

Analysis of Accidents in Trailer Towing

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ABSTRACT

There is a steady upward trend in the number of trailers on American roads. In 2011, there were 29.2 million trailers registered in the United States. On average, towing-related accidents are responsible for 1.2 deaths and 60 injuries per day, and the corresponding monetary loss due to these fatalities amounts to more than \$4 Billion annually. While advancements in the safety practices of towing have helped control the number of accidents, towing-related accidents remain a substantial cause of fatalities, injuries, and property damages. This study analyzes the data from the National Highway Traffic Safety Administration on the trailer-related crashes and accidents spanning 24 years from 1988 to 2011. The objective of this paper is to analyze the accident statistics on: (i) accidents with fatality, (ii) accidents with injury, and (iii) accidents with property damage caused by trailer towing in the United States. Additionally, data on the failed components in trailers is examined. The most prevalent failed component is safety chains. The probable causes of failure in safety chains are presented. The statistics examined in this paper underscore the importance of adhering to safe practices in trailer towing. Trailer-related accidents account for an average of 445 deaths and 21,821 injuries annually. For every 1000 trailer-related crashes, there are 8.5 fatalities and 415 injuries. Apart from injuries and fatalities, 38,747 trailer-related accidents cause property damage per year.

Keywords: Trailer, Towing, Safety Chain

INTRODUCTION

Towing is the process of pulling an unpowered vehicle called trailer or caravan using a motorized vehicle. Towing is a common method of transport in many countries; heavy consignments are towed by large trucks to transport materials and goods over long distances. Smaller trailers are towed by using smaller trucks or cars. Different types of trailers are available based on the activity performed; there are small cabin trailers, boat trailers, motorcycle trailers, recreational travel trailers and utility trailers. Commercial renting of trailers is also a popular business in many countries. From 1990 to 2005, the number of light duty trailers that were registered in the United States increased from 10.6 Million to 15.9 Million, an increase of more than 50% over the course of 15 years (Yu, 2010). As of 2011, 29.2 Million trailers and semi-trailers were registered in the U.S. (Office of Highway Policy Information, 2012). The trailer production in the United States increased by 9.4% from 2011 to 2012 (Trailer-Bodybuilders, 2013). There are a large number of trailers on the road, and the number is still growing.

There is a certain amount of danger in towing, as in any other method of transportation. Towing has to be performed with added care, adhering to safety standards in selection, installation, and use of the trailer. Even minor changes in the trailer or vehicle can have substantial effects on the satiability of the vehicle-trailer system (Allen, 2011). Studies have shown that the behavior of articulated vehicles is much more complex and difficult to predict compared to that Safety Management (2019)

of non-articulated vehicles. This unpredictability in handling can make their use challenging for all but the most experienced operators (Hac et al., 2008). Controlling a trailer becomes even more difficult when the vehicle-trailer system becomes unstable. The trailer can become unstable or possibly roll over in the event of jackknifing or increased sway (Hac et al., 2008). Trailer stability is affected by many variables such as weight distribution, vehicle speeds, cross winds, road profile, and the movement of cargo inside the trailer (Department Motor Vehicles, 2011).

More than one fatality occurs every day due to trailer towing related accidents (Yu, 2010). The National Highway Traffic Safety Administration estimates, as cited in Rachel DePompa (2013), that nearly 400 fatalities occur every year due to trailer towing accidents,. From 1996 to 2002, trailers were one of the main causes of general liability losses in rental centers, and ranked first in the total number of claims. In rental centers, trailer-related accidents accounted for 30% of the general liability losses, according a study in The Travelers Companies (2007). In addition to skill and experience, safe towing practices must be followed to tow safely. Trailering demands safety precautions throughout installation, operation, and maintenance of a trailer. Possibly the most important aspect of trailer towing safety is to have the trailer attached to the vehicle at all times. The objective of this study is to analyze the accident statistics on: (i) accidents with fatality, (ii) accidents with injury, and (iii) accidents with property damage caused by trailer towing in the United States. Data about the faulty systems in trailers is examined to determine the most prevalent accident causing components. The probable sources of component failure are discussed.

