tuesday (20 or 10%), but these differences were most likely due to random variation.



## Time of Day

Bicyclist deaths tended to occur most frequently in the afternoon and evening hours. The largest proportion of fatal crashes (38%) occurred between 3 p.m. and 8 p.m. The fewest fatal crashes occurred after midnight and before daybreak.



## Characteristics of Fatal Crashes

### Body Region Injured

For each bicyclist death in New York City, police investigators attempt to compile statements from on-scene medical and rescue personnel and witnesses to determine the type of injuries sustained from the crash. Injury type was unknown for 14% of the deaths.

Body Region Injured	Number	Percent
Known injury	177	86%
Unknown injury	30	14%
<b>Total</b>	<b>207</b>	<b>100%</b>

Source: NYC DOT Fatality Database

Of bicyclists with documented injury types, nearly three quarters involved a head injury.

Body Region	Number	Percent
Head only	86	49%
Head & all others	45	25%
All others	46	26%
<b>Total</b>	<b>177</b>	<b>100%</b>

Source: NYC DOT Fatality Database

} 74%

## Helmet Use

Information on helmet use was missing in some of the police records, particularly in the earlier years of this study's timeframe. Overall, information on helmet use was obtained for 59% of deaths.

<b>Helmet Use</b>	<b>Number</b>	<b>Percent</b>
Helmet use known	122	59%
Helmet use not known	85	41%
<b>Total</b>	<b>207</b>	<b>100%</b>

Source: NYC DOT Fatality Database

Among the fatalities with documented helmet use, 97% of the bicyclists were not wearing a helmet at the time of the crash. Only 4 bicyclists who died (3%) were wearing a helmet. All child or teen bicyclists who died were not wearing helmets. Helmet usage is required by law for all children under 14 in New York.

<b>Helmet Use</b>	<b>Number</b>	<b>Percent</b>
Yes	4	3%
No	118	97%
<b>Total</b>	<b>122</b>	<b>100%</b>

Source: NYC DOT Fatality Database

For bicyclist deaths occurring in 2004 and 2005 (n=38), documentation of helmet use was more complete (87% or 33). Analysis of helmet use in this subgroup revealed findings similar to the full group: 97% of bicyclists who died were not wearing a helmet. Of the 38 deaths during this time period 29 (or 76%) had head injuries.

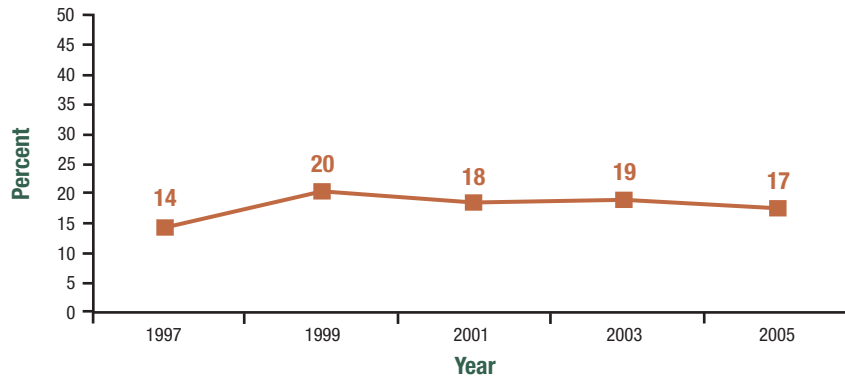
<b>Helmet Use</b>	<b>Number</b>	<b>Percent</b>
Yes	1	3%
No	32	97%
<b>Total</b>	<b>33</b>	<b>100%</b>

Source: NYC DOT Fatality Database

## Helmet-Wearing among NYC High School Students

The New York City High School Youth Risk Behavior Survey (YRBS) offers an alternative data source on helmet use among teenagers. Several thousand students from randomly selected public high schools participate in this anonymous survey every two years. One survey question probes helmet use. From 1997 to 2005, the proportion of students reporting that they ever wore a helmet changed very little. Between 14% and 20% of student bicyclists reported wearing a helmet in the past year.

### Student Bicyclists in New York City Reporting They Ever Wore a Helmet in the Past Year, 1997–2005



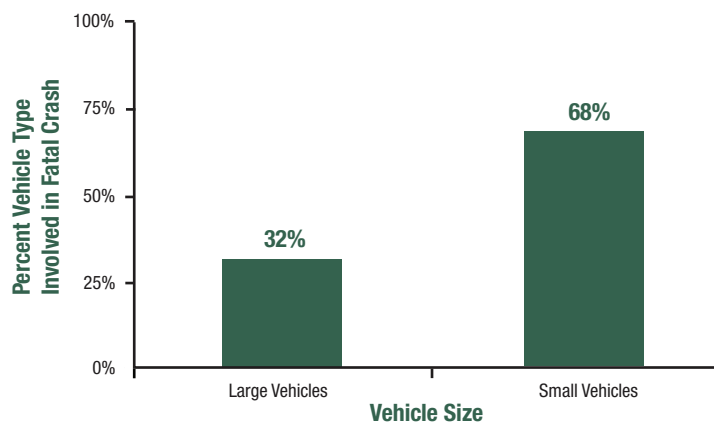
Source: NYC Youth Risk Behavior Survey

Another source of information on helmet use is available from a 2004 observational study conducted by the New York Metropolitan Transportation Council at 149 locations throughout New York City. Half of the study location observations were of bicycling on off-street paths, and half observed bicyclists riding on the street. Overall, the study found that 49% of bicyclists on off-street paths wore a helmet, whereas only 22% of bicyclists on streets wore a helmet.

### Motor Vehicle Type

Almost one third (32%) of traffic-related bicyclist deaths resulted from crashes with large motor vehicles, such as trucks and buses. Smaller vehicles such as cars, taxis, and sport utility vehicles were involved in 68% of fatal bicycle crashes. Taxis accounted for less than 1% (2) of crashes. Overall, taxis make up 2% of registered vehicles in New York City.

### Bicyclist Deaths by Vehicle Type, New York City, 1996–2005



Source: NYC DOT Fatality Database 11 crashes with unknown vehicle type are excluded

### **SPECIAL FOCUS:**

While it is difficult to determine the composition of small versus large vehicles on New York City roadways, two sources can provide some information.

- **Registered Vehicles in New York City, 2004**

Large vehicles constituted 5% of all registered vehicles and small vehicles constituted 95%.

- **Vehicle Classification on NYC Bridges**

On a typical weekday in 2004, between 7a.m. and 7p.m. slightly more than 1,820,000 vehicles crossed NYC bridges. Of these vehicles, 17% were large vehicles and 83% were small vehicles.

Based on these data sources, a disproportionate number of bicyclist deaths are caused by collisions with large motor vehicles, compared to large vehicle city traffic (32% of deaths vs. 5–17% of vehicles).

### **Crash-Related Factors for Motor Vehicle Drivers and Bicyclists**

In a crash scene investigation, investigators determine the apparent contributing factors for the fatal crash. Contributing factors do not assign blame. The purpose of assigning contributing factors to the motor vehicle driver, the bicyclist or both is to understand the actions that may have played a role in the crash. Contributing factors are categorized into three major types: human, vehicular and environmental. Contributing factors are listed on the police accident report; crash investigators use their professional judgement to indicate the apparent reasons for the accident. Factors were documented in almost all (97%) traffic-related fatal bicycle crashes.

<b>Documentation of Crash-Related Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Documented factors</b>	201	97%
<b>No factors documented</b>	6	3%
<b>Total</b>	<b>207</b>	<b>100%</b>

Source: NYC DOT Fatality Database

In crashes where factors were documented, almost all (94%) included human factors such as inattention or disregarding a traffic control device (i.e. a stop sign or traffic signal). Environmental factors, which accounted for 5%, included obstructed view, glare, slippery pavement and a defective shoulder. Vehicular factors such as defective brakes accounted for 1% of contributing factors.

