



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
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Memorandum

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SUBJECT : Annual Report of ATV Deaths and Injuries

Introduction

Injuries and deaths associated with the use of all-terrain vehicles (ATVs) have shown an increasing trend in the last several years. This report provides an update of the U.S. Consumer Product Safety Commission's data on ATV injuries and deaths. This report utilizes death data available as of December 31, 2001 and data on injuries occurring up to December 31, 2001.

There was a statistically significant increase in the estimated number of injuries for 2001, up about 17 percent over 2000. The increase is not fully explained by an increase in the number of ATVs in use. Children under 16 years of age accounted for 37 percent of the total estimated injuries from 1985 through 2001. The number of deaths associated with ATVs that have been reported to the Commission has increased by 459 since the last report. This may be partly due to the fact that since 1999, more complete data on public road fatalities has become available to CPSC than had been available prior to 1999. (See section on Estimated Deaths and Risk of Deaths for a full explanation.)

Deaths Reported to the Commission

On December 31, 2001, the Commission had reports of 4,541 ATV-related deaths that have occurred since 1982 (Table 1). The reported deaths increased by 459 since the December 31, 2000 tabulation for the last report dated May 14, 2001.

Table 1
Reported ATV¹-Related Deaths by Year
January 1, 1982 to December 31, 2001

Year ²	Number of Deaths	Difference Since Last Update (12/31/2000)
Total	4,541	+459
2001 ³	270	+270
2000 ³	344	+126
1999 ^{3,4}	357	+61
1998	251	+0
1997	241	+0
1996	248	+1
1995	200	+1
1994	198	+0
1993	183	+0
1992	221	+0
1991	230	+0
1990	234	+0
1989	230	+0
1988	250	+0
1987	264	+0
1986	299	+0
1985	251	+0
1984	156	+0
1983	85	+0
1982	29	+0

Source: U.S. Consumer Product Safety Commission, Directorate for Epidemiology, Division of Hazard Analysis.

Table 2 is a listing of ATV-related deaths for each state, the District of Columbia and Puerto Rico. The highest numbers of deaths were reported for California (278), Pennsylvania (264), Texas (206), Michigan (205) and New York (199). CPSC received no additional cases for 2000 and 2001 from five states (Delaware, Hawaii, Nevada, Rhode Island and Wyoming), the District of Columbia and Puerto Rico.

¹ Three, four, or an unknown number of wheels.

² In 1999, CPSC began collecting more death certificates of ATV fatalities occurring on public roads than had previously been available. Prior to 1999, fatalities on public roads had been collected through the gathering of newspaper clips, coroner's reports and consumer reports, but death certificates associated with public road fatalities had not been collected unless they were erroneously classified as occurring in a non-public-road location. The change is due to the revision of the cause-of-death codes for ATVs under the International Classification of Diseases, Tenth Revision, which has facilitated the collection of all ATV fatalities, regardless of location.

³ Reporting is incomplete.

⁴ Beginning in 1999, deaths were coded under the Tenth Revision of the International Classification of Diseases (ICD-10).

Table 2
Deaths Associated With ATVs⁵ by State
Reported for the Period January 1, 1982 Through December 31, 2001