TRAILER TOWING ACCIDENTS

Analysis was carried out using data from National Highway Traffic Safety Administration (NHTSA), Fatality Analysis Reporting System (FARS), and General Estimates System (GES) reports on trailer towing accidents from 1988 to 2011. The total number of trailer-related accidents is shown in Figure 1. There were a total of 1,259,631 crashes during this 24-year period. In 1999, maximum number of accidents, 65,904, took place (NCSA Information Service Team, 2012c). During this 24-year period, on the average, 52,485 trailer-related accidents took place per year.

Figure 2 shows the number of trailer-related accidents with one or more fatalities. The year with the maximum number of fatal accidents was 1989 with 448, and the minimum was in 2011 with 304 fatal crashes (NCSA Information Service Team, 2012c). The average number of fatal accidents from 1988 to 2011 was 377 per year. During this period, towing was the cause of 9,041 fatal crashes.

Figure 3 shows the number of trailer-related fatalities annually. Trailer towing accidents were responsible for a total of 10,691 fatalities from 1988 to 2011 (NCSA Information Service Team, 2012b). On average there were 445 fatalities per year resulting from trailer-related accidents, or 1.2 deaths per day. The monetary loss due to fatalities amounted to about \$4 Billion per year, considering the Value of Statistical Life which is about \$9.1 Million as in Trottenberg et al. (2013). Every 1000 trailer-related accidents caused 8.5 fatalities.

Figure 4 shows the number of trailer-related accidents causing injury. The greatest number of accidents causing injury was observed in the year 1999 with 21,508, and the minimum was observed in 1993 with 8853 injury crashes (NCSA Information Service Team, 2012c). The average number of accidents with injury from 1988 to 2011 was 13,361 per year. Trailer towing caused a total of 320,652 accidents with injury during this period.

Figure 5 shows the number of injuries from trailer-related accidents per year. Trailer-related accidents accounted for a total 523,709 injuries from 1988 to 2011 (NCSA Information Service Team, 2012a), an average of 21,821 injuries per year, or 60 per day. On average there were 415 injuries for every 1000 trailer-related accidents.

The number of trailer-related accidents that led to property damage is shown in Figure 6. The highest number was observed in 2008 with 49,107 accidents leading to property damage and the minimum was observed in 1989 with 29,329 (NCSA Information Service Team, 2012c). On the average, there were 38,747 trailer-related accidents involving property damage.

