

WORK-RELATED FATALITIES INVOLVING TRUCKS, AUSTRALIA, 2003 TO 2012



MAY 2014



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INVOLVING TRUCKS,
AUSTRALIA, 2003 TO 2012**

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Summary of Findings

Workers

Over the 10 year period 2003 to 2012, 787 workers were killed in truck-related incidents. These deaths amount to 30% of all worker fatalities over this period. Males accounted for 94% of truck-related fatalities.

Truck-related fatalities include drivers of trucks killed in vehicle crashes as well as workers who are working on or around a truck at the time of the incident. Truck-related fatalities were not limited to those where the truck was the sole contributor to the fatal incident.

Key statistical findings of this report include:

- Three-quarters of the worker fatalities in truck-related incidents occurred on a public road with these typically involving a vehicle crash.
- 80% of the truck-related incidents on a public road involved the death of the driver or passenger in a truck.
- 39% of truck-related fatalities involved single vehicle truck crashes.
- Incidents that occurred while loading or unloading a vehicle accounted for 15% of the truck-related fatalities while repair and maintenance activities accounted for 7%.
- Transport, postal & warehousing workplaces accounted for half of the truck-related fatalities. Construction workplaces accounted for 10% of fatalities and Agriculture, forestry & fishing accounted for 8%.
- Around 50 truck drivers are killed each year with 28 other workers killed in incidents involving trucks.

In an effort to prevent these fatalities, the following key focus areas have been identified. These include:

- managing public road travel to reduce fatigue and using appropriate speed for the conditions
- ensuring that vehicles are braked appropriately
- increasing awareness of pedestrian workers and members of the public
- ensuring that vehicles and equipment are maintained appropriately and used correctly
- improving protection from falls for those working at heights, and
- ensuring cargo is appropriately restrained particularly during unloading operations.

Bystanders

In addition to the workers killed, 298 members of the public were killed in truck-related incidents in the 10 years 2003 to 2012. All but 8 of these occurred on a public road. The majority of the bystander fatalities involved a person in a car being killed when hit by a truck (135 fatalities). The next biggest group were pedestrians who were hit by a truck (49 fatalities).

Australian Road Deaths comparison

The bystander data above includes only those incidents where the truck was considered to be at fault in the fatal incident. The Australian Road Deaths Database (ARDD) compiled by the Bureau of Infrastructure, Transport & Regional Economics includes in its count of crashes involving a heavy vehicle all incidents where a truck was in some way part of the incident scene. There is no causal information in the ARDD database so it is not possible to determine who was at fault in the incident. The ARDD data therefore includes cars that drive into trucks and pedestrians that make unsafe crossings in front of trucks. Matching the road toll data with information from the National Coronial Information System (NCIS) allows for more detailed analysis of the involvement of the truck.

Results of this analysis include:

- The ARDD identified 1119 deaths involving a rigid or articulated truck.
 - Just 37% of these were the fault of the heavy vehicle.
 - Of all fatalities on public roads, heavy vehicles were at fault in only 6% of them.
- 710 heavy vehicle drivers have been involved in a fatal incident over the last five years that were not their fault. These workers may be coping or dealing with work-related stress as a result of their exposure to a traumatic incident.

Introduction

Road safety has long been a focus of attention from police and road transport authorities and the number of truck-related deaths on public roads is frequently reported in the media.

This report looks at all fatal incidents that involve a truck in a working environment. Work-related fatalities are compiled by Safe Work Australia from a range of data sources into the Traumatic Injury Fatalities (TIF) database. Information on this database can be found in the Explanatory notes at the end of this report. The TIF data allows analysis of the circumstances surrounding the incident and allows for the identification of workers killed while driving the truck as well as those killed while undertaking loading/unloading activities, repair and maintenance activities and the deaths of workers who were simply working in an area where there are trucks.

Fatigue is a major work health and safety hazard for truck drivers. The time demands placed on drivers may also encourage speeding. The National Transport Insurance Company regularly reports on the circumstances of major heavy truck incidents occurring under their scheme. Their latest report, *Major Accident Research Report, 2013*, highlights both inappropriate speed and fatigue as dominant causes of incidents. Their analysis of 461 heavy vehicle crashes involving losses of more than \$50 000 determined that inappropriate speed accounted for one-quarter of the crashes and fatigue caused a further 12%. This observation is supported by an analysis of the circumstances surrounding heavy vehicle speeding in New South Wales between 1 January 2003 and 2 April 2011 that reported that 12 107 heavy vehicles were issued at least one strike for speeding at or more than 15 km/h over the posted limit (AIC, 2012).