State	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CALIFORNIA	278	6.1	278	6.1
PENNSYLVANIA	264	5.8	542	11.9
TEXAS	206	4.5	748	16.5
MICHIGAN	205	4.5	953	21.0
NEW YORK	199	4.4	1,152	25.4
WEST VIRGINIA	194	4.3	1,346	29.6
FLORIDA	173	3.8	1,519	33.5
KENTUCKY	168	3.7	1,687	37.2
NORTH CAROLINA	164	3.6	1,851	40.8
TENNESSEE	158	3.5	2,009	44.2
ARKANSAS	143	3.1	2,152	47.4
MISSISSIPPI	143	3.1	2,295	50.5
MINNESOTA	132	2.9	2,427	53.4
WISCONSIN	125	2.8	2,552	56.2
OHIO	124	2.7	2,676	58.9
MISSOURI	123	2.7	2,799	61.6
GEORGIA	114	2.5	2,913	64.1
LOUISIANA	110	2.4	3,023	66.6
ARIZONA	106	2.3	3,129	68.9
ALABAMA	96	2.1	3,225	71.0
ILLINOIS	92	2.0	3,317	73.0
VIRGINIA	84	1.8	3,401	74.9
ALASKA	83	1.8	3,484	76.7
INDIANA	82	1.8	3,566	78.5
UTAH	80	1.8	3,646	80.3
OREGON	74	1.6	3,720	81.9
MAINE	65	1.4	3,785	83.4
KANSAS	64	1.4	3,849	84.8
IOWA	61	1.3	3,910	86.1
OKLAHOMA	59	1.3	3,969	87.4
IDAHO	47	1.0	4,016	88.4
WASHINGTON	46	1.0	4,062	89.5
COLORADO	44	1.0	4,106	90.4
NEBRASKA	43	0.9	4,149	91.4
NEW MEXICO	40	0.9	4,189	92.2
SOUTH CAROLINA	40	0.9	4,229	93.1
MASSACHUSETTS	39	0.9	4,268	94.0
NEW HAMPSHIRE	35	0.8	4,303	94.8
VERMONT	32	0.7	4,335	95.5
NEW JERSEY	30	0.7	4,365	96.1
NEVADA	30	0.7	4,395	96.8
NORTH DAKOTA	27	0.6	4,422	97.4
SOUTH DAKOTA	27	0.6	4,449	98.0
MARYLAND	25	0.6	4,474	98.5
MONTANA	24	0.5	4,498	99.1
CONNECTICUT	18	0.4	4,516	99.4
WYOMING	11	0.2	4,527	99.7
DELAWARE	5	0.1	4,532	99.8
RHODE ISLAND	3	0.1	4,535	99.9
DISTRICT OF COLUMBIA	2	0.0	4,537	99.9
HAWAII	2	0.0	4,539	100.0
PUERTO RICO	2	0.0	4,541	100.0

Source: U.S. Consumer Product Safety Commission, Directorate for Epidemiology, Division of Hazard Analysis.

⁵ Three, four and unknown number of wheels

Characteristics of ATVs and Fatalities

A review of the reported fatalities indicated that 1,714 victims (38% of the 4,541 total) were under 16 years of age and 799 (18% of the total) were under 12 years of age.

The percent of reported fatalities that involved four-wheel ATVs has increased from seven percent or less prior to 1985 to about 86 percent for 2001, based on those fatalities reported so far for 2001. (Data collection for 2001 is not yet complete.) The increase in the proportion of the total that involve four-wheel ATVs is expected, since production of the three-wheel vehicle ceased in the mid 1980s.

Estimated Deaths and Risk of Death, 1985 to 2000

The deaths reported to the Commission represent a minimum count of ATV-related deaths. To account for deaths not reported to the Commission, estimates of the annual deaths were calculated for 1985 through 2000 using a statistical approximation method. Table 3 shows the annual reported and estimated numbers of ATV-related deaths for ATVs with three, four or unknown number of wheels, in addition to the annual estimates and risk of death (per 10,000 in use) for four-wheel ATVs from 1985 to 2000.

CPSC captures reports of ATV-related deaths in two databases. A change in the types of deaths collected in one of them affects the estimates of deaths in years beginning in 1999. The Death Certificate file (DTHS) contains death certificates purchased from the states. Prior to 1999, CPSC received death certificates only of fatalities occurring in places other than public roads and of fatalities occurring in public road locations that were erroneously reported as non-public-road locations. In 1999, CPSC began collecting death certificates of all fatalities involving an ATV, as coded under the tenth revision of the International Classification of Diseases (ICD-10). ICD-10 marks the first revision for which all ATV-related fatalities are grouped under a single code, thus facilitating more complete collection of these incidents by CPSC. CPSC also captures ATV-related deaths in the Injury or Potential Injury Incident file (IPII), regardless of where the fatality happened. This was true before 1999, and remains so now. These reports come from sources such as news clips, reports from lawyers or consumers, and through the Medical Examiners and Coroners Alert Project.