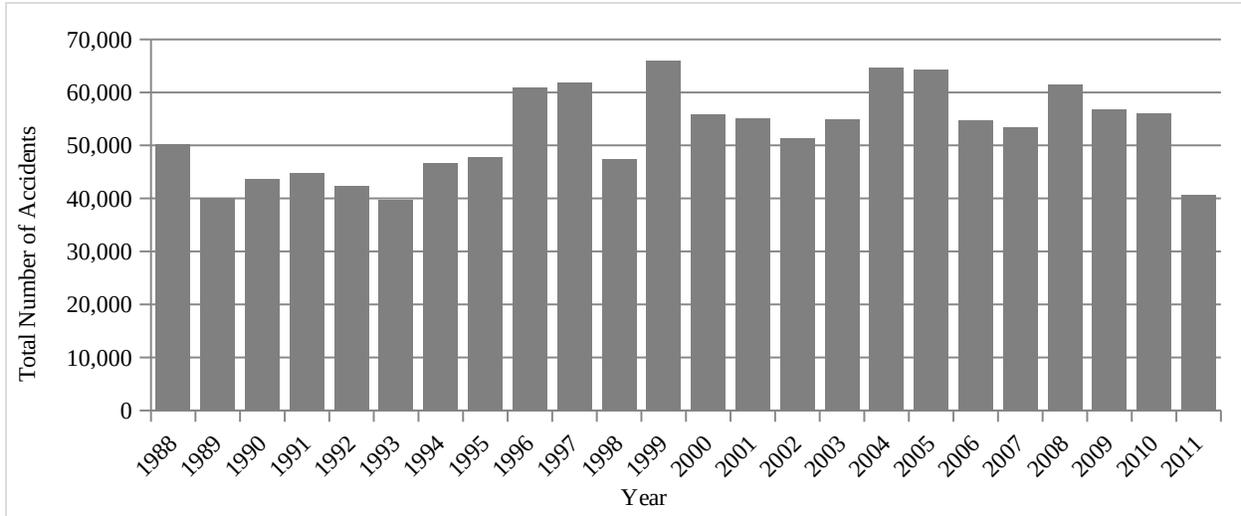


Figure 1. Total number of trailer-related accidents, 1988 to 2011

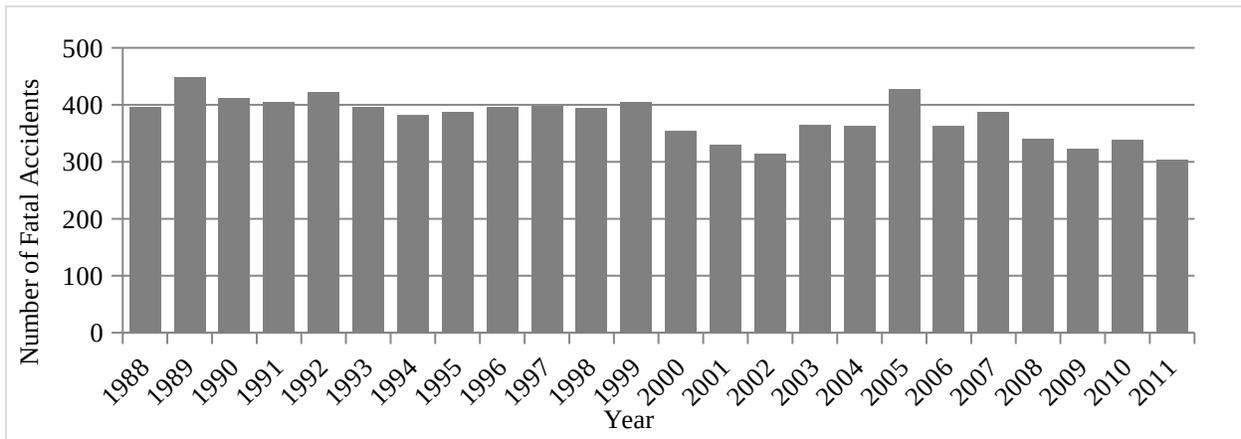


Figure 2. Number of trailer-related fatal accidents, with one or more fatalities, 1988 to 2011