<b>Factor Type</b>	<b>Number</b>	<b>Percent</b>
<b>Human</b>	189	94%
<b>Environment</b>	10	5%
<b>Vehicular</b>	2	1%
<b>Total</b>	<b>201</b>	<b>100%</b>

Source: NYC DOT Fatality Database

### **Multiple factors**

Each fatal crash may have multiple contributing factors assigned. For example, a bicyclist may have disregarded traffic controls while at the same time the motor vehicle driver may have been inattentive, resulting in two contributing factors for one crash. In 36% of crashes with documented factors, both the bicyclist and the driver were assigned factors that contributed to the crash. Overall, the bicyclist was assigned a factor more frequently than the motor vehicle driver. In interpreting these data, it is important to remember that in some fatal crashes the motor vehicle driver's recollection of the crash is the only one available, which may bias these findings to show more bicyclist errors compared to motor vehicle driver errors.

<b>Crash-Related Contributing Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Bicycle factor only</b>	86	42%
<b>Vehicle factor only</b>	41	20%
<b>Bicycle &amp; vehicle factors</b>	74	36%
<b>No factors documented</b>	6	3%
<b>Total</b>	<b>207</b>	<b>100%</b>

Source: NYC DOT Fatality Database

### **Motor Vehicle Crash-Related Factors**

The table below shows the top five crash-related factors attributed to motor vehicle drivers that may have led to bicyclist deaths, as determined by crash scene investigators. These included driver inattention (39%), driving at an unsafe speed (12%), obstructed view (10%), alcohol involvement (6%) and unspecified human error (5%). (For a more detailed description of these categories, please see the Technical Appendix.)

<b>Motor Vehicle Crash-Related Contributing Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Driver inattention</b>	45	39%
<b>Unsafe speed</b>	14	12%
<b>Obstructed view</b>	11	10%
<b>Alcohol involvement</b>	7	6%
<b>Unspecified human error</b>	6	5%
<b>All Others</b>	32	28%
<b>Total</b>	<b>115</b>	<b>100%</b>

Source: NYC DOT Fatality Database

### ***Bicyclist Crash-Related Factors***

Factors attributed to bicyclists were also examined. Disregarding traffic controls was the most frequently documented (38%), followed by bicyclist inattention (20%), failure to yield right of way (9%), and traveling the wrong way on a street (8%). Emerging from behind parked vehicles, unsafe lane changing, and passing or improper lane usage each accounted for 6% of bicyclist contributing factors.

<b>Bicycle Crash-Related Contributing Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Disregarding traffic controls</b>	61	38%
<b>Bicyclist inattention</b>	32	20%
<b>Failure to yield right of way</b>	15	9%
<b>Traveling wrong way</b>	13	8%
<b>Emerging from behind parked vehicles</b>	9	6%
<b>Passing or improper lane usage</b>	9	6%
<b>Unsafe lane changing</b>	9	6%
<b>All others</b>	12	8%
<b>Total</b>	<b>160</b>	<b>100%</b>

Source: NYC DOT Fatality Database

### **SPECIAL FOCUS:**

#### **Pedestrian Deaths Due to Collisions with Bicycles**

From 1996 through 2005, 11 pedestrians died as a result of crashes with bicyclists. Most of the pedestrians were older adults; the average age was 64 years. Most crashes (73%) took place in Manhattan.

#### ***The pedestrians***

- Ranged in age from 28 to 82 years old
- Average age, 64 years old (73% were age 60 or older)

#### ***Crash circumstances***

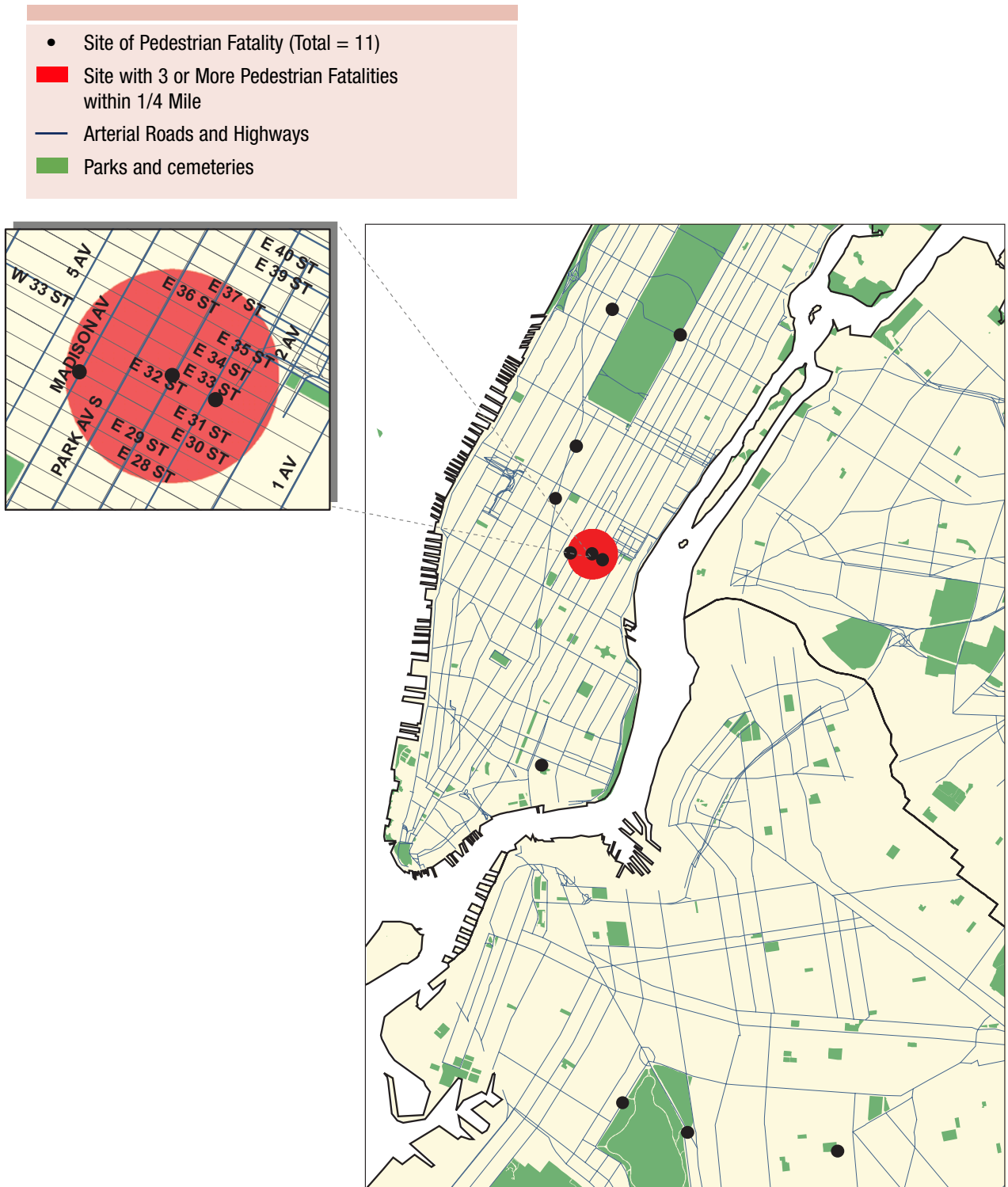
- 3 of the 11 (27%) pedestrians were identified as disregarding traffic controls such as crossing the street against the traffic light.

#### ***Crash location***

- 8 crashes with pedestrians in Manhattan (73%); 3 occurred within a 1/4 mile radius in the vicinity of Murray Hill.
- 3 crashes were in Brooklyn (37%).
- 4 crashes occurred on the perimeter of large parks.

Figure 3 shows the location of the 11 pedestrian deaths that resulted from a collision with a bicycle.

