

FIXED-SITE AMUSEMENT RIDE INJURY SURVEY, 2010 UPDATE

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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 2010. 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, 2010 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 2010 was up 4.2% from 2009 and estimated ridership was up about 1.0%.

Table 1. Survey Highlights

Year	Number of Facilities	Estimated Annual Attendance (millions)	Estimated Annual Ridership (billions)	Estimated Annual Number of Ride-Related Injuries	Injuries per Million Attendance
2001-2002	459	302.9	---	2,486	8.2
2003*	403	300.4	1.95	2,044	7.0
2004	403	300.0	1.81	1,637	5.2
2005	398	300.4	1.82	1,783	5.2
2006	395	291.7	1.76	1,797	6.6
2007	395	292.1	1.78	1,664	4.6
2008	422	291.2	1.70	1,523	4.7
2009	398	278.4	1.69	1,181	4.4
2010	386	290.1	1.70	1,299	4.4

Source: 2001-2002, Heiden & McGonegal (2003). 2003-2010, 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 92 lower in 2010 (1,299 vs. 1,207), 95 lower in 2009 (1,181 vs. 1,086), 180 lower in 2008 (1,523 vs. 1,343), 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 for total injuries and other injuries. However, the distributions of injuries by ride type varied somewhat for serious injuries, with the attendance-based estimates showing a higher portion of injuries on children's rides, a lower portion on family and adult rides, and a slightly lower portion on roller coasters compared to the ridership-based estimates.

Table 2. Attendance-Based vs. Ridership-Based Injury Estimates, 2003-2010

Year	Attendance-Based		Ridership-Based	
	Estimated Annual Number of Ride-Related Injuries	Injuries per Million Attendance	Estimated Annual Number of Ride-Related Injuries	Injuries per Million Patron-Rides
2003	2,044	7.0	1,954	1.0
2004	1,637	5.2	1,648	0.9
2005	1,783	5.2	1,713	0.9
2006	1,797	6.6	1,546	0.9
2007	1,664	4.6	1,309	0.7
2008	1,523	4.7	1,343	0.8
2009	1,181	4.4	1,086	0.6
2010	1,299	4.4	1,207	0.7

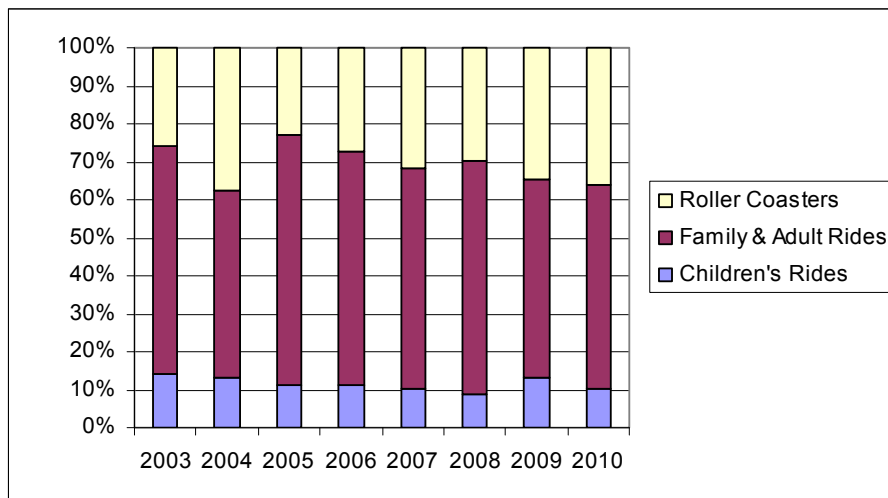
Source: National Safety Council estimates based on annual fixed-site amusement ride injury surveys.

Ridership is a better measure of exposure to risk than attendance because injuries on rides are 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 was up 11.1% in 2010 compared to 2009 (1,207 vs. 1,086).
- The rate of injuries per million patron-rides increased 10.9% in 2010 compared to 2009 (0.71 vs. 0.64).
- Compared to 2003, both the estimated number of injuries and the rate in 2010 were down – by 38.2% and 30.0%, respectively.

As shown in Figure 1, over half (54.0%) of the injuries in 2010 occurred on family and adult rides compared to a slightly lower 52.1% in 2009 and slightly higher portions of 61.6% and 58.0% in 2008 and 2007, respectively. The overall number of injuries on family and adult rides in 2010 was down 15.4% compared to 2009. Roller coasters accounted for 35.9% of the injuries in 2010 – more than in any other year except for 2004. The overall number of injuries on roller coasters in 2010 was up 15.5% from 2009. After increasing nearly 5% from 2008 to 2009, the proportion of injuries associated with children’s rides declined over 3% from 2009 to 2010. Unlike the increases observed for family and adult rides and roller coasters, the overall number of injuries on children’s rides decreased 15.9% from 2009 to 2010.

Figure 1. Proportion of Injuries By Ride Type, U.S., 2003-2010



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

In 2010, the injury rate for family and adult rides was 0.6 per million patron-rides, compared to 1.0 for roller coasters and 0.5 for children’s rides. The difference between the injury rate for children’s rides and roller coasters is statistically significant, as is the difference between the family and adult and roller coaster injury rates. The difference between the injury rate for children’s rides and family and adult rides was not significant.

About 5% of the injuries were reported to be “serious,” meaning an injury resulting in immediate admission and hospitalization in excess of 24 hours for purposes other than medical observation. The remaining 95% were other than serious. The proportion of injuries that were serious in 2010 was down 18.3% from the proportion in 2009 and was lower than for every other year except for 2007, when the portion was 2.7%. The rate of serious injuries per million patron-rides was 0.03 in 2010—down from 0.04 in 2009 and 0.05 in 2008, up slightly from 0.02 in 2007, and down from 0.1 for each of the previous four years.

Table 3. Summary of Estimated Fixed-Site Amusement Ride-Related Injuries, U.S., 2003-2010 (based on ridership)

Year	Characteristic	Ride Type				Injury Severity		
		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
2008	Estimated Number of Injuries	1,343	117	827	399	1,343	80	1,264
	Percent	100.0%	8.7	61.5	29.7	100.0%	5.9	94.1
	Injuries per Million Patron-rides	0.8	0.6	0.8	1.0	0.8	0.05	0.7
2009	Estimated Number of Injuries	1,086	145	565	375	1,086	65	1,021
	Percent	100.0%	13.4	52.1	34.5	100.0%	6.0	94.0
	Injuries per Million Patron-rides	0.6	0.6	0.5	0.9	0.6	0.04	0.6
2010	Estimated Number of Injuries	1,207	122	652	433	1,207	59	1,148
	Percent	100.0%	10.1	54.0	35.9	100.0%	4.9	95.1
	Injuries per Million Patron-rides	0.7	0.5	0.6	1.0	0.7	0.03	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 386 eligible facilities with rides in 2010, a total of 134 provided some or all of the data requested (27 provided attendance data only, 19 provided ridership data only, 81 provided both attendance and ridership data, and 7 provided injury data only). The respondents used in the analyses represented about 64.4% of the estimated total annual attendance and 65.0% of the estimated total rides taken at all facilities.

Data from 104 facilities were used for the 2010 attendance-based estimates compared to 113 for 2009, 153 for 2008, 125 for 2007, 124 for 2006, 117 for 2005 and 124 for 2004. Data from 96 facilities were used for the 2010 ridership-based estimates compared to 105 for 2009, 134 for 2008, 104 for 2007, 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.

2003-2010 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.