

**FIXED-SITE AMUSEMENT RIDE INJURY SURVEY, 2007 UPDATE**

**Prepared for  
International Association of Amusement Parks and Attractions  
Alexandria, Virginia**

by



**National Safety Council  
Research and Statistical Services Group  
Itasca, Illinois**

**September 2008**

Preface

This report presents the results of work done by the National Safety Council, Research and Statistical Services Group, under contract to the International Association of Amusement Parks and Attractions. It includes estimates by the Council for calendar years 2003 through 2007. The Council’s work is an extension of, but independent of, the estimates made for 2001-2002 by Heiden Associates, which are included here for reference and reported more fully in the June/July 2003 issue of *Injury Insights* (Heiden & McGonegal, 2003).

**FIXED-SITE AMUSEMENT RIDE INJURY SURVEY, 2007 UPDATE**

Since 2001 the International Association of Amusement Parks and Attractions (IAAPA) has sponsored an annual survey to collect and analyze ride, attendance, and patron injury data from facilities that operate fixed-site amusement rides. The IAAPA survey was undertaken to gain perspective on fixed-site amusement ride injuries in the United States. The surveys include amusement and theme parks, tourist attractions, and family entertainment centers. The results of these surveys are presented below.

Facilities were asked to report attendance and ridership as well as the number of patron injuries. Separate attendance-based and ridership-based analyses were performed and are shown in Table 2. To be consistent with the estimates previously reported for 2001-2002, the “Survey Highlights” are shown in Table 1. Estimated attendance in 2007 was less than 0.5% higher than in 2006 and estimated ridership was up 1.1%.

**Table 1. Survey Highlights**

	2001-2002	2003*	2004	2005	2006	2007
Number of Facilities	459	403	403	398	395	395
Estimated Annual Attendance (millions)	302.9	300.4	300.0	300.4	291.7	292.1
Estimated Annual Ridership (billions)	--	1.95	1.81	1.82	1.76	1.78
Estimated Annual Number of Ride-Related Injuries	2,486	2,044	1,637	1,783	1,797	1,664
Injuries per Million Attendance	8.2	7.0	5.2	5.2	6.6	4.6

Source: 2001-2002, Heiden & McGonegal (2003). 2003-2006, National Safety Council estimates based on fixed-site amusement ride injury surveys.

\*Changes in the estimating method beginning with 2003 affect comparability with the 2001-2002 survey.

Not all facilities were able to report both attendance and ridership and therefore there were differences in the selection of facilities used in each analysis. Table 2 indicates that the ridership-based estimates of ride related injuries compared to attendance-based estimates are 355 lower in 2007 (1,664 vs. 1,309), 251 lower in 2006 (1,797 vs. 1,546), 70 lower in 2005 (1,713 vs. 1,783), 11 higher in 2004 (1,648 vs. 1,637), and 90 lower in 2003 (1,954 vs. 2,044). The changes in exposure noted above had a corresponding affect on the resulting injury estimates. Nevertheless, the distributions of injuries by ride type and severity obtained from the ridership-based estimates were very similar to the distributions obtained from the attendance-based estimates.

**Table 2. Attendance-Based vs. Ridership-Based Injury Estimates, 2003-2007**

	2003	2004	2005	2006	2007
<b>Attendance-Based</b>					
Estimated Annual Number of Ride-Related Injuries	2,044	1,637	1,783	1,797	1,664
Injuries per Million Attendance	7.0	5.2	5.2	6.6	4.6
<b>Ridership-Based</b>					
Estimated Annual Number of Ride-Related Injuries	1,954	1,648	1,713	1,546	1,309
Injuries per Million Patron-Rides	1.0	0.9	0.9	0.9	0.7

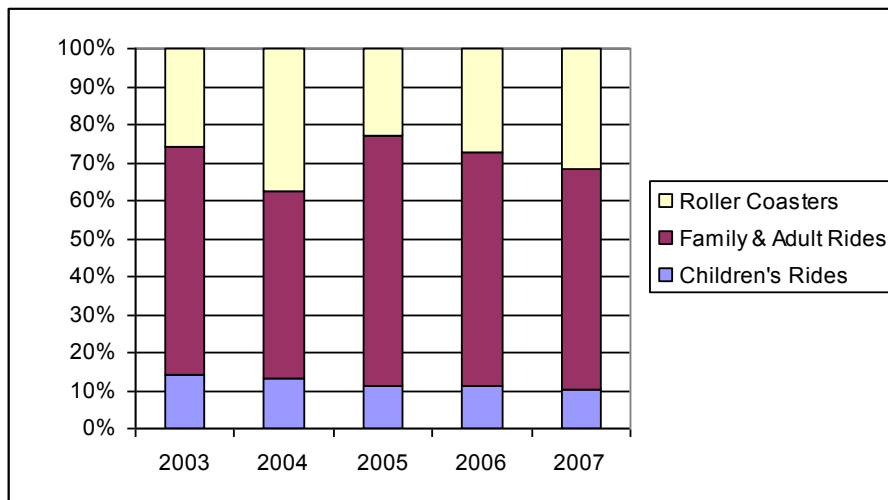
Source: National Safety Council estimates based on annual fixed-site amusement ride injury surveys.

Ridership is a better measure of exposure to risk than attendance because injuries on rides is the outcome of interest. Parks with similar attendance may have much different ridership numbers because of differences in the number and kinds of amusement rides provided. The results reported below are based on the ridership analysis, which is shown in Table 3. This analysis provides additional results that were not available from the 2001-2002 survey.

- The estimated injury total is down 15.3% in 2007 compared to 2006 (1,309 vs. 1,546).
- The rate of injuries per million patron-rides was down 22.2% in 2007 compared to 2006 (0.7 vs. 0.9)
- Compared to 2003, both the estimated number of injuries and the rate in 2006 were down.