Figure 3: Bicycle-Related Pedestrian Fatalities in New York City 1996 to 2005



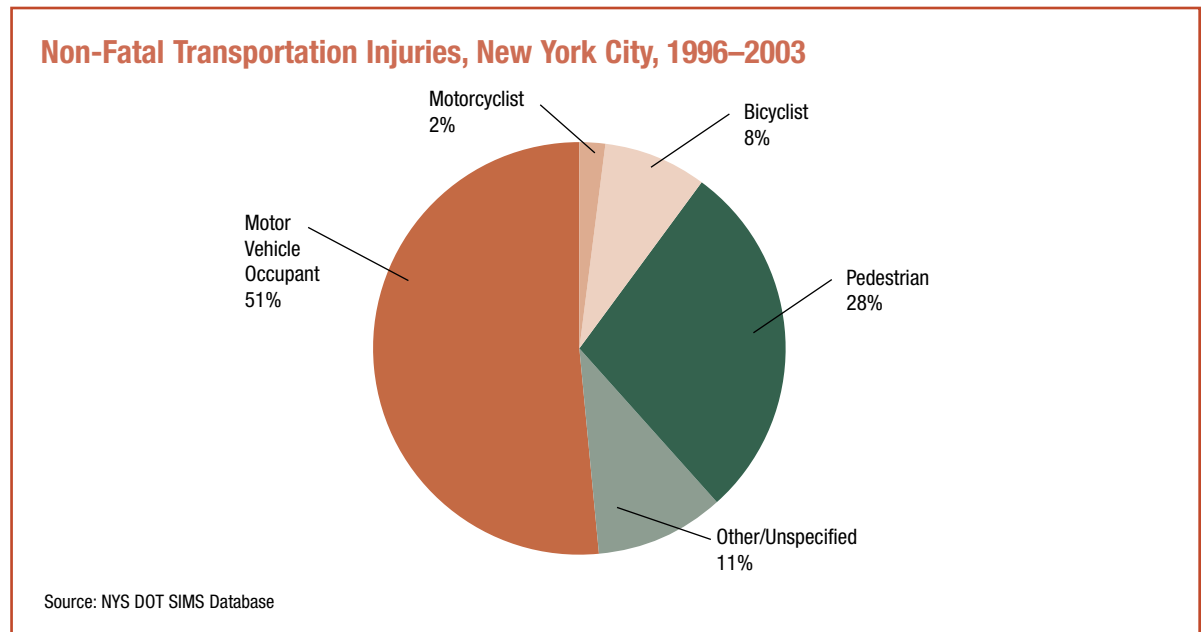
Source: NYC DOT Fatality Database

# Non-Fatal Bicyclist Injuries

As mentioned earlier, fatal crashes are the most thoroughly investigated type of crash. For traffic-related bicycle crashes that result in serious injury, data are available from the NYS DOT Safety Information Management System (SIMS). However, information on the circumstances of these crashes is less complete. This section highlights traffic-related bicycle crashes for the eight-year period 1996 through 2003, the most recent year for which data are available (information on non-traffic crashes is not collected). Serious injuries are defined as injuries that require the bicyclist to be taken to the hospital, and may include amputation, concussion, internal bleeding, severe burns, fracture and dislocation.

## Overview

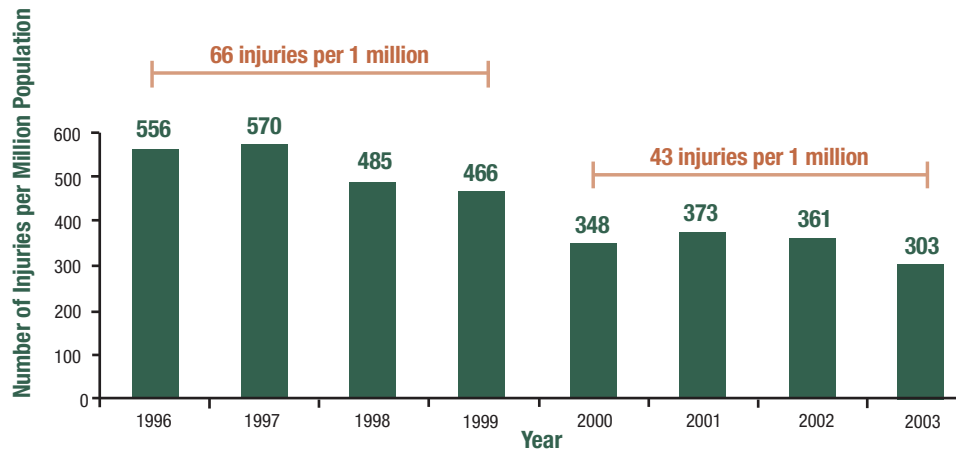
From 1996 through 2003, there were 43,882 transportation crashes resulting in serious injury of a motor vehicle occupant, motorcyclist, pedestrian or bicyclist. Motor vehicle occupants represented 51% of serious traffic injuries (n=22,366), followed by pedestrians at 28% (n=12,412). A total of 3,462 bicyclists (8%) were severely injured in non-fatal crashes with motor vehicles.



Unlike the stable rate of bicyclist fatalities, the number of injuries declined 46% from 556 injuries in 1996 to 303 in 2003. The average rate of serious bicyclist injuries for the first four years of the study period was 66 per million population (corresponding to approximately 519 serious injuries each year), compared to an average rate of 43 per million in the last four years (corresponding to approximately 346 serious injuries per year).



### Bicyclist Injuries, New York City, 1996–2003



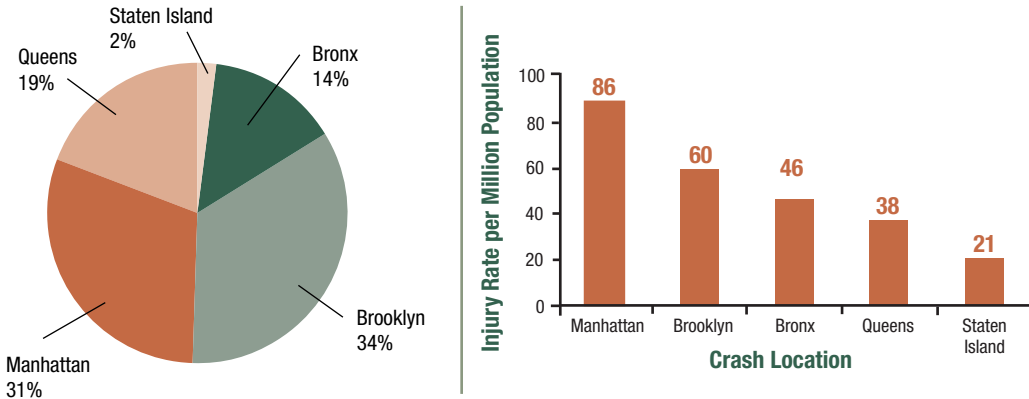
Source: NYS DOT SIMS Database

### Location of Crashes

#### Borough

Geographically, Manhattan had the highest rate of serious bicycle injuries per population size. Slightly more than a third (34%) of all crashes resulting in serious bicyclist injury took place in Brooklyn. Thirty-one percent of serious bicyclist injuries were in Manhattan.