However, driving within the speed limit does not prevent all incidents. While Australian Design Rules require all vehicles over 12 tonnes gross vehicle mass to be speed limited to 100 km per hour, a large proportion of heavy vehicle incidents occur at lower speeds. For rigid trucks, the Bureau of Infrastructure, Transport and Regional Economics (BITRE) reports that in recent years around 60% of fatal crashes occurred on roads where the posted speed limit was 90 km per hour or less (BITRE, 2012). Research suggests that “total elimination of heavy vehicle speeding might prevent roughly one-quarter of serious casualties involving a heavy vehicle” (Brooks, 2002).

There is also a wealth of research showing the high use of drugs among long distance truck drivers and how the strain of night time driving impairs these drivers. A recent study undertaken by researchers at Monash University has found that the chance of crashing is increased threefold if the driver is driving between midnight and 6am compared with 6am to midday. But overnight driving is the industry norm.

While many truck-related incidents occur on public roads this report will show that around one-quarter of truck-related deaths occur at worksites.

This report builds on the information reported in *Work health and safety in the Road freight transport industry* published by Safe Work Australia in October 2013, which provides details of fatalities and work-related injuries experienced by workers in the Road Freight industry sector. Over the 10 years from 2003 to 2012 half of the workers killed in truck-related incidents were employed in the Road transport sector, the other half were employed in a range of industries. This report will look at truck-related incidents more generally.

Worker fatalities involving trucks

On average 79 workers die each year in an incident involving a truck

In the 10 years from 2003 to 2012, 787 workers died in incidents involving trucks. These deaths amount to 30% of all worker fatalities over this period.

Male workers accounted for 96% of all truck-related worker fatalities in the 10 years 2003–12. This is consistent with the overall proportion of worker fatalities that occur to males (94%) and reflects the male domination of the workforce in occupations that involve trucks.

Table 1 shows that the number of truck-related worker fatalities in any one year ranged from 59 in 2011 to 98 in 2007. While the total number of worker fatalities has shown some major improvements in recent years, the 74 truck-related worker fatalities in 2012 is a large increase on the previous year. However, it remains lower than the 10-year average of 79. The 74 truck-related worker fatalities accounted for 33% of all worker fatalities in 2012, the second highest proportion of truck-related worker fatalities behind 2009 with 35%.

Three quarters of the fatalities involved workers inside the truck

Not all of the workers killed in truck-related incidents were associated with the truck. Occupants of trucks (drivers and passengers) accounted for 77% of fatalities with the remainder being workers in other vehicles or pedestrians working in the vicinity of the truck. These data show that the number of non-truck occupants killed each year has remained relatively stable however, the number of truck occupants has ranged from 42 to 78.

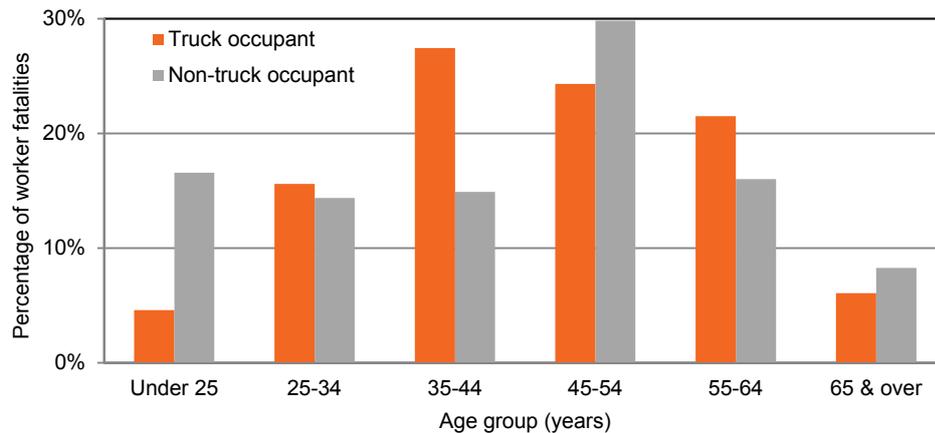
Table 1: Truck-related worker fatalities: number by truck occupancy and year

