

2016 INDIANA FIREWORK-RELATED INJURY REPORT

November 2016



Division of Trauma and Injury Prevention

Indiana State Department of Health

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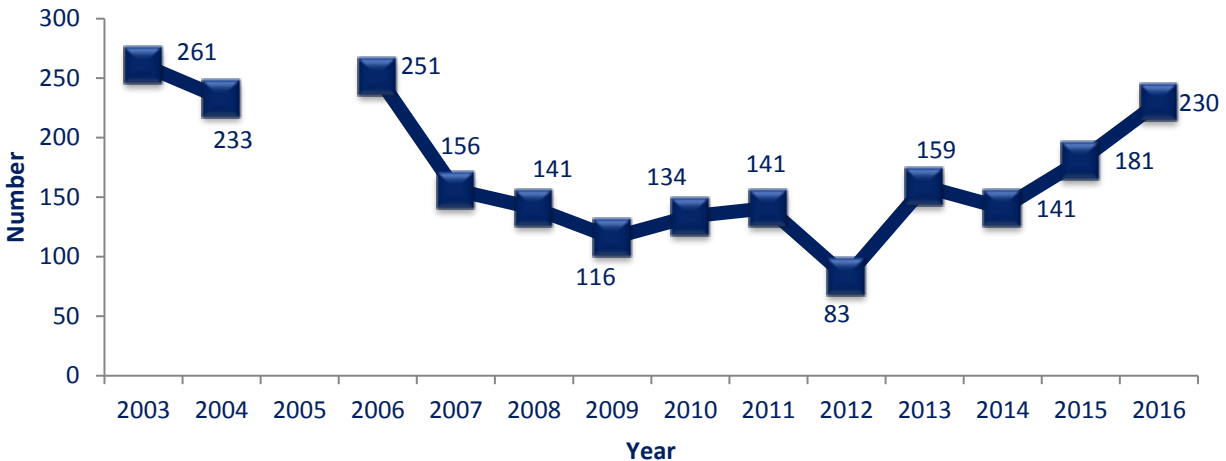
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All hospitals, medical facilities and private medical practices are mandated by law to report all firework injuries and deaths to the Indiana State Department of Health (ISDH); however, it is estimated that the number of injury reports received is an underestimation of the true burden of fireworks injuries. This report presents firework-related injury data compiled from submitted fireworks forms for the 2016 reporting cycle (Sept. 13, 2015 – Sept. 12, 2016). Figure 1 indicates the number of firework-related injuries from 2003 to 2004 and 2006 to 2016.

Figure 1. Firework-related injuries by reporting cycle year, Indiana, 2003–2016*



*2016 reporting cycle included cases from Sept. 13, 2015–Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention.

2016 highlights

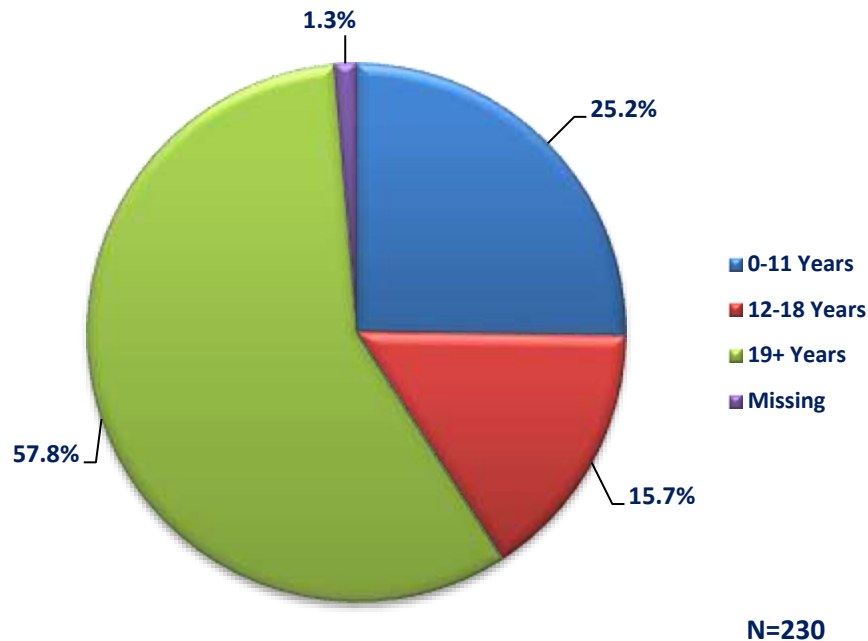
- There were 230 unduplicated cases of firework-related injuries reported to ISDH.
- No deaths were reported due to firework-related injuries.
- Forty-one percent of all reported firework-related injuries involved individuals 18 years of age and younger. The youngest injured person was 6 months old.
- Nearly 70 percent of cases were among men; 50 percent of total cases were white men.
- Eighty-five cases occurred on July 4, 2016, which represents 37 percent of all reported cases.
- Thirty-one percent of firework-related burn injuries were to the hands and fingers.
- Fifty-one cases were hospitalized or transferred to another hospital for treatment.
- Eye injuries accounted for 12.1 percent of the total number of injuries; 83.3 percent of these cases did not use eye protection.
- Forty-eight percent of the injuries were caused by firecrackers, rockets and aerial devices.
- Malfunctioning or mishandling of fireworks accounted for nearly 55 percent of reported fireworks injury mechanisms.
- Firework use on private property accounted for 58.7 percent of reported injury cases.