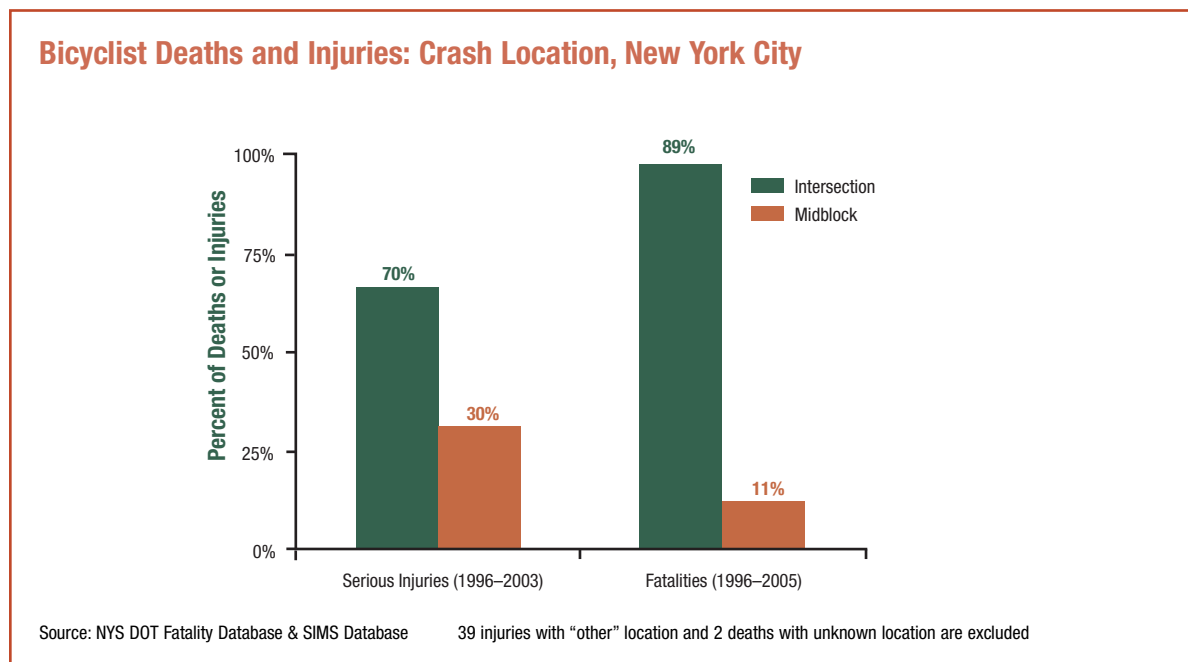
### Bicyclist Injuries: Crash Location, New York City, 1996–2003



Source: NYS DOT SIMS Database

### Crash Location: Intersection vs. Mid-block

Compared to bicyclist fatalities, a lower proportion of serious bicyclist injuries occurred at intersections (70% vs. 89%), suggesting that when crashes occur at intersections they are particularly dangerous.



**Figure 4** (opposite page) shows the location of all traffic-related bicycle crashes resulting in serious injury between 1996 and 2003. Highlighted areas show possible injury clusters – locations where 5 or more (red) or 3 or more (orange) collisions occurred within 250 feet during the time period. In the accompanying legend, information on the year of the crashes and the cross streets is presented. The densest clusters were observed in Midtown Manhattan, the areas just north of Central Park and the Central Bronx; however, large areas of clustering also occurred south of Midtown Manhattan.

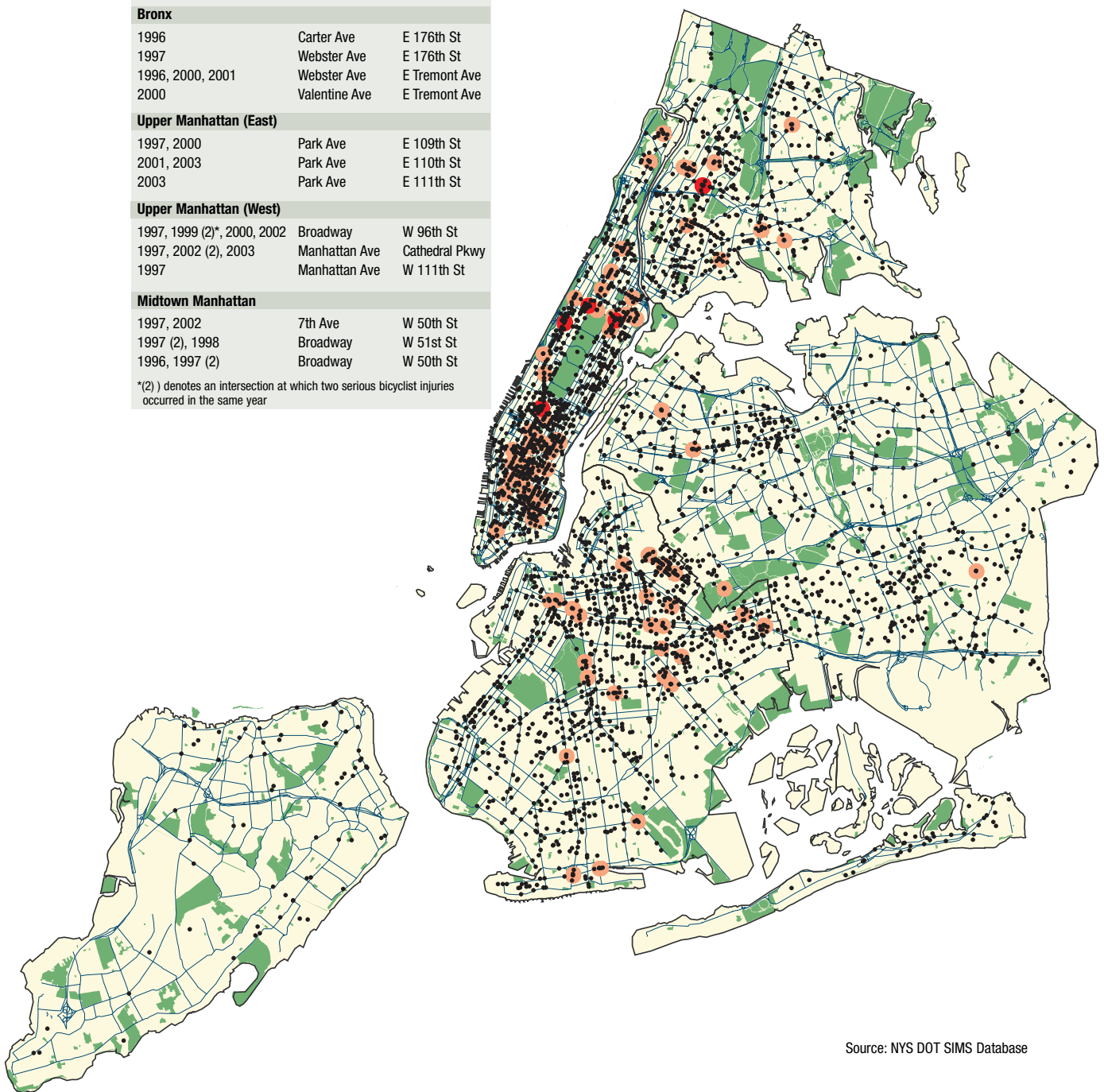
New York City community districts with the highest numbers of serious bicyclist injuries were Midtown Manhattan (199), Bedford-Stuyvesant, Brooklyn (123), and Jamaica, Queens (119). After taking into account district size, Midtown Manhattan also had the highest concentration of injuries, followed by the Lower East Side (105) and Greenwich Village/Soho (94).