Prior to 1999, the procedure for estimating ATV-related deaths had two parts. Because death certificates generally were not collected for public road fatalities, the count for these fatalities was the number of reports received, mostly in IPII. For incidents occurring in other places, a capture-recapture approach was applied by examining the overlap between DTHS and IPII. The two parts (incidents occurring on public roads and incidents occurring in other places) were then combined for the annual estimate of deaths. We believe estimates for years prior to 1999 to be underestimates because of this. Since CPSC now receives death certificates for ATV incidents occurring anywhere (on public roads or in other locations), the capture-recapture approach has been utilized for the entire estimate of ATV-related deaths from 1999 forward. The resulting estimates of deaths represent a better approximation of the number of deaths associated with ATVs.

Table 3
Annual Estimates of ATV⁶-Related Deaths
And Risk of Death for Four-Wheel ATVs
As of December 31, 2001

Year	Reported Deaths	Estimated Deaths	Estimated Deaths Involving 4-Wheel ATVs ⁷	Risk of Death per 10,000 4-Wheel ATVs In Use ⁸
2000 ⁹	344	547	495	1.5
1999 ^{9,10}	357	474	439	1.5
1998	251	287	245	0.9
1997	241	291	243	1.0
1996	248	267	208	0.9
1995	200	276	212	1.0
1994	198	244	168	0.8
1993	183	211	144	0.7
1992	221	241	158	0.8
1991	230	255	152	0.8
1990	234	250	151	0.9
1989	230	258	153	0.9
1988	250	286	152	1.1
1987	264	282	126	1.1
1986	299	347	95	1.3
1985	251	295	55	1.5

Source: U.S. Consumer Product Safety Commission, Directorate for Epidemiology, Division of Hazard Analysis.
Note: Data collection is incomplete for 1999 and 2000.

Estimated Hospital Emergency Room Treated Injuries

Table 4 shows estimates of ATV-related injuries treated in hospital emergency rooms nationwide between January 1, 1982 and December 31, 2001. Children under 16 years of age accounted for about 37 percent of the total estimated injuries from 1985 through 2001 inclusive¹¹. These estimates are generated from CPSC's National Electronic Injury Surveillance System, a probability sample of U.S. hospitals with 24-hour emergency rooms and more than six beds.

⁶ Three, four and unknown number of wheels.

⁷ The estimated number of deaths associated with four-wheel ATVs was calculated by first dividing the reported number of deaths for four-wheel ATVs by the combined reported number of deaths for three- and four-wheel ATVs, then multiplying this quotient by the estimated number of deaths for all ATVs (three wheels, four wheels, and unknown number of wheels).

⁸ The number of ATVs in use is based on ATV sales and operability rates data provided by industry. Because reliable operability rates data are not available for three-wheel ATVs, the risk of death is shown only for four-wheel ATVs.

⁹ Reporting is incomplete.

¹⁰ Beginning in 1999, deaths were coded under the Tenth Revision of the International Classification of Diseases (ICD-10).

¹¹ After further analysis, CPSC has determined that the percentage of injuries occurring to children under the age of 16 for 1985-2000 as reported in the 2000 Annual Report should be amended to 38 percent.

Table 4
Annual Estimates¹² of ATV-related¹³ Hospital Emergency Room Treated Injuries
January 1, 1982 through December 31, 2001

Year¹⁴	All Ages	Ages less than 16 years
2001	111,700	34,800
2000	95,500	33,100
1999	85,100	28,700
1998	70,200	26,000
1997	54,700	21,300
1996	53,600	20,200
1995	52,200	19,300
1994	50,800	21,400
1993	49,800	17,900
1992	58,200	22,000
1991	58,100	22,500
1990	59,500	22,400
1989 ¹⁵	70,300	25,700
1988	74,600	28,500
1987	93,600	38,600
1986	106,000	47,600
1985 ^{15,16}	105,700	42,700
1984 ¹⁶	77,900	17
1983 ¹⁶	32,100	17
1982 ¹⁶	10,100	17