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Demographics

- The median age of persons with a firework-related injury was 22 years. The average age of all injured persons was 24.1 years old; ages ranged from 6 months to 84 years. Three cases did not report age.
- Forty-one percent of those injured were age 18 or younger, with 25.2 percent of those injured under the age of 12 (Figure 2).
- Across all age groups, males reported more firework-related injuries than females. Of reported injuries, 69.6 percent involved males. Four cases did not report gender. (Figure 3).
- Sixty-nine percent of persons injured were white, 17.4 percent were black or African-American and 2.2 percent were multiracial (Figure 4). Race was not known or not reported in 10.4 percent of the injury reports. White males represented 50.0 percent of cases.
- Nearly one-fourth of the injury reports did not record ethnicity. Of those who reported ethnicity, Hispanic ethnicity was reported in 7.4 percent of cases.
- Ninety percent of injured people provided a home address in Indiana, 4.3 percent reported out-of-state addresses, and 5.2 percent did not provide an address. The counties of residence with the most cases of firework-related injuries were Marion, Lake and Porter counties, with 32, 21 and 16 cases, respectively.

Figure 2. Firework-related injuries by age group, Indiana, 2016*

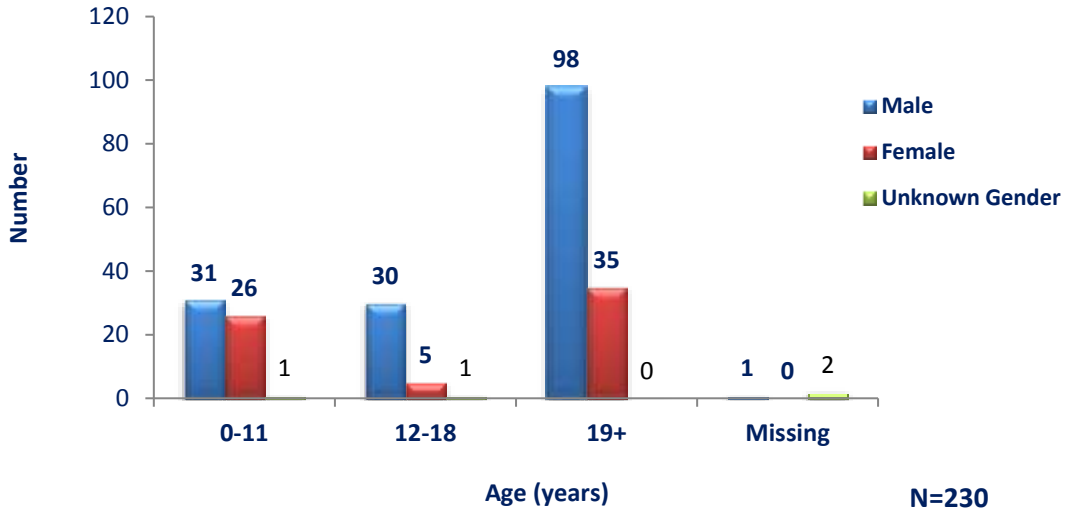


*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

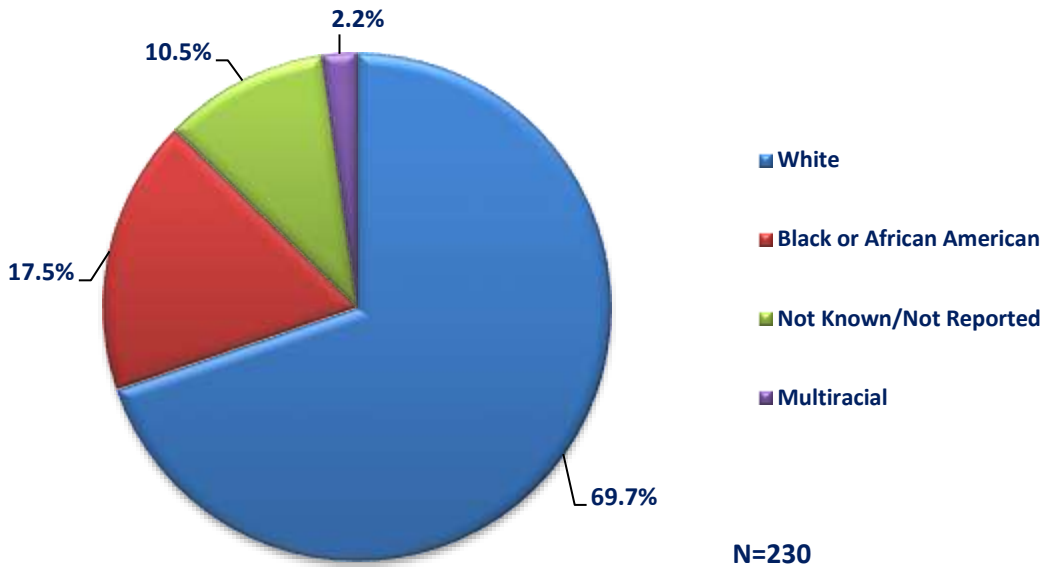
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Figure 3. Firework-related injuries by age and sex, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.
 Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