**Figure 4: Traffic-Related Serious Bicyclist Injuries in New York City 1996 to 2003**

- Site of Injury (Total = 3,354)
  - Sites with 5 or More Serious Injuries within 250 Feet
  - Sites with 3 or More Serious Injuries within 250 Feet
  - Parks and cemeteries
  - Arterial Roads and Highways
- 108 crashes with unknown location are excluded

Intersections With 5 Or More Serious Injuries Within 250 Feet		
Year	Street 1	Street 2
<b>Bronx</b>		
1996	Carter Ave	E 176th St
1997	Webster Ave	E 176th St
1996, 2000, 2001	Webster Ave	E Tremont Ave
2000	Valentine Ave	E Tremont Ave
<b>Upper Manhattan (East)</b>		
1997, 2000	Park Ave	E 109th St
2001, 2003	Park Ave	E 110th St
2003	Park Ave	E 111th St
<b>Upper Manhattan (West)</b>		
1997, 1999 (2)*, 2000, 2002	Broadway	W 96th St
1997, 2002 (2), 2003	Manhattan Ave	Cathedral Pkwy
1997	Manhattan Ave	W 111th St
<b>Midtown Manhattan</b>		
1997, 2002	7th Ave	W 50th St
1997 (2), 1998	Broadway	W 51st St
1996, 1997 (2)	Broadway	W 50th St

\* (2) ) denotes an intersection at which two serious bicyclist injuries occurred in the same year



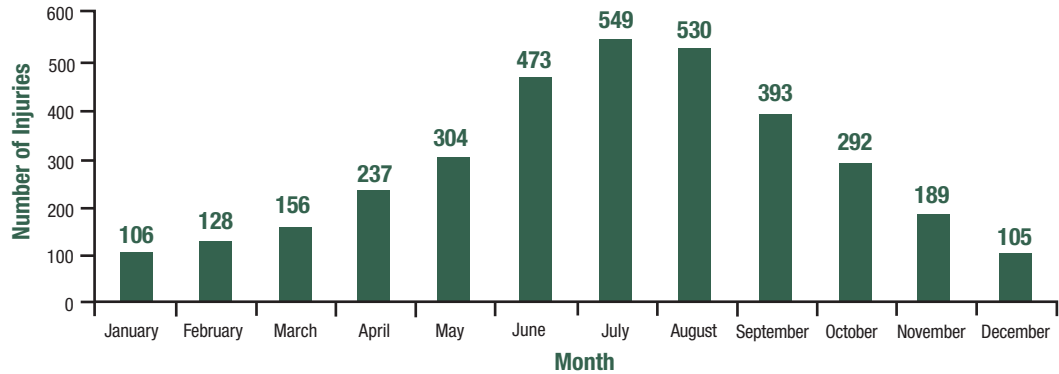
Source: NYS DOT SIMS Database

## Time of Crashes

### Month and Day of Week

From 1996 through 2003, similar to bicyclist deaths, the highest number of injuries was seen in the months of July and August and the lowest number of injuries occurred in December and January. There were no differences observed between weekdays and weekends (data not shown).

**Serious Bicyclist Injuries, by Month of Crash, New York City, 1996–2003**

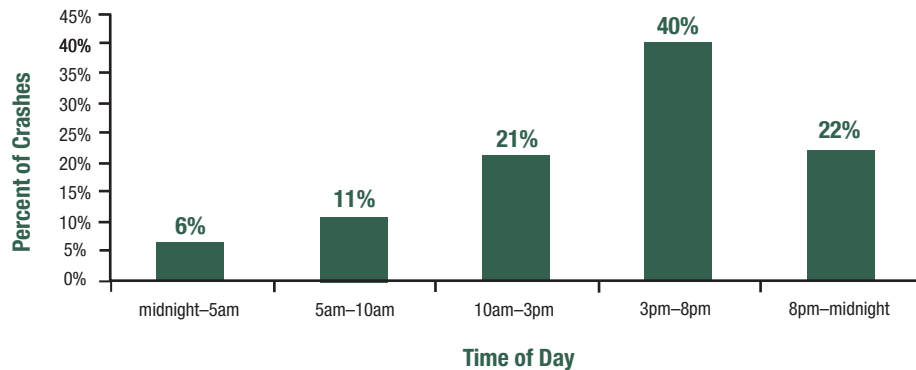


Source: NYS DOT SIMS Database

### Time of Day

Similar to bicyclist fatalities, many of the crashes resulting in serious injury happened between 3 p.m. and 8 p.m. The fewest crashes occurred after midnight and before daybreak.

**Serious Bicyclist Injuries, by Crash Hour, New York City, 1996–2003**



Source: NYS DOT SIMS Database 161 injuries with unknown crash hour are excluded

## Characteristics of Crashes

### Helmet Use

Documentation of helmet use among bicyclists suffering serious injuries improved markedly beginning in 2001. Even so, for the time period 2001–2003, helmet use was only documented in 32% of crashes resulting in serious injuries.

Helmet Use (2001–2003)	Number	Percent
Helmet use known	333	32%
Helmet use not known	704	68%
<b>Total</b>	<b>1037</b>	<b>100%</b>

Source: NYS DOT SIMS Database

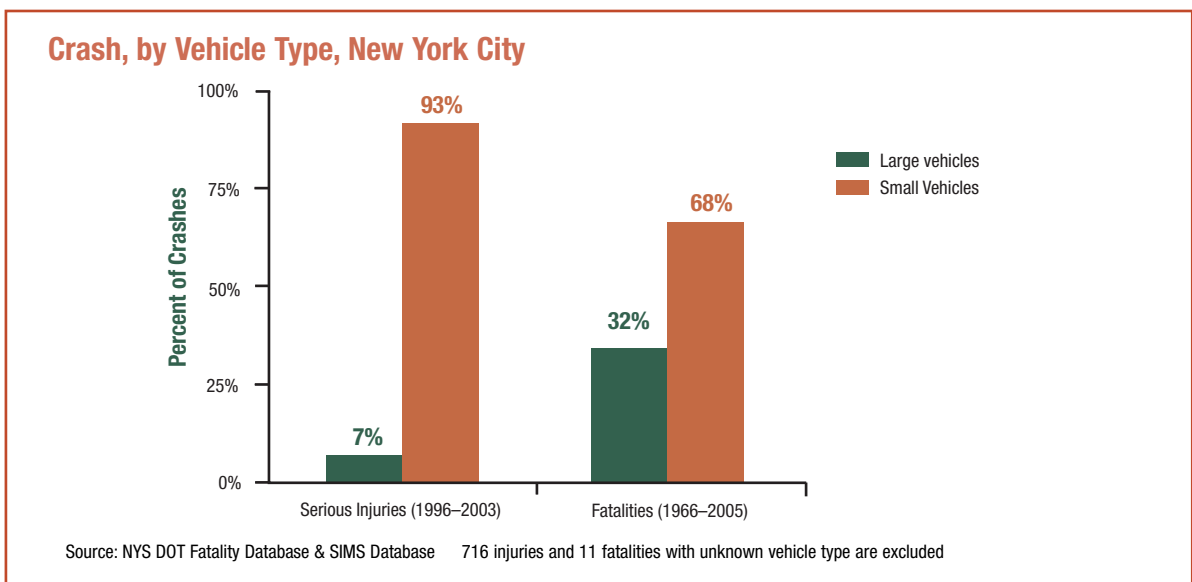
Among serious injury crashes for which helmet use was documented, 87% of bicyclists were not wearing a helmet at the time of the crash; 13% were wearing a helmet. While interpretation is hampered by missing data, the lower level of helmet use in fatal crashes (3% vs. 13%) suggests that not wearing a helmet may be particularly dangerous.

Helmet Use (2001–2003)	Number	Percent
Yes	43	13%
No	290	87%
<b>Total</b>	<b>333</b>	<b>100%</b>

Source: NYS DOT SIMS Database

### Motor Vehicle Type

Almost all (93%) serious bicyclist injuries resulted from crashes with smaller vehicles such as cars, taxis and SUVs. Large vehicles were involved in 7% of non-fatal crashes. This more closely mirrors the estimated NYC vehicle roadway mix described earlier in this report (*see page 18*), in contrast to the higher percentage of large vehicles involved in fatal bicycle crashes (32%).



### Crash-Related Factors

As with fatal crashes, investigators attempt to determine the contributing factors that played a role in non-fatal crashes, including the role of human factors (drivers and bicyclists), vehicular factors, and environmental factors. Factors were documented in more than half (55%) of bicycle crashes resulting in serious injury.

<b>Documentation of Crash-Related Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Documented factors</b>	1899	55%
<b>No factors documented</b>	1563	45%
<b>Total</b>	<b>3462</b>	<b>100%</b>

Source: NYS DOT SIMS Database

Of crashes with documented factors, almost all (95%) were human factors, such as inattention or disregarding traffic controls. Environmental factors, such as obstruction, glare, and slippery pavement, accounted for 3% of factors. Vehicular factors, such as defective brakes, accounted for 2% of contributing factors.