Source: National Electronic Injury Surveillance System, U.S. Consumer Product Safety Commission

Figure 1 presents annual estimates by age group for ATV-related injuries treated in hospital emergency rooms since 1989. The total estimate for 2001 reflects a statistically significant increase of about 17 percent over the 2000 estimate. All age groups contributed to the increase in injuries except the 45-54 age group. Statistically significant increases were found for the 16-24 age group, the 35-44 age group and the 55-and-over age group.

¹² Estimates have been adjusted retrospectively to account for NEISS sampling frame updates. Occupational injuries have been excluded.

¹³ Three, four and unknown number of wheels.

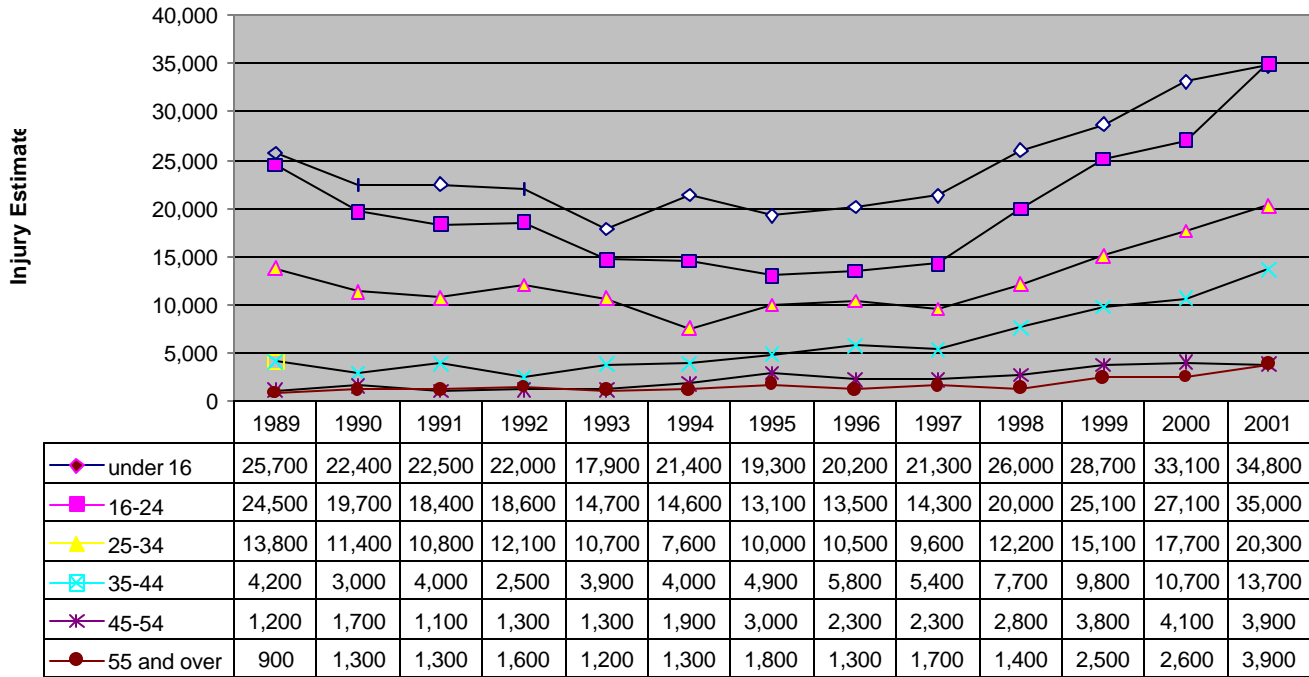
¹⁴ Estimates adjusted by factors to account for out of scope (non-ATV) cases based on injury surveys in 1985, 1989 and 1997. The adjustment factors were 0.93 for 1986 through 1988, 0.95 for 1990-1996, and 0.935 (amended from 0.984) for 1997 onward.