Figure 4. Firework-related injuries by race, Indiana, 2016*



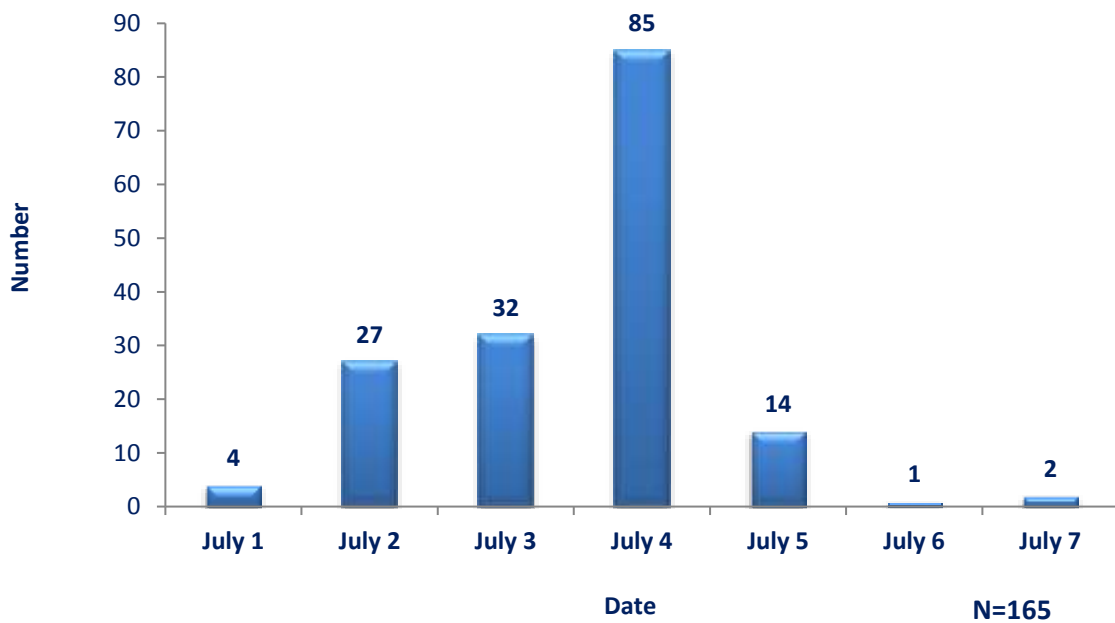
*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.
 Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

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Date and time of injuries

- Nearly seventy-two percent of all reported injuries in 2016 occurred from July 1–7, and 37.0 percent of all fireworks injuries in 2016 occurred on July 4 (Figure 5).
- Seven firework-related injury were reported between Sept. 12 and Dec. 31, 2015. Twenty-two firework-related injuries were reported between Jan. 1 and June 30, 2016. Twenty-two cases occurred from July 8 to Sept. 12, 2016. Thirteen cases did not have information about the date the injury occurred.
- Fifty-eight percent of reported firework-related injuries occurred between 8 p.m. and midnight, with 54 cases occurring between 10 and 10:59 p.m. and 29 cases occurring between 11 and 11:59 p.m. (Figure 6).
- Thirty-five cases failed to report the time the injury occurred, of which 22 failed to report if the injury occurred before or after noon.

Figure 5. Firework-related injuries by date, July 1–July 7, Indiana, 2016*

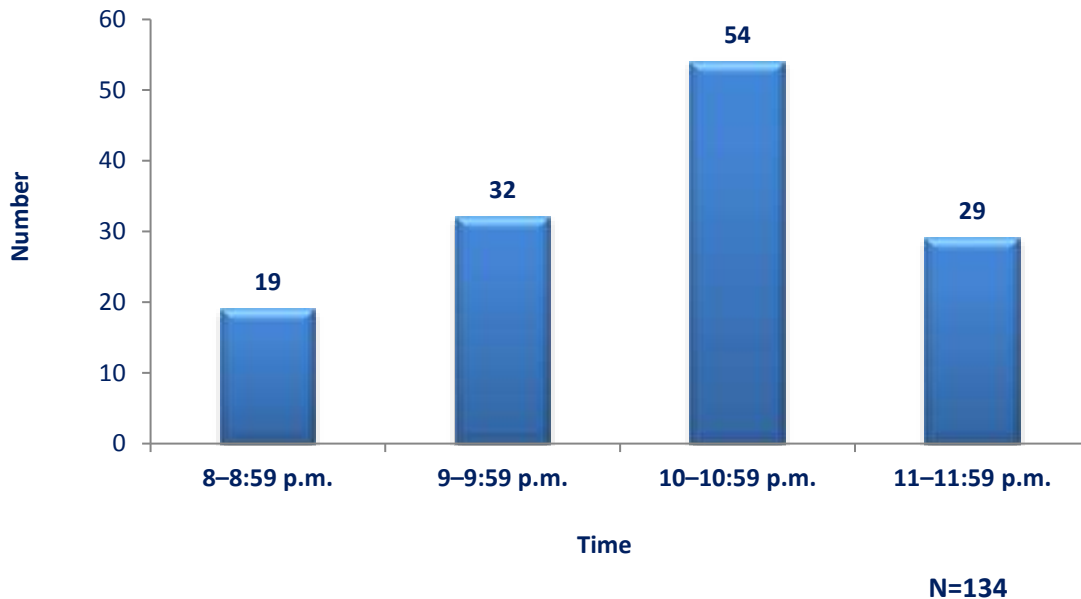


*2016 reporting cycle includes cases from Sept. 13, 2015–Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