<b>Factors Types</b>	<b>Number</b>	<b>Percent</b>
<b>Human</b>	1804	95%
<b>Environmental</b>	60	3%
<b>Vehicular</b>	35	2%
<b>Total</b>	<b>1899</b>	<b>100%</b>

Source: NYS DOT SIMS Database

### Multiple Factors

In contrast to bicyclist deaths, a higher proportion of serious injury crash factors were assigned to motor vehicle drivers than to bicyclists, and only a small proportion (6%) were documented to be the result of both motor vehicle driver and bicyclist factors. Because both the bicyclist and the driver are available to recount the events leading up to the crash, the assignment of contributing factors for serious injuries might be more accurate than among fatalities. However the large amount of missing information makes this difficult to confirm.

<b>Crash-Related Contributing Factor Type</b>	<b>Number</b>	<b>Percent</b>
<b>Bicycle factor only</b>	455	13%
<b>Vehicle factor only</b>	1222	35%
<b>Bicycle &amp; vehicle factors</b>	222	6%
<b>No factors documented</b>	1563	45%
<b>Total</b>	<b>3462</b>	<b>100%</b>

Source: NYS DOT SIMS Database

### Motor Vehicle Crash-Related Contributing Factors

Driver inattention (31%), unspecified human error (29%), failure to yield (9%), speeding (4%) and disregarding traffic controls (4%) were the five most common factors attributed to motor vehicle drivers.

<b>Motor Vehicle Crash-Related Contributing Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Driver inattention</b>	454	31%
<b>Unspecified human error</b>	422	29%
<b>Failure to yield</b>	133	9%
<b>Speeding</b>	62	4%
<b>Disregarding traffic controls</b>	58	4%
<b>All others</b>	315	22%
<b>Total</b>	<b>1444</b>	<b>100%</b>

Source: NYS DOT SIMS Database

### Bicycle Crash-Related Contributing Factors

Among the top factors attributed to bicyclists, a bicyclist crossing into a vehicle path accounted for 84% of documented bicyclist contributing factors. This was followed by disregarding traffic controls (8%), failure to yield (2%), speeding (1%) and turning improperly (1%).

<b>Bicycle Crash-Related Contributing Factors</b>	<b>Number</b>	<b>Percent</b>
<b>Bicyclist crossing into a vehicle path</b>	572	84%
<b>Disregarding traffic controls</b>	54	8%
<b>Failure to yield</b>	13	2%
<b>Speeding</b>	9	1%
<b>Turning improperly</b>	8	1%
<b>All others</b>	21	3%
<b>Total</b>	<b>677</b>	<b>100%</b>

Source: NYS DOT SIMS Database

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# Discussion

## Summary

This report describes bicyclist fatalities in New York City over a ten-year period, as well as bicyclist serious injuries for an 8-year period. Several key points emerge from the analysis. First, nearly all bicyclist deaths were the result of a collision with a motor vehicle. In particular, a high proportion of bicyclist fatalities were due to a crash with a large vehicle, such as a truck or a bus. Second, the vast majority of deaths occurred outside of bicycle lanes and other bicycle facilities. When a fatal bicycle crash with a motor vehicle occurred on a city street with a bicycle lane, the bicyclist was always outside of the lane itself, suggesting that dedicated bicycle paths or lanes may help reduce crashes with a motor vehicle. Third, human factors on the part of both motorists and bicyclists were the most common type of contributing factor for bicyclist deaths. For motor vehicle drivers, inattention was the most frequent cause of involvement in a fatal bicyclist crash. For bicyclists, disregarding traffic signs or signals at intersections was demonstrated to be particularly deadly. Fourth, most bicyclists who died had head injuries, and nearly all of the bicyclists killed were not wearing a helmet at the time of the crash. Head injuries may not have been the primary cause of death in all cases, but these findings do highlight the head as being particularly vulnerable to injury and a likely major cause of bicyclist fatalities. While the rate of helmet use among those bicyclists with serious injuries was low, it was six times higher than the rate among those bicyclists killed. These data suggest that helmet use is a critically important protection for all bicyclists. Fifth, nearly all bicyclists who died were male. While the majority of bicyclists in NYC may indeed be male, these findings suggest that they are at greater risk for having a fatal accident. This report also identifies several geographic clusters of bicyclist fatalities and serious injuries. While not adjusted for level of bicycling activity, these clusters could be used to inform programs intended to increase bicyclist safety.

Many of the key findings in this report may be related to NYC's uniquely dense urban environment. The City's fast pace contributes to road users of all types frequently disregarding traffic signs and signals which can cause frequent and dangerous transportation encounters. Different trend patterns were noted between bicyclist fatalities and serious injuries. While serious bicycle injuries declined, fatalities remained fairly constant suggesting that additional resources and education are needed. Knowledge of whether bicycling increased, decreased, or stayed the same over the 10-year timeframe is limited, but screen-line count data and YRBS survey findings suggest that no large increase or decrease occurred. The possible lack of increase in bicycling in most recent years warrants attention, as promotion of bicycling can help address health problems such as obesity and diabetes.

## Limitations

One limitation of this report is its inability to calculate actual mortality rates among bicyclists to estimate the true risk associated with different bicycling practices. To do so would require more information about the number of bicyclists in NYC, how much they ride, and where they ride in the city. Geographic areas or demographic groups identified in this report as having higher numbers of fatalities or injuries may be the result of more bicyclists in these groups, as opposed to being at higher risk for bicycle crashes. Similarly, data measuring time of day and month are not normalized to take into account the volume of motor vehicles and bicyclists on the road.

This report describes all bicyclist fatalities and non-fatal serious bicyclist injuries in NYC identified by the following city agencies: DOT, NYPD, DOHMH, and OCME. The process of matching information on bicyclist fatalities from DOT and NYPD to DOHMH death certificates, and OCME files should have captured all bicyclist fatalities occurring in NYC during the study time frame. It is possible, however, that additional bicyclist fatalities or serious injuries occurred that were not properly reported.

While substantial effort was made to improve the quality and completeness of data by reviewing original records, this report is limited by missing information. Certain types of data were hard to capture, such as helmet use, contributing factors, traffic violations, and type of injury. The contributing factor data from bicyclist fatalities may be particularly incomplete, since many bicyclist fatalities lacked witnesses other than the motor vehicle driver.



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## Recommendations

The following recommendations are aimed at promoting bicycling and increasing bicycle safety. Recommendations are grouped for the following constituencies: motor vehicle drivers, bicyclists, community-based organizations and health care providers.

### *Motor Vehicle driver education and safety messages should explicitly address bicyclist safety, with a focus on the following critical messages:*

- **Be aware at all times**—Motorist inattention was found to be the most frequent known contributing factor for motor vehicle drivers in both fatal and serious injury bicycle crashes.
- **Respect bicyclists' right to the road**—By law, a bicyclist is granted the same rights to the road as a motor vehicle. However, in the case of an accident between a motor vehicle and a bicyclist, the bicyclist bears a far greater risk of death and injury than a driver. Motor vehicle drivers should be reminded that driving and parking in bicycle lanes is against the law, and that staying alert when turning can save lives.
- **Take additional precautions when driving large vehicles**—Due to the additional danger large vehicles pose and drivers' diminished ability to see bicyclists, drivers of trucks, vans and large sport utility vehicles should exercise extreme caution, particularly at intersections. Consider the use of cross over mirrors. Cross over mirrors, placed on the hood of a large vehicle, enable the driver to see pedestrians or bicyclists passing directly in front of the vehicle. Large vehicle drivers should be especially careful of the rear part of their vehicle when making a right turn.
- **Obey speed limits**—Unsafe speed by motor vehicle drivers was the second most frequent known contributing factor to fatal bicycle crashes.