Year	Truck-related fatalities			All work-related fatalities	
	Truck occupant	Non-truck occupant	Total	Number	% that are truck-related
2003	56	16	72	258	28%
2004	76	15	91	284	32%
2005	57	9	66	257	25%
2006	62	20	82	287	29%
2007	78	20	98	310	32%
2008	67	21	88	281	31%
2009	68	21	89	256	35%
2010	45	23	68	226	30%
2011	42	17	59	224	26%
2012	55	19	74	225	33%
Total	606	181	787	2608	30%

Age of worker

Figure 1 shows that the age profile of truck occupant fatalities is quite different to the age profile of non-truck occupants killed in truck-related incidents. For truck occupants, the proportion killed in truck-related incidents increased sharply with age up to 35–44 years (28%) and then fell gradually before a large fall-off for the 65 years and over age group. This is a similar pattern to the general workforce.

Figure 1: Truck-related worker fatalities: percentage within truck occupancy and age group, 2003 to 2012 combined



The biggest differences between the proportions for truck and non-truck occupant fatalities occurred in the Under 25 and 35–44 years age groups. For the youngest age group, the lower proportion of truck occupant fatalities may be partially explained by the smaller number of truck drivers in this age group. The age of truck drivers reflects the amount of time required to obtain a truck licence. The higher proportion of non-truck occupant fatalities for this age group may be linked to the higher proportion this age group accounts for in public road deaths with 15 of 29 truck-related fatalities involving a collision between the deceased in a light vehicle and a truck. These deceased young people had to be working at the time of the incident to be included in this analysis.

While there is a large difference in the proportion of fatalities between truck and non-truck occupants for the 35–44 years age group, it is the 45–54 years age group for non-truck occupants that is the most dissimilar to the other age groups. For non-truck occupants, the proportions were similar for most age groups ranging from 8% to 17% except for the 45-54 years age group which accounted for 30% of non-truck occupant fatalities. The reasons for this disparity are unclear. However, in the 45–54 years age group there were a lot more pedestrian workers hit by trucks or items falling off trucks than the other age groups.

Higher numbers of fatalities in a particular age group do not on their own indicate a higher risk of death due to working with trucks. Rates per million workers are required to make this assessment. However, because there are a wide variety of occupations that have contact with trucks, it is not possible to determine an appropriate number of workers to use in calculating fatality rates. Due to the smaller numbers of workers aged less than 25 and aged 65 and over in the workforce, fatality rates for these age groups could be higher than the other age groups if suitable worker counts were available.

Public road fatalities

Three quarters of truck-related fatalities occurred on public roads

Table 2 shows that crashes on public roads accounted for three-quarters (73%) of truck-related worker fatalities. Of the public road incidents over the 10 years 2003–12, 80% (464 fatalities) resulted in the death of the truck driver or passenger (truck occupant).

These data also show that for one-quarter (27%) of the truck-related incidents, the worker was killed at worksites away from a public road. The 210 fatalities in this category include 142 truck occupants (68%) and 54 pedestrian workers (26%).

Table 2: Truck-related worker fatalities: number by truck occupancy and public road status, 2003 to 2012 combined

Truck occupancy	Number of truck-related fatalities			Percentage of truck-related fatalities		
	Not on public road	On Public road	Total	Not on public road	On Public road	Total
Truck occupant	142	464	606	23%	77%	100%
Truck driver	132	440	572	22%	73%	94%
Truck passenger	10	24	34	2%	4%	6%
Not in truck	68	113	181	38%	62%	100%
Occupant of other type of vehicle	14	99	113	8%	55%	62%
Pedestrian worker	54	14	68	30%	8%	38%
Total	210	577	787	27%	73%	100%

As pedestrian workers are more likely to be close to a truck at a workplace than they are on the road, it is not surprising that these data show that 54 pedestrian workers were killed in a truck-related incident at a worksite while only 14 were killed on public roads.

How the incident occurred

2 out of 5 truck-related fatalities involved a single vehicle collision

Table 3 shows that over the 2003–12 period, 72% of truck-related worker fatalities were due to a *Vehicle collision*. Single vehicle incidents accounted for over half (55%) of the *Vehicle collision* fatalities and 39% of all truck-related fatalities. This means that 2 out of every 5 workers killed in a truck-related incident died in a single vehicle crash.