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Figure 6. Most frequent times of day when firework-related injuries occurred, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

Type of fireworks involved in injuries

- ❑ Rockets, firecrackers and aerial devices accounted for nearly half (48.5 percent) of the reported injuries (Table 1).
- ❑ At least twenty of the “other” types of fireworks injuries were indicated to have involved mortars (tube-shaped devices used as launching mechanisms for shells in aerial fireworks displays).
- ❑ Two individuals were noted to be injured by more than one firework. One individual was reportedly injured from holding numerous sparklers that were lit at the same time. Another individual was injured when several fireworks were placed in a glass jar, which heated the jar to the point of explosion.
- ❑ Six cases involved more than one type of firework.
- ❑ Malfunctioning or mishandling of fireworks accounted for 54.8 percent of reported fireworks injury mechanisms (Figure 7). For 16 reports, there were more than one cause of firework-related injury, leading to 250 causes for 230 reported injuries.

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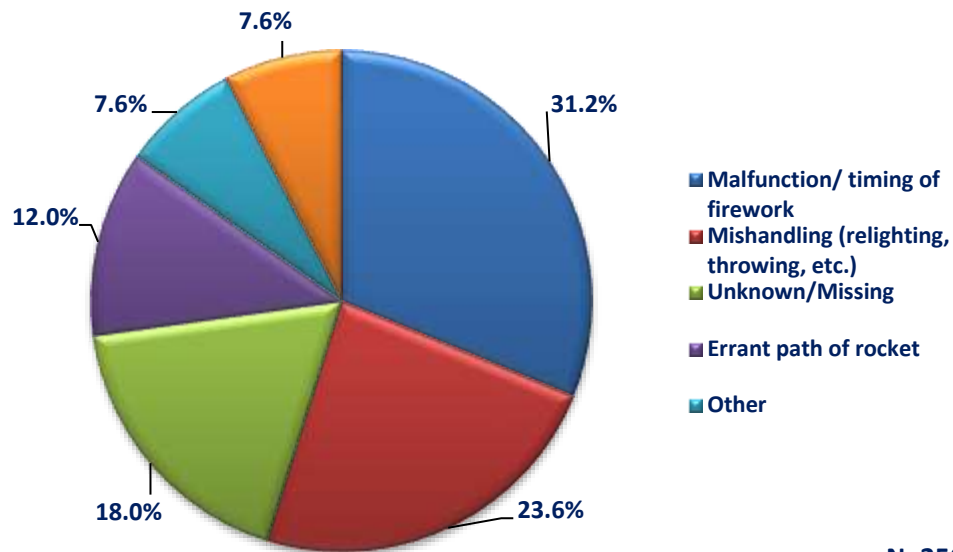
Table 1: Frequency and percent of firework type involved in injury, Indiana, 2016*

Firework Type	Frequency	Percent
Other, specified	63	26.6
Firecrackers	48	20.3
Rockets	41	17.3
Sparklers	26	11.0
Aerial devices	26	11.0
Unknown / Missing	19	8.0
Twisters	5	2.1
Homemade fireworks	5	2.1
Lighting gunpowder	2	0.8
Pyrotechnics	2	0.8
Total	237	100.0%

*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

Figure 7. Cause of firework-related injury, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

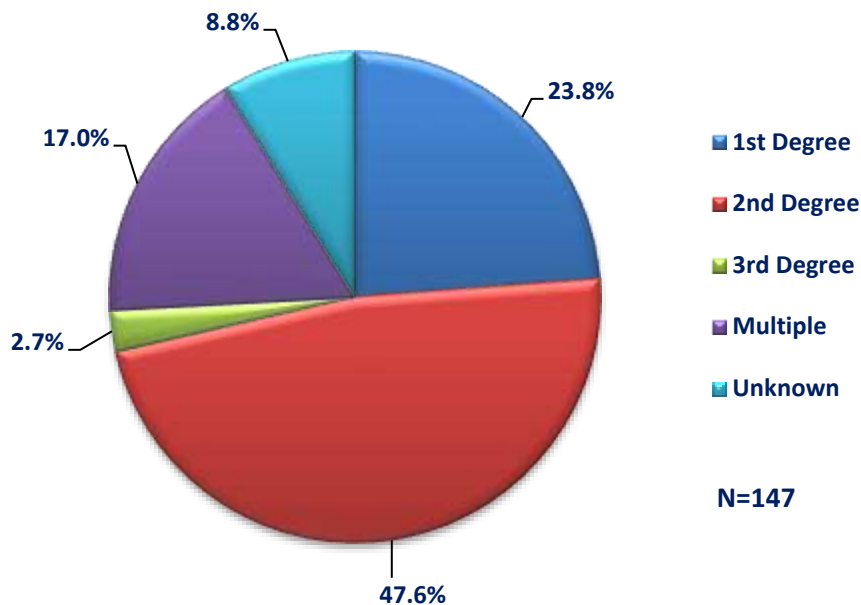
Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

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Type of injuries

- During the 2016 reporting cycle, there were 309 firework-related injuries that occurred among 230 individuals. Fifty-five individuals experienced multiple types of injuries.
- Burn injuries were reported in 147 individuals (47.6 percent), of varying degrees of severity:
 - 35 were first-degree burns
 - 70 were second-degree burns
 - 4 were third-degree burns
 - 25 were multiple-degree burns
 - 13 did not indicate degree of burn (Figure 8)
- Burns were the most commonly reported injury; 31.3 percent of burns were of the hands or fingers and 14.8 percent of burns were of the face, ear and head.
- Other types of injuries included contusions/lacerations/abrasions (25.6 percent), penetrating foreign body/missiles (5.8 percent), sprains/fractures (5.5 percent), puncture wounds (3.6 percent), other injuries (8.7 percent), and the injury was not known or not recorded in 3.6 percent of cases (Figure 9).
- Seven injuries were documented to have resulted in amputation.