### *Bicyclist education and safety messages should be provided to both NYC children and adults:*

- **Wear a bicycle helmet at all times while riding**—Nearly three-quarters of bicyclist fatalities with available information involved an injury to the head. Nonetheless, our data suggest nearly all (97%) riders involved in a fatal crash, and 87% of riders seriously injured were not wearing a helmet at the time of the accident. Bicycle helmet usage is mandatory for all children under the age of 14 in New York; safety messages should remind families of this law and encourage all bicyclists to wear helmets.
- **Follow traffic rules and control devices**—Disregarding traffic controls such as traffic signs or signals was the most frequent contributing factor among bicyclist fatalities and the second most frequent contributing factor in serious injuries.
- **Be alert when crossing roadway intersections**—Most bicyclist fatalities occurred within 25 feet of an intersection. Even when following traffic signals properly, bicyclists need to stay alert when crossing roadway intersections.
- **Stay on designated bicycle lanes whenever possible**—Designated lanes may provide bicycle riders additional protection from motor vehicles and increase awareness among drivers. Riders are also cautioned against riding on limited access highways, which is prohibited by law. Crashes on limited access highways accounted for 7% of all fatal crashes.
- **Be aware at all times**—Bicyclist inattention was the second most frequent known contributing factor to fatal bicycle crashes.
- **Stay off sidewalks and exercise care around pedestrians**—The majority of pedestrian deaths occurred on a sidewalk or in a designated lane shared by pedestrians and bicyclists.

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***Health care providers and community-based organizations should actively promote safe bicycling as a way to increase physical activity and fitness.***

- **Encourage bicycling as a fun way to increase physical activity**—Regular bicycling improves health by reducing the risk of obesity, cardiovascular disease and other major diseases.
- **Offer prevention messages about bicycle safety**—Health care providers and community-based organizations are trusted sources of reliable information. Staff and providers can remind patients about bicycle safety, promote helmet use, encourage riders to wear bright clothing and reflectors, educate riders to stop and look before entering roadways, and ask parents to supervise young children while they are riding.
- **Provide resources to encourage safe bicycling**—Health care providers and community-based organizations can provide and distribute information about free and low cost helmet programs, proper use of bicycle helmets, and bicycle maps such as those produced by DOT (See Resources).

### **Action Steps**

There are a number of steps that the City of New York can immediately take to improve bicycle safety. The City will undertake the following action steps by September 2007:

#### ***Bicycle Infrastructure***

The City will continue to expand and improve bicycle facilities. Facilities such as bicycle lanes may lead to increased bicycle safety and an increase in ridership.

- Complete 200 miles of bicycle facilities (paths, lanes and routes) over the next three years on NYC streets.
- Focus on introducing new bicycle paths and improving and maintaining existing ones.
- Conduct a pilot program of easily identified green-colored lanes to reinforce on-street striped lanes.
- Install chevron markings, bicycle logos, and special signs for bicycle routes designed to improve how bicyclists and motorists share the road.
- Investigate opportunities to incorporate requirements into the NYC Zoning Resolution for indoor bicycle parking in new buildings, as well as during substantial renovations.
- Accelerate the placement of outside bicycle parking racks citywide.
- Conduct follow up analyses to better ascertain locations which have disproportionately high fatalities or injuries in relation to exposure. Study these locations for possible safety improvements.
- Install bicycle racks on city park grounds, either as part of planned Capital projects or, where Capital projects are not planned but demand exists. Use the CityRacks program to incorporate bicycle racks where feasible and appropriate.
- Aggressively pursue grant funding for new greenway construction.
- Upgrade and improve existing greenway infrastructure within City parks.
- Complete 40 miles of greenways in City parks over the next four years, as well as aligned greenway destinations and enhancements such as comfort stations, boat launches, and environmental restoration projects.
- Begin construction of mountain bike trails in the South Park section of Fresh Kills, Staten Island. Complete construction of mountain bike trails in Highland Park and Cunningham Park in Queens.

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### **Motorist Awareness**

The City will take the following steps to increase motorist awareness of bicyclists:

- Launch a public awareness campaign for both motorists and bicyclists to increase roadway awareness and make clear a bicyclist's right to the road. This campaign will be conducted in collaboration with elected officials, community partners and transportation advocates.
- Provide materials on bicycle awareness to new driver education and remedial traffic school programs.
- Expand the number of workshops for commercial and non-commercial drivers in the City's government fleet, and include bicycle safety information.
- Work with commercial and non-commercial driving associations such as American Automobile Association (AAA), the American Trucking Association, the Truck Load Carriers Association and Teamsters Local 16 to increase awareness around bicycle safety issues.

### **Bicyclist Awareness**

The City will undertake the following efforts to increase awareness among bicyclists:

- Launch a public awareness campaign for both motorists and bicyclists to increase roadway awareness and make clear a bicyclist's right to the road. This campaign will be conducted in collaboration with elected officials, community partners and transportation advocates.
- Introduce programs to supply free bicycle helmets and helmet fit instructions to all interested bicyclists in New York City.
- Develop a video documentary that depicts the dangers associated with failing to obey traffic laws while riding a bicycle.
- Collaborate with community partners, transportation advocates and schools to increase promotion of helmets and other protective gear (such as bells, lights, mirrors, and bright clothing), and to increase awareness among parents and children about the mandatory bicycle helmet law for children under 14.
- Work with associations of bicycle riders, including delivery and messenger services, to improve bicycle safety among workers.
- Coordinate the DPR Bicycle Safety Education Campaign with off-peak closures in Central Park. Invite bicycling advocates to join city officials at campaign checkpoints.
- Develop a hands-on bicycling skills and safety instruction program to be added to after-school and summer camp programs run by the Department of Parks and Recreation. Participating children will practice riding bicycles and wearing helmets properly and will receive certificates upon completion.
- Develop a family bicycling program to be offered during the spring and summer months at parks and greenways throughout the city. The program will include safety instruction. Certain venues will also offer guided nature and historic rides led by Urban Park Rangers.
- Increase participation in the Queens Star Track youth track cycling and mentoring program for children 9-13 years old, located at the Kissena Velodrome. Consider development of an indoor fitness and nutrition component during winter months. Support participation in track bicycling competitions for advanced cyclists.
- Educate bicyclists about existing and proposed bike routes through increased distribution of bicycling maps, particularly in areas with high rates of bicycle traffic.

### **Investigation and Enforcement**

The City will undertake the following efforts to improve crash investigations and enforce existing regulations:

- Train more DOT accident investigation staff to ensure that all transportation fatalities are investigated in a timely manner.
- Continue enforcement of laws against motorists who are parked or driving in a bicycle lane, and enforce proper regard of traffic control signals among motorists and bicyclists.

## Legislation

The City will undertake the following efforts related to roadway legislation:

- Support state legislation requiring large vehicles to be equipped with cross over mirrors. These mirrors, commonly seen on school buses, increase a vehicle operator's ability to see in front of the vehicle.
- Support legislation to increase the fine for motor vehicles that park in bicycle lanes within city parks.
- Explore the utility of legislation as a means to increase helmet use.

## Improve Data Collection, Analysis and Reporting of Bicyclist Injuries

One of the limitations of this study was the incomplete or inconsistent data on bicyclist fatalities and injuries. To improve data collection the City will take the following steps:

- Train health care providers to better document contributing factors in medical records.
- Add a question on bicycle use to DOHMH's annual population-based telephone survey of adults to better enumerate the bicycling population and monitor trends.
- Reconcile bicyclist death information among Department of Transportation (Fatality Database), NYPD (Accident Investigation Squad) and Department of Health and Mental Hygiene (Vital Records Death Certification) on a quarterly basis, to better ascertain the number of bicyclist fatalities each year.
- Conduct a follow up examination on bicyclist fatalities between 1996 and 2005 using Office of the Chief Medical Examiner files to identify additional factors contributing to fatal bicycle crashes including the clinical impact of head trauma, occupational risks, and risks specific to children.
- Consider conducting the screen-line count more frequently, and extend it to additional boroughs.
- Submit a proposal to the NYS Department of Motor Vehicles to modify the recording of bicycle crash information on the police accident form. Such a change may lead to improved, more standard documentation of bicycle crash information.