As shown in Figure 1, about three fifths of the injuries in 2007 occurred on family and adult rides compared to about the same portion in 2006 and two thirds in 2005. Roller coasters accounted for 31.8% of the injuries in 2007 – more than in 2006, 2005, and 2003 but less than in 2004. Injuries associated with children’s rides decreased steadily from 14.2% in 2003 to 11.2% in 2005, remained basically unchanged at 11.4% in 2006, and decreased again to 10.2% in 2007.

**Figure 1. Proportion of Injuries By Ride Type, U.S., 2003-2007**



Source: National Safety Council estimates based on annual fixed-site amusement ride injury surveys.

In 2007, the injury rate for family and adult rides was 0.7 per million patron-rides, compared to 0.9 for roller coasters and 0.5 for children’s rides. The difference between the injury rate for children’s rides and family and adult rides is statistically significant as is the difference between the injury rates for children’s rides and roller coasters. The difference between the family and adult and roller coaster injury rates was also statistically significant.

About 2.7% of the injuries were reported to be “serious,” which means an injury that results in immediate admission and hospitalization in excess of 24 hours for purposes other than medical observation. The remaining 97.3% were other than serious. The proportion of injuries that were serious in 2007 was lower than in previous years. The rate of serious injuries per million patron-rides was 0.02, down from 0.1 for each of the previous three years.

**Table 3. Summary of Estimated Fixed-Site Amusement Ride-Related Injuries, U.S., 2003-2007 (based on ridership)**

Year	Characteristic	Total	Children's Rides	Family and Adult Rides	Roller Coasters	Total	Serious Injuries	Other Reportable Injuries
2003	Estimated Number of Injuries	1,954	277	1,173	504	1,954	106	1,848
	Percent	100.0%	14.2	60.1	25.8	100.0%	5.4	94.6
	Injuries per Million Patron-rides	1.0	1.2	1.0	1.0	1.0	0.1	1.0
2004	Estimated Number of Injuries	1,648	219	806	613	1,648	132	1,516
	Percent	100.0%	13.3	49.5	37.2	100.0%	8.0	92.0
	Injuries per Million Patron-rides	0.9	1.0	0.8	1.2	0.9	0.1	0.8
2005	Estimated Number of Injuries	1,713	192	1,131	390	1,713	132	1,582
	Percent	100.0%	11.2	66.0	22.8	100.0%	7.7	92.3
	Injuries per Million Patron-rides	0.9	0.8	1.0	0.9	0.9	0.1	0.9
2006	Estimated Number of Injuries	1,546	177	943	426	1,546	135	1,411
	Percent	100.0%	11.4	61.0	27.6	100.0%	8.7	91.3
	Injuries per Million Patron-rides	0.9	0.7	0.9	1.0	0.9	0.1	0.8
2007	Estimated Number of Injuries	1,309	134	759	416	1,309	35	1,274
	Percent	100.0%	10.2	58.0	31.8	100.0%	2.7	97.3
	Injuries per Million Patron-rides	0.7	0.5	0.7	0.9	0.7	0.02	0.7

Source: National Safety Council estimates based on annual fixed-site amusement ride injury surveys.

Note: Totals may not equal sum of parts due to rounding.

### Survey Response

Of the 395 eligible facilities in 2007, 138 provided some or all of the data requested. The number of facilities responding was similar to previous years. The respondents used in the analyses represented about 67% of the estimated total annual attendance and about 66% of estimated total rides taken at all facilities.

Data from 125 facilities were used for the 2007 attendance-based estimates compared to 124 for 2006, 117 for 2005 and 124 for 2004. Data from 104 facilities were used for the 2007 ridership-based estimates compared to 97 for 2006, 90 for 2005 and 99 for 2004. It was impractical to find a single set of facilities that reported all data (attendance, ridership, and injuries) for all years as that would have reduced the reliability of the estimates.

### Differences with NEISS

National statistics on fixed-site amusement ride injuries are also available from annual reports issued by the U.S. Consumer Product Safety Commission (CPSC; e.g., Levenson, 2003 and Levenson, 2005). However, the IAAPA survey and the CPSC estimates are based on different definitions, data sources, and methodological approaches so direct comparisons are not appropriate.

### 2003-2007 Methodology

The National Safety Council conducted the survey using a master list of amusement/theme parks, family entertainment centers, and tourist attractions thought to have fixed-site rides. The master list was prepared in consultation with IAAPA and Amusement Industry Consulting, Inc. The survey consisted of a notification letter, a package of reporting information mailed one week later, and a follow-up postcard mailed one week after the reporting package. After the mailings, IAAPA volunteers made follow-up telephone calls and sent e-mails to IAAPA member facilities and some nonmember facilities. Injury rates based on the reporting facilities were used to estimate national totals. (See also "Survey Response" above.)

### 2001-2002 Methodology

In 2001 and 2002 IAAPA mailed survey questionnaires to members previously identified as having fixed-site amusement rides. IAAPA retained Heiden Associates, Washington, DC, to analyze the survey results. Using the IAAPA survey results and other data, Heiden Associates estimated the number of U.S. facilities with one or more fixed-site amusement rides and the injury totals and rates.

### References

Heiden, E.J., & McGonegal, S. (2003). 2001-2002 fixed-site amusement ride injury survey analysis. *Injury Insights*, June/July 2003.

Levenson, M.S. (2003). *Amusement ride-related injuries and deaths in the United States: 2003 update*. Bethesda, MD: U.S. Consumer Product Safety Commission.

Levenson, M.S. (2005). *Amusement ride-related injuries and deaths in the United States: 2005 update*. Bethesda, MD: U.S. Consumer Product Safety Commission.