Figure 8. Degree of burn experienced from firework-related injury, Indiana, 2016*

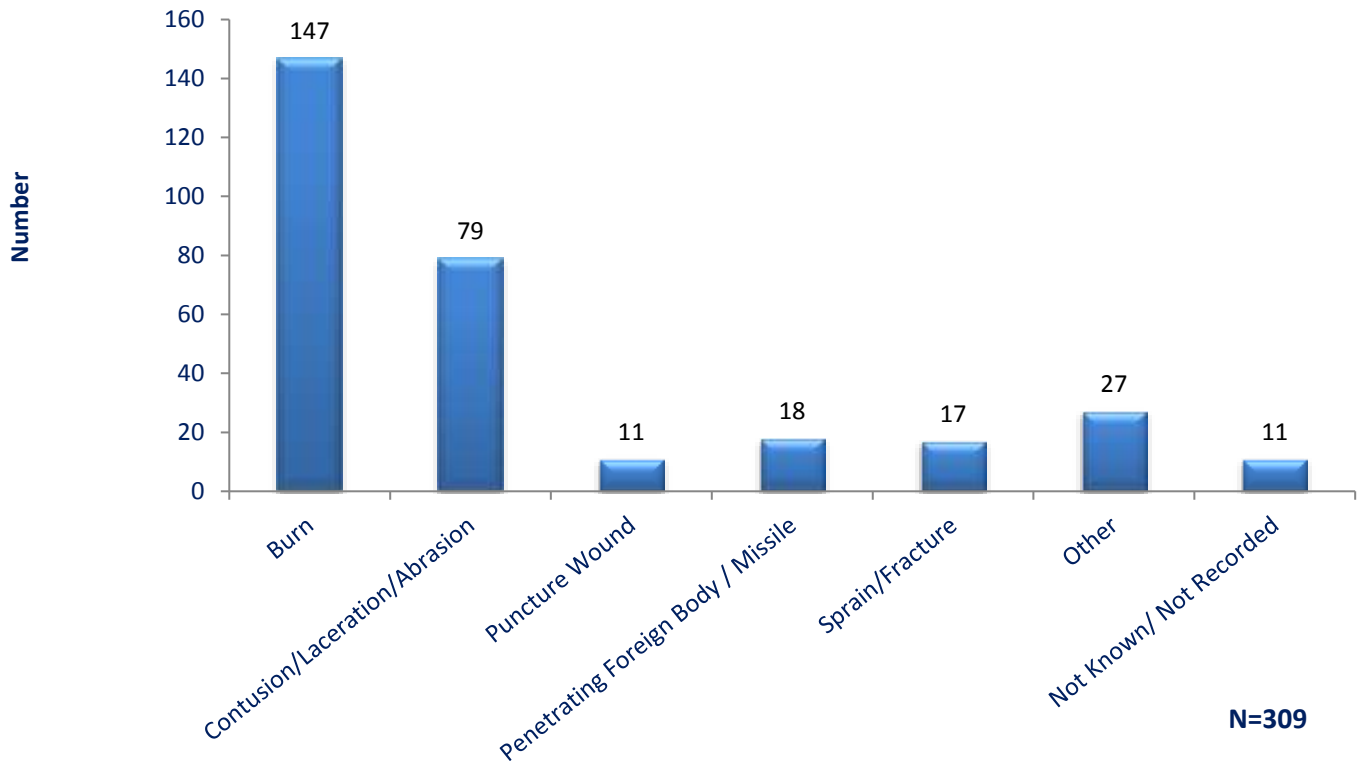


*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

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Figure 9. Type of firework-related injury, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