## Key New York City and New York State Traffic Laws for Motorists and Bicyclists

### For motorists and passengers:

- Parking, standing or stopping vehicles within, or otherwise obstructing, bicycle lanes is prohibited.
- Motor vehicles must not drive across a bicycle lane except for access, safety, and turns.
- Motor vehicle drivers must signal and look before making a turn.
- Motor vehicle drivers and passengers cannot open the door or get out of the vehicle on the side available to moving traffic unless and until it is reasonably safe to do so.
- Motor vehicle drivers should not exceed 30 mph unless a posted sign indicates otherwise.

### For bicyclists:

- Riding bicycles on sidewalks is prohibited.
- Bicyclists must ride with traffic.
- Bicyclists must use a bicycle lane or path if provided except for access, safety, and turns.
- Bicycles are prohibited on expressways, drives, highways, interstate routes and thruways unless authorized by signs.
- A bicycle rider must ride on a permanent seat with feet on pedals. The bicycle must carry only the number of persons for which it is designated and equipped.
- Attaching a bicycle to another vehicle being operated on a roadway is prohibited.
- The following equipment is required: a white headlight and red taillight from dusk to dawn, a bell or other audible signal (not whistle), working brakes, and reflective tires and/or other reflective devices.
- Bicyclists are required to use hand signals to turn left/right and to stop/decrease speed. A rider can use either hand to signal a right turn.
- Any child under age 14 operating a bicycle must wear a helmet.
- Children under the age of 1 may not be passengers on bikes.
- Child passengers must wear helmets and be carried in a properly affixed child carrier.

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## Technical Appendix

### DATA SOURCES:

**Deaths and Serious Injuries:** The NYPD Highway Patrol District Accident Investigation Squad (AIS) investigates vehicle and bicycle accidents in which a person is killed or seriously injured and likely to die. A *serious injury* is defined by the NYS Department of Motor Vehicles as an injury that requires the bicyclist to be taken to the hospital, and may include amputation, concussion, internal bleeding, severe burns, fracture and dislocation.

Police officers record information about fatal or non-fatal accidents on a two page Police Accident Report. Fields on this form reflect the State Department of Motor Vehicle accident reporting requirements. Time and date of the accident, demographic information on person killed or injured, and vehicle, environment and human factors contributing to the accident are key fields on this form. Officers also write evaluative summaries detailing the accident. The Police Accident Report was modified in 1996 to include a field for bicyclist helmet use.

Key data from the Police Accident Reports are entered and archived in two state databases. From the Accident Information System (AIS) database maintained by the NYS Department of Motor Vehicles, select fields were used to describe bicyclist fatalities in NYC. The serious injury information used for this report was obtained from the NYS DOT Safety Information Management System (SIMS).

**Ridership and Helmet Wearing in Teens:** The New York City Youth Risk Behavior Survey (YRBS), administered every two years, is an anonymous cross-sectional survey of public high school students. The survey question described in this report is:

When you rode a bicycle during the past 12 months, how often did you wear a helmet?

- |  |                                    |
|--|------------------------------------|
| a. I did not ride a bicycle during the past 12 months. | d. Sometimes wore a helmet.        |
| b. Never wore a helmet.                                | e. Most of the time wore a helmet. |
| c. Rarely wore a helmet.                               | f. Always wore a helmet.           |

**Vehicles on NYC roads:** The New York State Internet Office of the New York State Department of Motor Vehicles, Statistics, Vehicle Registrations in Force, 2004 is the source of information on large and small vehicle registration. A different data source, the New York City Department of Transportation Vehicle Classification on NYC Bridges, 2004 corroborates this information. In observations made in both directions on NYC bridges between 7:00 a.m. and 7:00 p.m., DOT officials determined the distribution of large and small vehicles, classified as autos, buses, commuter vans, trucks, or commercial vans.

**US comparison data:** National data on bicyclist fatalities come from the CDC's National Centers for Injury Prevention and Control Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. Data considered are 1999 to the most recent year available (2003), because of 1999 changes in the external cause injury coding in the International Classification of Disease.

**DOT Screen-line Count:** The annual bicycle screen-line count is conducted by the New York City Department of Transportation. The survey is performed weekdays from 7 a.m.–7 p.m., over a period of 2 weeks at the summer's end or early fall. The survey is conducted at 50th Street from First Avenue to the Hudson River Greenway, on all four East River Bridges, and the Staten Island Ferry bike loading area at Whitehall Terminal.

### DOT AND DOHMH BICYCLIST FATALITIES MATCH

All DOT and NYPD-reported bicyclist fatalities between 1996 and 2005 were matched with those recorded by the DOHMH's Office of Vital Statistics. Bicyclist fatalities were identified by underlying Cause of Death with the following International Classification of Disease codes: for 1996-1998 ICD 9 codes of E810-E819, E800-E807, E820-E825, E826.1, E826.9, E827-E829; for 1999-2005 ICD 10 codes of V10-V19, with a fourth digit subdivision identifying the injured person as a pedal cyclist were included. The DOHMH Office of Vital Statistics identified 46 deaths that did not have a clear match with the DOT Fatality Database. DOHMH staff conducted Office of Chief Medical Examiner (OCME) case record reviews of these 46 cases. Of these, 4 case files were missing. Among the 42 cases reviewed, 10 were matched with DOT fatalities since more data were available to confirm the match; 13 were confirmed to involve a crash with a motor vehicle and a bicyclist and these cases were added to the DOT fatalities list; the remaining 19 were excluded because the accident occurred outside of New York City, because the deceased was incorrectly identified as a bicyclist or because the accident did not involve a bicycle.

### MAPPING PROCEDURES:

Locations of fatalities were geocoded for placement on maps using Geosupport Desktop Edition Software Version 9.6.9. There were insufficient data to geocode one fatality in Queens. Locations of serious injuries were previously geocoded by the NYC DOT. There were 108 serious injuries without sufficient location data for geocoding (20 in the Bronx, 34 in Brooklyn, 24 in Manhattan, 24 in Queens, and 6 in Staten Island).

ESRI ArcMap version 9.1 software was used to draw circular buffers around each fatality or injury location, beginning by using a radius of 250 feet, which is the approximate average length of a NYC block. The buffer radius was increased by 50 foot increments up to one quarter mile maximum radius. Areas with a minimum of three fatalities or injuries occurring within the buffer area were identified as possible clusters. The buffer radius was increased to 1000 feet to identify possible fatality clusters; however, possible injury clusters were identified using a 250 foot radius.

### ADJUSTMENTS:

Percentages and rates have been rounded to the nearest whole number.

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### For copies of this report

Please call 311, visit [nyc.gov/health](http://nyc.gov/health) or [nyc.gov/dot](http://nyc.gov/dot), or email [bicycling@health.nyc.gov](mailto:bicycling@health.nyc.gov)

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*Cover photos provided by Masami Adachi.*

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## Resources

### NYC Government

<b>NYC Department of Transportation, Bicycles &amp; Pedestrians</b>	<a href="http://www.nyc.gov/dot">www.nyc.gov/dot</a>
<b>NYC Department of Health and Mental Hygiene</b>	<a href="http://www.nyc.gov/health">www.nyc.gov/health</a>
<b>New York City Police Department</b>	<a href="http://www.nyc.gov/nypd">www.nyc.gov/nypd</a>
<b>NYC Department of Parks and Recreation, Planning Division</b>	<a href="http://www.nyc.gov/parks">www.nyc.gov/parks</a>
<b>NYC Department of City Planning, Transportation Division, <i>Bicycle Network Development Program</i></b>	<a href="http://www.nyc.gov/planning">www.nyc.gov/planning</a>

For a listing of additional bicycling resources, please visit: <http://www.nyc.gov/html/dcp/html/bike/orgs.shtml>