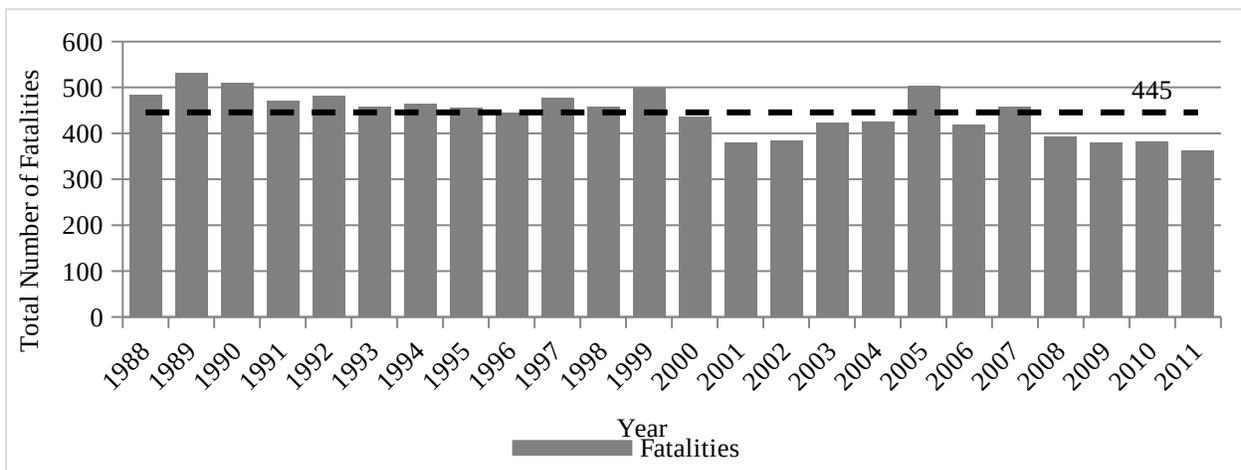


Figure 3. Number of fatalities resulting from trailer-related accidents, 1988 to 2011

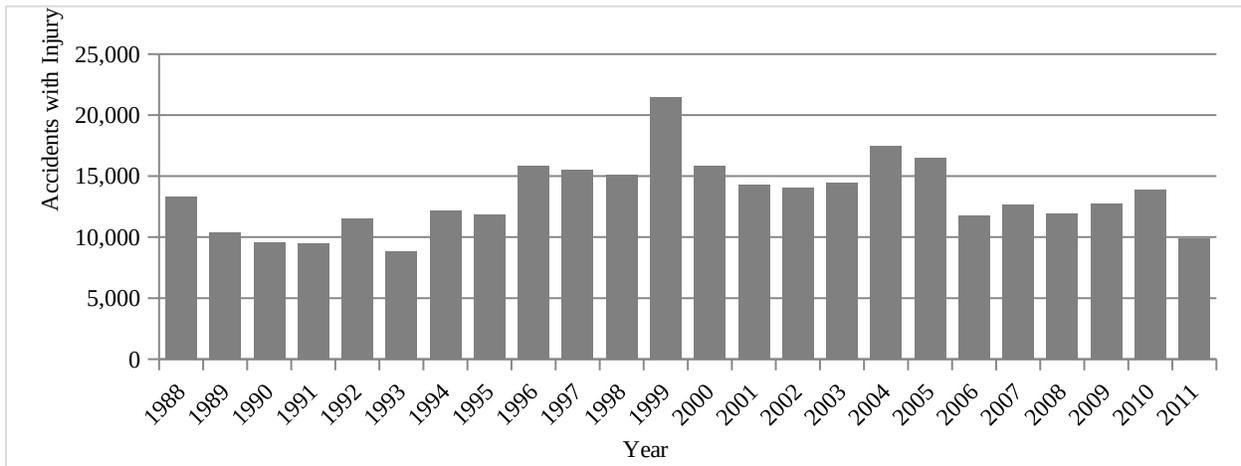


Figure 4. Number of trailer-related accidents leading to one or more injuries, 1988 to 2011