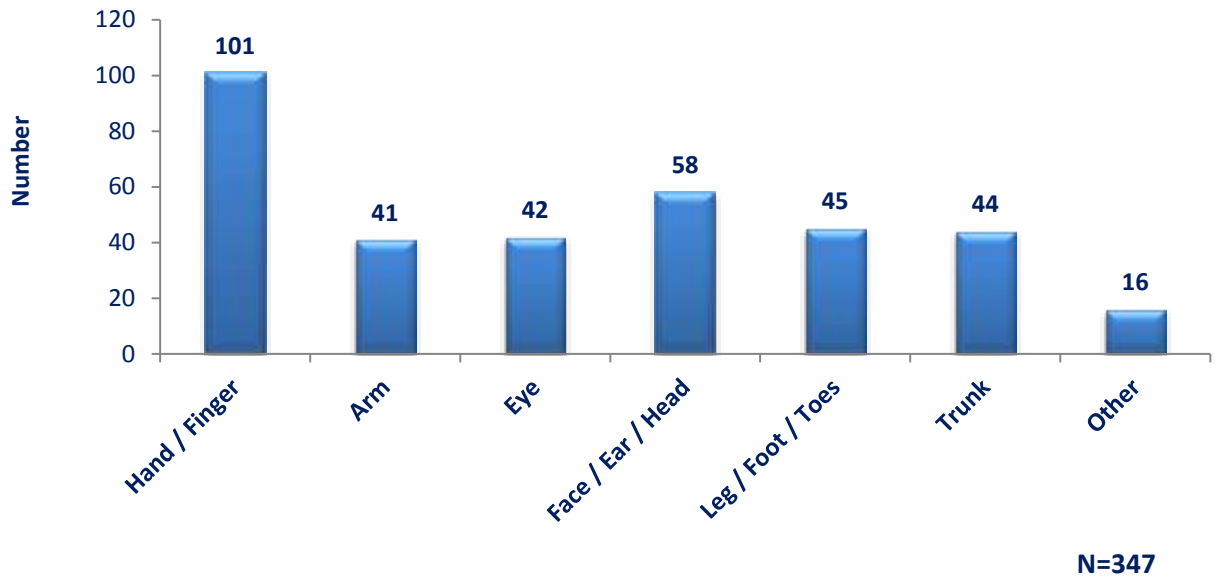
Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

Body part injured

- In 2016, of the 230 total cases, 66 individuals experienced injuries to multiple body parts.
- The most common type of injury was to the hand or finger (Figure 10).
 - 40.9 percent of injuries involved the hand, finger or arm.
 - 16.7 percent of injuries involved the face, ear or head.
 - 12.1 percent of injuries involved the eyes.
 - 13.0 percent of injuries involved the leg, foot or toes.
 - 12.7 percent of injuries involved the trunk.
 - 4.6 percent of injuries involved other body parts, including the neck, back and buttock.
- Of the 42 individuals who had eye injuries, 83.3 percent (35 cases) did not have or use eye protection, two wore contact lenses, and one wore eye glasses or safety glasses. Four cases with eye injury did not indicate whether eye protection was used.

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Figure 10. Body part affected by firework-related injury, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

Source of care and injury outcomes

- The majority of people injured by fireworks sought care at an emergency department or urgent care center (98.7 percent). The remaining cases received care from provider offices.
- Sixty-four percent of those seeking treatment were evaluated and released to go home. Eighteen cases indicated the patient was admitted to the hospital. Thirty-one records did not provide information regarding the patient's outcome.
- There were 33 transfers from one hospital to another, most often to a trauma center. Twelve patients were transferred to another hospital outside of Indiana.
- Four individuals visited more than one facility to be evaluated and treated for firework-related injuries.
- No cases were reported to have expired.

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Additional information

Geographical location

- 58.7 percent of people were injured at a private home, yard or property.
- 23.5 percent were injured at someone else's home, yard or property.
- Public property was noted as the site for 14 cases (6.1 percent).
- Four individuals were injured at other, unspecified locations.
- Injury location information was unknown for 23 cases (10.0 percent) (Figure 11).

Alcohol use

- Alcohol use was recorded in 39 instances.
- Alcohol was consumed by 31 injured individuals, of which 21 cases reported consuming alcohol within three hours of injury, and 8 reported others to be consuming alcohol at the scene.
- Alcohol was consumed by four injured individuals under age 21. (Figure 12).

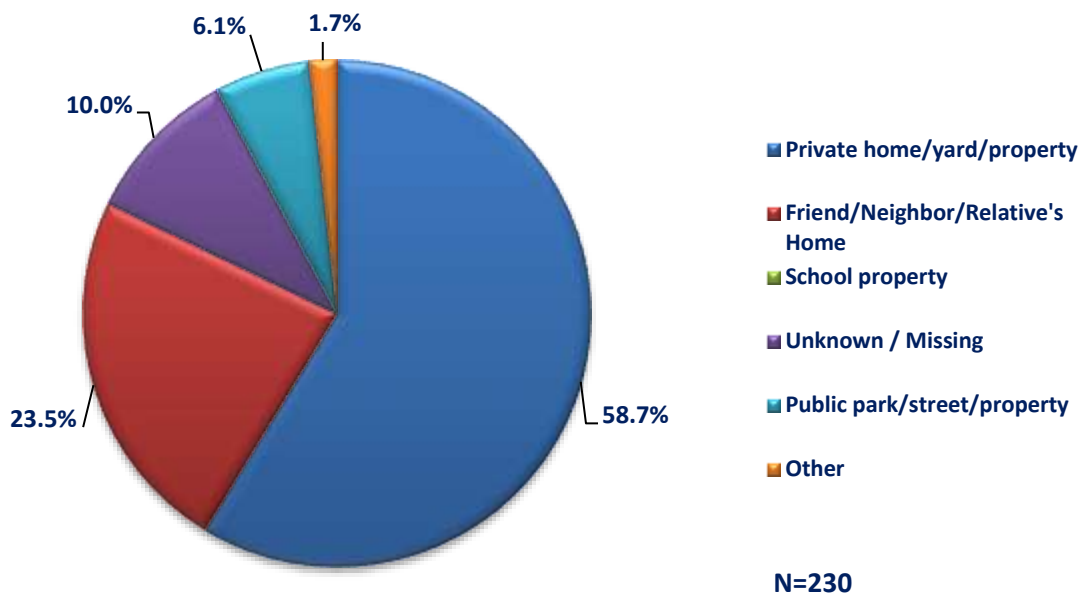
Adult supervision

- Among the 94 individuals injured who were 18 years old or younger at the time of the injury, 57 were injured while in the presence of an adult and nine had no adult supervision. Information regarding adult supervision was not reported in 28 cases (Figure 13).