Table 3: Truck-related worker fatalities: number by public road status and mechanism of incident, 2003 to 2012 combined

Mechanism of incident	Number of truck-related fatalities			Percentage of truck-related fatalities		
	Not on public road	Public road incident	Total	Not on public road	Public road incident	Total
Vehicle collision	32	530	562	15%	92%	72%
Multi vehicle incident	13	242	255	6%	42%	32%
Single vehicle incident	19	288	307	9%	50%	39%
Being hit by moving objects	50	39	89	24%	7%	11%
Being trapped between stationary and moving objects	42	4	46	20%	1%	6%
Being hit by falling objects	31	2	33	15%	0%	4%
Falls from a height	26	2	28	12%	0%	4%
Other	29	0	29	14%	0%	4%
Total	210	577	787	100%	100%	100%

A further 11% of truck-related worker fatalities were due to *Being hit by moving objects*, which in most cases was a pedestrian worker hit by a vehicle. *Vehicle collision* and *Being hit by moving objects* were responsible for nearly all of the fatalities that occurred on a public road.

Non-public road fatalities occurred for a variety of reasons. The most common mechanism was *Being hit by moving objects*. This mechanism accounted for 24% of non-public road fatalities with 29 of the 50 fatalities due to being hit by a truck. This was followed by *Being trapped between stationary and moving objects* which accounted for 20% of non-public road fatalities. These often involved being crushed between the truck and a gate or wall due to the truck not being braked properly.

Vehicle collision and *Being hit by falling objects* each accounted for 15% of the fatalities at worksites other than a public road while *Falls from a height* accounted for 12%.

Activity at time of incident

Nearly one in six truck-related fatalities occurred while loading or unloading

Table 4 shows the activity that the deceased worker was undertaking at the time of the incident. In 72% of the truck-related incidents the deceased worker was driving at the time of the incident. This was followed by Loading/unloading activities (15%) and Repair/maintenance activities (7%).

These data also show that a *Vehicle collision* was the main mechanism of worker death for both truck occupants (76%) and workers in other vehicles (90%) with the majority of these occurring while driving.

Table 4: Truck-related worker fatalities: number by truck occupancy, mechanism of incident and victim activity at time of incident, 2003 to 2012 combined

Vehicle type / Mechanism	Activity at time of incident				Total	% of total
	Driving	Loading/unloading	Repair/maintenance	Other activity		
Truck occupants	465	87	32	22	606	77%
Vehicle collision	455	5	1	0	461	59%
Being hit by moving objects	0	18	13	10	41	5%
Being trapped between stationary and moving objects	0	17	7	6	30	4%
Being hit by falling objects	1	20	4	0	25	3%
Falls from a height	3	12	5	4	24	3%
Other type of incident	6	15	2	2	25	3%
Workers in other vehicles	98	10	4	1	113	14%
Vehicle collision	97	4	0	0	101	13%
Being hit by moving objects	0	2	4	1	7	1%
Other type of incident	1	4	0	0	5	1%
Worker on foot	0	23	19	26	68	9%
Being hit by moving objects	0	7	8	26	41	5%
Being trapped between stationary and moving objects	0	8	7	0	15	2%
Being hit by falling objects	0	4	2	0	6	1%
Other type of incident	0	4	2	0	6	1%
Total	563	120	55	49	787	100%
Percentage of total	72%	15%	7%	6%	100%	

Half of the fatalities that occurred while driving were single vehicle truck crashes

Workers killed while driving

Over the 10 years from 2003 to 2012, 563 workers were killed in a truck-related incident while driving, of which 94% occurred on a public road. Single truck incidents accounted for just over half of these incidents (313 fatalities) with a further 20% (111 fatalities) involving two trucks.

Fault can be difficult to determine in some vehicle crashes. In this report information was derived mainly from police reports attached to coronial records. For this analysis all single vehicle incidents were considered to be driver fault. However, if another vehicle was known to cause the truck to leave the road without a collision then the incident would be classified as a multi-vehicle incident.

Table 5 shows that 83% of the truck-related worker fatalities while driving were considered to be the decedent's fault. This is partially due to half of the fatalities being single vehicle truck crashes. For multi-vehicle incidents alone, 62% were considered to be the decedent's fault.

Half of the multi-vehicle fatalities involved a head on crash

In the 10 years 2003–12, 250 workers were killed in a multi-vehicle incident involving a truck. These cases involved the fatalities of 153 workers in trucks, 85 workers in light vehicles (cars, utilities and vans) and 12 workers in other vehicles (buses, motorbikes, bicycles and trains). Of the 250 multi-vehicle incidents, half (56%) involved head-on collisions, one quarter (24%) were rear-enders and 19% were side on incidents.