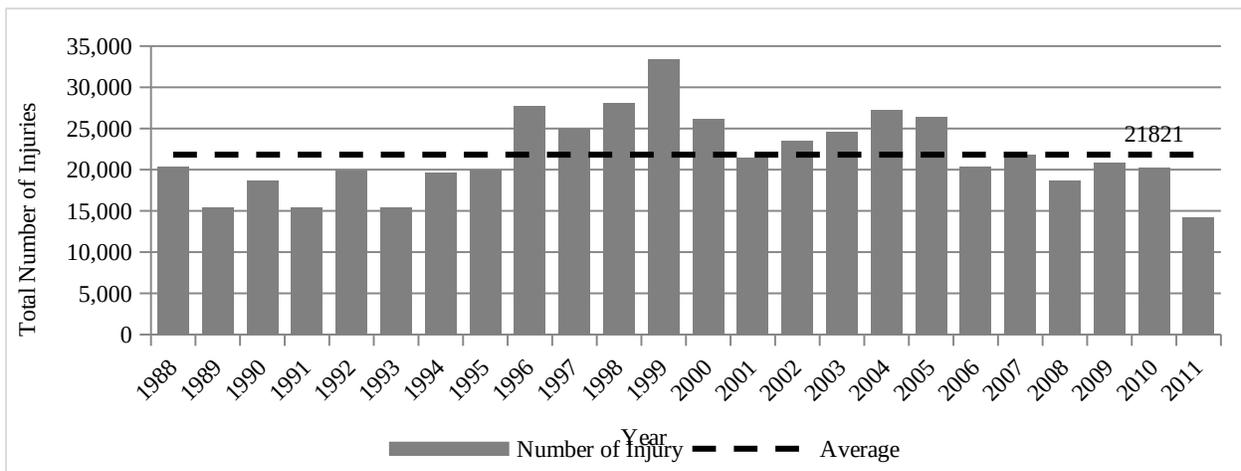


Figure 5. Number of injuries resulting from trailer-related accidents, 1988 to 2011

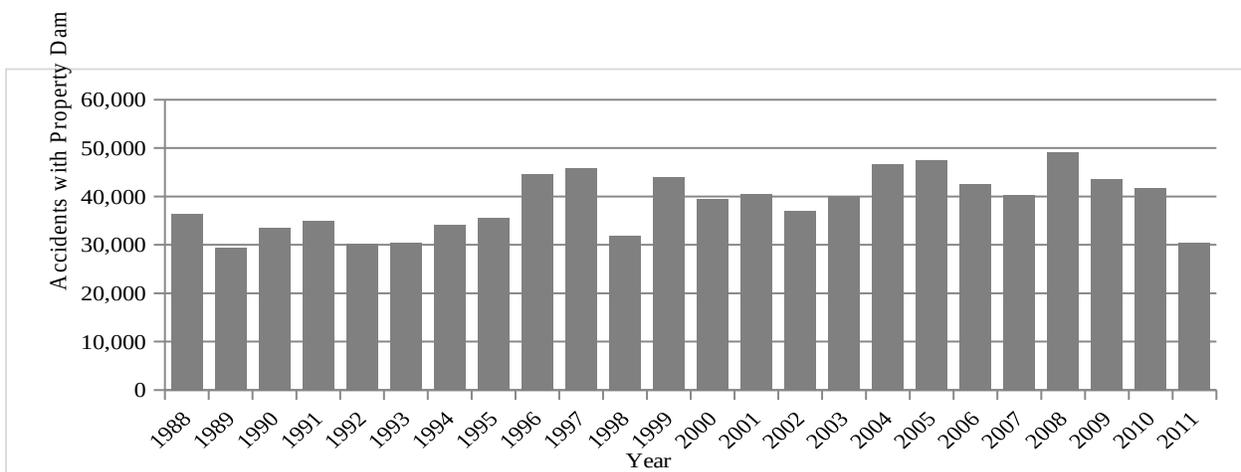


Figure 6. Number of trailer-related accidents causing property damage, 1988 to 2011

Elder (2011) inspected 51,213 trailers for faulty systems. The inspection was done on parts such as frame, lighting, brakes, decking, safety chains, tires, breakaway, and suspension. Of the 51,213 trailers inspected, 23,888 were found to have faulty safety chains. This indicates that 46.6% of the safety chains examined in the study were faulty. Lighting and brakes were the second- and third-most faulty systems, respectively. Figure 7 shows the number of faulty parts in the study.