Bystanders

- There were 33 firework-related injuries reported among bystanders, of which 16 were 18 years old or younger.

Figure 11. Location of firework-related injury, Indiana, 2016*

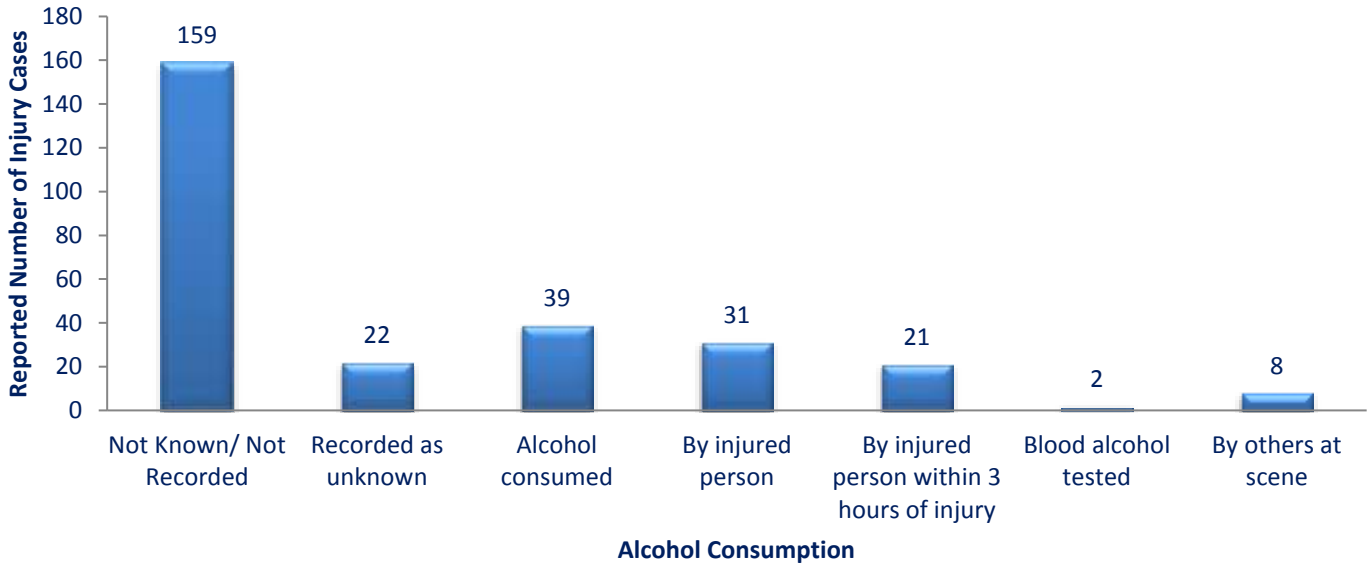


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Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

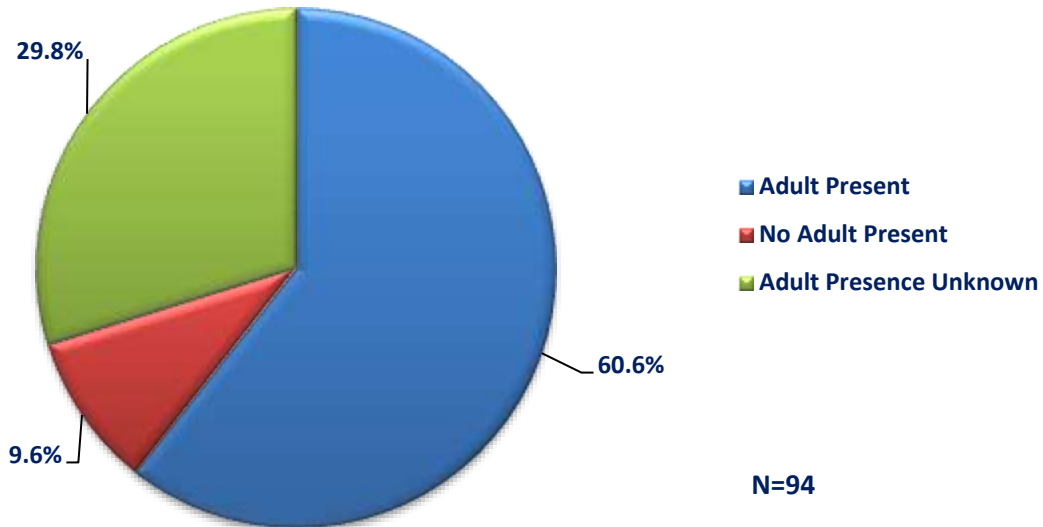
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Figure 12. Alcohol use of those injured by fireworks, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.
 Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

Figure 13: Adult supervision of individuals 18 years of age or younger, Indiana, 2016*



*2016 reporting cycle includes cases from Sept. 13, 2015-Sept. 12, 2016.
 Source: Indiana State Department of Health, Division of Trauma and Injury Prevention

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Summary of firework-related injuries for 2016

There were 230 unduplicated cases of firework-related injuries reported to the ISDH during the 2016 reporting cycle. There were 49 more cases reported in 2016 compared to the previous year's report. While the ages of those injured ranged in age from 6 months to 84, children and adolescents comprised 40.9 percent of reported firework-related injury cases. Males were injured more frequently than females across all age groups and 50.0 percent of all injured persons were white males. Sixty-nine percent of the individuals were white and 17.4 percent were black. Race was not known or not reported for 24 individuals. Two hundred and eight cases were Indiana residents, with 10 cases from other states and 12 with unknown or unrecorded home addresses.