In 67% of the multi-vehicle incidents the truck was considered to be at fault. It must be remembered that these data relate only to workers who were killed in truck-related incidents. For the fatality of a non-truck driver to be included in Table 5 that person must have been working at the time of the incident. An analysis of all public road collisions involving trucks is undertaken in a later chapter of this report.

Table 5: Truck-related worker fatalities while driving: number by type of incident and driver at fault, 2003 to 2012 combined

Type of incident	Deceased at fault	Other at fault	Total
Single vehicle incident	309	4	313
Multi vehicle incident	156	94	250
Occupant of truck killed in a collision with another truck	69	42	111
Occupant of light vehicle killed in a collision with a truck	56	27	83
Occupant of truck killed in collision with a light vehicle	19	13	32
Occupant of other vehicle killed in collision with a truck	3	8	11
Occupant of truck killed in collision with other vehicle	8	2	10
Other incidents	1	2	3
Total	465	98	563
Percentage of total	83%	17%	100%

There were 4 single vehicle incidents where the truck driver was not considered at fault. One incident involved a tree branch crashing onto the cabin of the truck and the other 3 incidents involved truck drivers caught in bushfires after being given clearance to drive in that area.

Of the single vehicle incidents, half involved a truck rollover, probably due to driving too fast for the conditions, while the other half involved leaving the road and hitting a stationary object such as a fence or a tree.

Just about all (93%) of the single vehicle incidents occurred on a public road. Of the single vehicle public road incidents, one-third were noted to have occurred on a bend. There were very few cases that indicated that a particular hazard impacted on the crash. In 12 cases the crash was attributed to equipment failure such as a tyre blowout, 5 were attributed to hazards on the road such as animals, tree branches and debris from other vehicles and 3 were attributed to a medical event just prior to the incident. However for most of the remaining cases the road appeared straight and without hazards, possibly indicating a lack of concentration or fatigue as the reason the truck left the road. Coronial data available to this project do not contain sufficient information to determine the impact of long driving hours, drug use or pay rates on fatalities.

Typical examples of fatal driving incidents include:

The truck and trailer combination has veered right across the incorrect side of the roadway and has driven down an embankment before colliding with a large gum tree.

The truck drifted onto the gravel shoulder of the carriageway. The driver over-corrected and lost control of the vehicle. The truck tipped onto its side and slid diagonally across the carriageway.

While negotiating a left hand bend a prime mover has crossed to the incorrect side of the roadway and collided head on with another prime mover killing both drivers.

A truck driver was killed when he was hit by an out of control Nissan Patrol that had hit the gravel on the side of the road and over-corrected to get back onto the road.

Workers killed while loading or unloading cargo

12 workers were killed while loading or unloading a truck each year

In the 10 years 2003–12, 120 workers were killed during loading/unloading activities involving a truck. Of these, 88 (74%) were truck occupants.

As shown in Table 6, 44 workers died after being hit by a vehicle while undertaking loading or unloading activities. In 16 of these instances, the moving vehicle was the worker's own vehicle which had not been braked properly prior to exiting. In an additional 13 instances the truck driver was hit by another vehicle and in 15 instances a pedestrian worker was hit by a truck.

Table 6: Truck-related worker fatalities involving loading/unloading: number by type of incident, 2003 to 2012 combined

Type of incident	No. of fatalities	Percentage
Hit by moving vehicle	44	37%
Hit by own vehicle	16	13%
Pedestrian worker hit by truck	15	13%
Truck driver hit by other vehicle	13	11%
Hit by falling cargo	20	17%
Fall from vehicle	15	13%
Loading plant onto tray of truck	9	8%
Vehicle overbalanced	7	6%
Trapped in lifting equipment	6	5%
Hitting overhead power lines	5	4%
Hit by falling ramp	4	3%
Explosion	3	3%
Other	6	5%
Total	120	100%

Examples of fatal incidents while loading/unloading in which the worker was hit by a moving vehicle include:

The deceased has reversed his Mack truck down a slight slope to make a delivery and has become bogged. He has then driven his loader down to the truck and placed a chain between the front of the loader and the truck. He was in the process of attaching the chain to the bull bar of the truck when the loader has moved forward pinning and crushing him against the bull bar of his truck. The loader did not have working brakes.