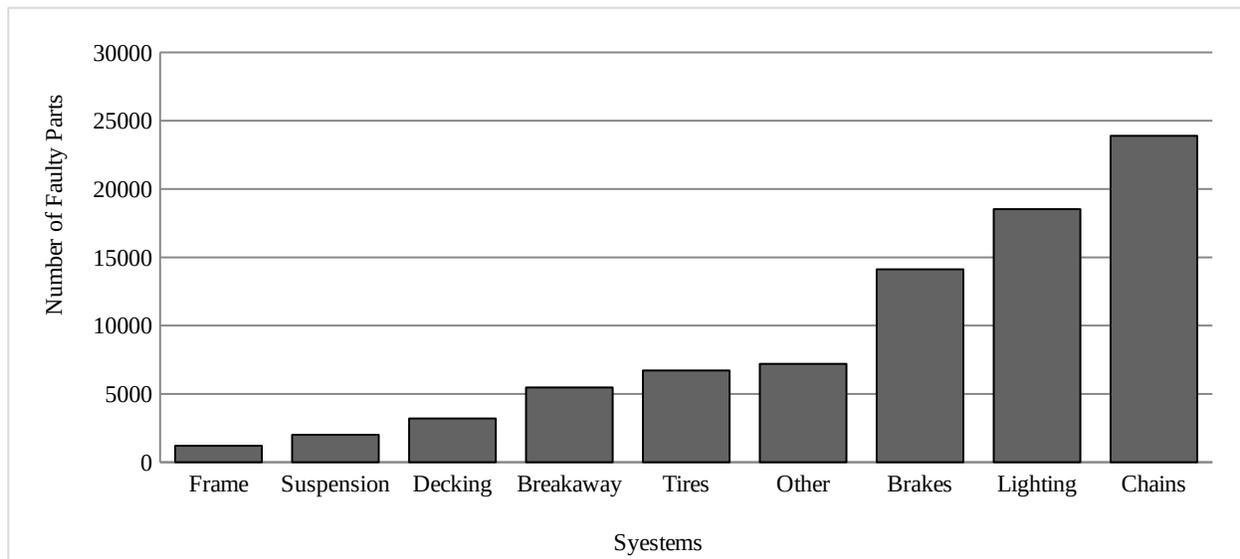


Figure 7. Faulty parts found in 51,213 inspected trailers

Safety chains act as a backup device to link the vehicle and the trailer during the failure of a primary coupling. According to Whitford et al. (2011) {Whitford, 2011 #15@@author-year;Whitford, 2011 #15}, keeping the trailer connected to the truck is one of the most important aspects in safety of trailer towing. Based on literature review and consultation with towing experts, some of the probable causes of failure in safety chains are (1) Improper selection of safety chains (2) Using chains of improper length (3) Hooking the chains to the wrong part of the truck or trailer (4) Using improper hooks to mount the chains on to the vehicle or trailer (5) Using repaired chains (6) Welding the chains to the trailer or vehicle (7) Using single safety chain instead of two safety chains (8) Failure to cross the chains (9) Wearing of chains by corrosion or rubbing with other components (10) Failure to attach a safety chain (Asbell, 2011; McCord et al., 2011; NHTSA Department of Transportation, 2002; Prather, 2000; Whitford et al., 2011). Runaway trailers are caused due to the failure of safety chains after the primary coupling fails. Even though runaway trailers are not common, they cause devastating accidents and death when occurred (Levin et al., 2007). Runaway trailers caused at least 540 accidents from 2000 to 2007 and most of the failures were due to elementary mistakes and lack of knowledge in basic safety and towing procedures (Levin et al., 2007).

CONCLUSION

This paper highlights the losses due to trailer towing-related accidents in the United States. Trailer-related accidents account for an average of 445 deaths and 21,821 injuries per year, or 1.2 fatalities and 60 injuries per day. Every 1000 trailer-related accidents cause 8.5 fatalities and 415 injuries. Apart from injuries and fatalities, 38,747 towing-related accidents result in property damage. Safety chains are observed to be the most faulty component in trailers. It is apparent from the data presented that lack of safety practices in trailer towing is a substantial cause for concern.

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Future studies need be performed to develop alternative safety devices and systems to replace safety chains to improve safety in towing.

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