More than half (53.0 percent) of the injuries involved the hands, fingers, eyes or arms. Burns were the most common type of injury, occurring in 147 injured persons and affecting 230 parts of the body. The majority (98.7 percent) of people injured by fireworks sought care at an emergency department or urgent care center, with the remaining cases seeking medical care from another type of provider. Of those seeking medical care, 64.3 percent were evaluated and released to go home and 22.2 percent were admitted to the hospital or transferred to another hospital.

For the 230 cases of firework-related injuries reported to ISDH during the entire reporting cycle, 761.7 percent occurred between July 1 and July 7 and 37.0 percent of injuries took place on July 4, 2016. Nearly fifty-nine percent of injuries occurred on private property. Firecracker, rocket and sparkler use resulted in 48.5 percent of firework-related injuries. The mechanism of injury was most commonly malfunctioning or timing of firework, followed by mishandling of fireworks.

This report has several implications. First, the knowledge of the most commonly affected body parts in firework-related injury can help focus prevention efforts to eliminate injuries. Second, identifying the day and time of most firework-related injuries can help medical personnel better prepare to treat these injuries. Thirdly, this report can help inform policy surrounding which firework types appear to be most dangerous.

There are several limitations of this report, which include the near certainty of underreporting and underrepresenting the true burden of firework-related injuries in Indiana because some medical facilities and providers may not report all of their firework injuries to ISDH. It may be because the physician or staff is not aware of the reporting requirement or because the patient does not acknowledge that he was injured by fireworks. Also, there may be some injuries due to fireworks that did not require formal medical evaluation or treatment. Additionally, not every report submitted to the state was completed fully or accurately. Some reports were sent numerous times, and this report only contains unduplicated records.

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APPENDIX

Firework-related injury year comparisons

The Indiana State Department of Health began receiving firework injury reports in 2003 after the collection of this information was mandated by law. After two years, the law expired and no reports were collected in 2005. In 2006, the law was reinstated with requirements identical to the previous law. Table 2 shows the comparison of firework-related injuries for the years in which reporting was mandated (2003, 2004, 2006-2016).

Table 2. Comparison of firework-related injuries, Indiana, 2003-2004 and 2006-2016

Year	2003	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of cases reported	261	233	251	156	141	116	134	141	83	159	141	181	230
Demographics													
Median Age	18	18	17	20	21	19	20	21	23	23.5	25	24	22
Age Range (in years)	0-74	0-72	0-67	0-70	0-70	0-81	1-69	0-65	2-64	1-78	0-63	1-78	0-84
Children/Adolescents	53%	52%	55%	48%	50%	50%	47%	42%	36%	41%	32%	36%	41%
Males	73%	76%	70%	67%	70%	72%	75%	72%	87%	70%	75%	68%	70%
Females	27%	24%	30%	33%	30%	28%	25%	28%	13%	29%	23%	31%	29%
White	84%	87%	82%	87%	73%	82%	73%	84%	77%	79%	76%	74%	69%
Black or African American	10%	8%	13%	7%	14%	7%	16%	12%	16%	11%	12%	15%	17%
Injury Type													
Burns	76%	67%	73%	69%	65%	61%	62%	55%	50%	56%	54%	53%	48%
Body Part Injured													
Hand or Finger	34%	32%	36%	41%	33%	37%	27%	31%	42%	30%	33%	38%	29%
Eye	17%	25%	29%	24%	21%	16%	17%	18%	13%	17%	16%	16%	12%
No Eye Protection	82%	88%	97%	92%	76%	91%	91%	93%	93%	75%	77%	90%	83%
Injury Circumstances													
Injured on Private Property	83%	89%	86%	83%	87%	84%	79%	67%	61%	60%	68%	69%	59%
Children Injured with Adults Present	60%	50%	64%	61%	62%	41%	57%	87%	57%	64%	59%	64%	61%
Hospitalized or Transferred to a Hospital	3%	6%	11%	8%	9%	10%	14%	12%	24%	11%	18%	18%	22%
Died	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Fireworks Circumstances													
Injuries from Sparklers, Rockets, and Firecrackers	63%	64%	57%	52%	53%	52%	51%	51%	47%	59%	54%	53%	48%
Injuries from Mishandling Fireworks	27%	23%	29%	30%	28%	24%	23%	26%	24%	27%	29%	33%	23%
Errant Path or Malfunctioning Fireworks	21%	37%	41%	35%	40%	41%	43%	43%	37%	44%	14%	43%	43%

Source: Indiana State Department of Health, Division of Trauma and Injury Prevention