¹⁵ Annual estimates for 1985 and 1989 are based on injury surveys.

¹⁶ Estimates adjusted due to revisions in the NEISS Coding Manual in March 1985. Estimates for 1982 through 1985 were adjusted based on a review of NEISS comments to exclude dune buggies and identify ATVs classified as mini or trail bikes.

¹⁷ Adjusted estimates for children under 16 years old were not computed prior to 1985.

Figure 1
Annual ATV-Related¹⁸ Injury Estimates¹⁹
1989-2001



Source: National Electronic Injury Surveillance System, U.S. Consumer Product Safety Commission

Although the group aged 55 and older exhibited the fewest number of injuries, it had the greatest percentage increase from 2000 to 2001, rising by 50 percent. The 35-44 and 16-24 age groups each increased by almost 30 percent, while the 25-34 age group increased by 15 percent. The under-16 age group increased by 5 percent. The 45-54 age group decreased by 5 percent.

Table 5 shows estimates of four-wheel ATV-related injuries and risk of injury for January 1, 1985 through December 31, 2001, where risk is defined as the estimated number of injuries divided by the number of vehicles in use, multiplied by 10,000. The increasing trend in the risk of injury from the late 1990s to 2001 may suggest that the increase in deaths in corresponding years is not due merely to the fact that under the Tenth Revision of the International Classification of Diseases, CPSC began receiving death certificates for ATV deaths on public roads.

¹⁸ Three, four and unknown number of wheels.

¹⁹ Estimates have been adjusted retrospectively to account for NEISS sampling frame updates. Estimates for 1989 are based on the 1989 injury study. Occupational injuries have been excluded.

Table 5
Estimated Number of Injuries And Risk of Injury
Associated with Four-Wheel ATVs
January 1, 1985 – December 31, 2001

Year	Injury Estimate ²⁰	Risk Estimate per 10,000 ATVs ²¹
2001 ²²	99,600	261.8
2000	85,200	257.4
1999	71,400	245.4
1998	59,200	226.4
1997	41,100	171.2
1996	40,700	181.5
1995	36,200	172.0
1994	33,300	165.7
1993	32,000	164.7
1992	33,000	175.2
1991	34,400	188.1
1990	30,800	175.1
1989 ²³	35,700	217.7
1988	39,400	275.8
1987	33,900	306.1
1986	23,400	319.2
1985 ²¹	14,700	391.1

Source : U.S. Consumer Product Safety Commission, Directorate for Epidemiology, Division of Hazard Analysis, National Electronic Injury Surveillance System, and the Directorate for Economic Analysis.

Discussion

The use of three-wheel ATVs has declined; therefore, ATVs in use are primarily four-wheel vehicles. Estimated numbers of deaths for four-wheel ATVs (Table 3) were generally constant from the late 1980s through the early 1990s; thereafter, estimated numbers of deaths increased. In 1999, a revision of the system for coding deaths was implemented. Because of those changes,

²⁰ Annual estimates are adjusted by factors to account for out of scope cases. Adjustment factors are 0.93 for 1986 through 1988, 0.95 from 1990 through 1996, and 0.935 for 1997 onward. Estimates have also been adjusted retrospectively to account for NEISS sampling frame updates. Occupational injuries have been excluded.

²¹ Calculations are based on 2000 ATV use tables developed by CPSC's Directorate for Economic Analysis, from sales and operability rates data provided by industry. Because reliability rates data are not available for three-wheel ATVs, risk of injury is given for four-wheel ATVs only.

²² Data collection is incomplete.

²³ Estimates for 1985 and 1989 are based on CPSC injury studies.

some of the increase for 1999 and 2000 may be due to CPSC now being able to obtain more accurate counts of deaths occurring on public roads. The estimated number of injuries for four-wheel vehicles (Table 5) was also relatively constant for the late 1980s through the early-to-mid 1990s; thereafter the numbers of injuries also increased, and significant increases have occurred every year since 1997.