With the engine running, hand brake not engaged, and gears in neutral the deceased exited the truck and went to connect the air brake to the trailer. As the deceased connected the air from the truck to the trailer the vehicles shunted forward resulting in the deceased losing his footing and subsequently the left rear tyres of the prime mover rolled over the deceased.

Being hit by falling cargo caused 20 worker fatalities over the 10 years, with hay bales, logs and steel being the most common items that fell on to workers. Examples of these types of incidents include:

A truck driver was standing next to his trailer while steel tubing was being unloaded by a forklift from the other side. The forklift knocked 1.7 tonne of the tubing, which hit the driver and resulted in a crush injury to his head.

A transport truck driver removed chains over large mining plant tyres each weighing 1382kgs prior to a crane and forklift being in place to support them. As he released the chains one of the tyres fell on him and knocked him off the trailer with that tyre and two subsequent tyres landing on top of him.

There were 15 workers who fell from their truck and sustained fatal injuries. Most of these trucks were tray back types and hence had no railing to prevent falls.

Examples of falls while loading include:

Loading ramps were put across the trailers of two trucks to form a bridge to transfer an elevating work platform (EWP). As the deceased drove the EWP across the ramps one of the trailers moved causing one loading ramp to fall. The deceased was thrown from the EWP basket as it fell sideways.

A worker was securing a load of steel poles onto a flatbed semi-trailer when he lost his balance and fell to the ground striking his head.

Workers killed while undertaking repair and maintenance activities

Around 5 workers are killed undertaking truck repairs each year

Over the 10 years 2003–12, 55 workers were killed while they were undertaking repairs to a vehicle. Table 7 shows that the largest group (14 fatalities) involved trucks not being braked properly and rolling over or colliding with the worker while they were repairing it. An additional 9 workers were hit by other trucks while they were repairing a truck. There were also 13 incidents where workers were within the body of the truck and were crushed when parts came together.

Table 7: Truck-related worker fatalities involving repair/maintenance activities: number by type of incident, 2003 to 2012 combined

Type of incident	No of fatalities	Percentage
Working on truck when it moved	14	25%
Crushed while inside truck body	13	24%
Working on truck when hit by another truck	9	16%
Tyre incidents	5	9%
Working on cars when hit by a truck	4	7%
Falls from trucks	3	5%
Crushed when jack failed	3	5%
Other incidents	4	7%
Total	55	100%

Examples of fatal incidents involving repair and maintenance activities are:

The deceased intended to inflate his bobcat's tyres using the truck's air supply. The deceased crawled under the truck while its motor was still running and the gearbox was in neutral. When the deceased disconnected the air hose the truck no longer had any operative brakes. Due to the slight decline of the road the truck rolled backwards trapping the deceased between the rear axle and the bitumen road surface.

As the crane truck travelled up the hill, it stalled. The deceased alighted and moved behind the vehicle while another worker attempted to start it. While the deceased was on the phone the crane rolled backwards and struck him.

The deceased was crushed when another truck reversed into the front of his vehicle as he was cleaning his windscreen at a service station.

There were a number of truck-related fatal incidents involving the repair and maintenance of other vehicles. These include 4 workers who had stopped to change tyres on their own vehicles and were hit and killed by passing trucks. A typical example is:

The deceased was changing the wheel of a trailer attached to the rear of his ute which was stationary in the emergency lane of the freeway. A prime mover with a tanker trailer attached was seen by witnesses to slowly drift across the lane and into the emergency lane where it collided squarely with the rear of the stationary ute.

There were also 5 incidents that involved tyres exploding or moving. An example is:

The deceased received fatal injuries from the catastrophic release of pressure from a tyre that failed via the side wall after being changed.

Other types of truck-related incidents

Table 8 shows that of the 49 workers who were killed while undertaking activities not directly associated with driving, loading or repair of a vehicle, 22 involved a truck driver. In addition there were 26 pedestrian workers killed when hit by a truck and 1 car driver hit and killed by a passing truck while stopped in the emergency lane to take a phone call.

Table 8: Truck-related worker fatalities involving other activities: number by type of incident, 2003 to 2012 combined

Vehicle type/activity at time of incident	No. of fatalities	Percentage
Truck	22	45%
Entering/exiting vehicle	14	29%
Opening gate	4	8%
Resting	3	6%
Working on side of road	1	2%
Worker on foot	26	53%
Traffic control	10	20%
Working on side of road	7	14%
Working on construction sites	4	8%
Working on other sites	5	10%
Other vehicle	1	2%
Total	49	100%

Entering or exiting a truck was associated with 14 fatalities in the ten year period. Common examples include:

The deceased started the engine of his truck and then left it to warm up and build up the air pressure needed to operate the brakes. The truck started to roll down a slight slope and the deceased tried to climb into the moving truck before he was pinned by a tree that struck the open door.

The driver alighted from his truck to shift a bin and the truck began to move forward. He attempted to remount the truck and was crushed between the truck door and a brick wall.

There were 4 cases of truck drivers temporarily leaving their vehicle to open a gate. A common example is:

The driver left his cattle truck in neutral without applying the handbrake and got out of his truck to open a gate. The movement of the six cattle inside probably made the truck roll forward and the driver was crushed against the gate.

Of the workers on foot who were killed in a truck-related incident, the biggest group were traffic controllers with 10 killed in the 2003–2012 period. Common examples include:

A worker checking the placement of witches hats was struck and killed by an asphalt truck that was reversing in preparation for road surfacing.

An employee was controlling traffic when he was fatally struck by a reversing street sweeper.

There were also 7 people working on the side of the road who were hit by passing trucks. Some of the cases include:

The deceased was working approximately 10 metres in front of a marked roads maintenance truck. A fully loaded B-double truck has collided with the rear of the maintenance vehicle pushing this vehicle into the deceased.

The deceased was mowing lawns on the side of the road when he was hit by a large dual truck tyre that had snapped from the driver side rear of a passing truck.

Industry of workplace

Workers interact with trucks in a variety of ways across a variety of industry workplaces. Table 9 shows that of the 787 workers killed in truck-related incidents, 506 (64%) were specifically employed as truck drivers. Table 9 also shows the type of industry in operation at the incident site. This is not the same as the industry that employs the worker although in many instances they are the same. An example of where they would be different is a manufacturing business that contracts a trucking company to move their products from their business to a retail outlet. The industry of employer of the truck driver would be Transport, postal & warehousing but the industry of workplace could be Manufacturing, Retail trade or Transport, postal & warehousing depending on whether the fatal incident occurred during the loading, unloading or transport phase of the work.

Half of the truck-related fatalities occurred at Transport, postal & warehousing workplaces

Table 9 shows that just over half (51%) of truck-related fatalities occurred at Transport, postal & warehousing worksites. For 354 of the 400 incidents (89%), the worksite was a public road. This is not unexpected as the primary roll of the transport industry is to move freight and/or people around.

Construction workplaces were the location for 10% of truck-related fatalities with half of these occurring on public roads.

Table 9: Workers killed in truck-related fatalities: number by industry of workplace, truck driver status and public road status, 2003 to 2012 combined

Industry of workplace	Public road status		Total	% of total
	Not on a public road	On a public road		
Employed as a truck driver				
Transport, postal & warehousing	40	323	363	72%
Construction	13	14	27	5%
Agriculture, forestry & fishing	10	8	18	4%
Manufacturing	5	18	23	5%
Retail trade	9	7	16	3%
Wholesale trade	6	16	22	4%
Mining	16	4	20	4%
Electricity, gas, water & waste services	1	1	2	0%
Other industries	2	13	15	3%
Total truck driver fatalities	102	404	506	100%
Employed as other type of worker				
Transport, postal & warehousing	6	31	37	13%
Construction	25	26	51	18%
Agriculture, forestry & fishing	23	25	48	17%
Manufacturing	6	9	15	5%
Retail trade	9	13	22	8%
Wholesale trade	5	8	13	5%
Mining	12	0	12	4%
Electricity, gas, water & waste services	8	15	23	8%
Other industries	14	46	60	21%
Total other worker fatalities	108	173	281	100%
Total worker fatalities				
Transport, postal & warehousing	46	354	400	51%
Construction	38	40	78	10%
Agriculture, forestry & fishing	33	33	66	8%
Manufacturing	11	27	38	5%
Retail trade	18	20	38	5%
Wholesale trade	11	24	35	4%
Mining	28	4	32	4%
Electricity, gas, water & waste services	9	16	25	3%
Other industries	16	59	75	10%
Total fatalities	210	577	787	100%

50 truck drivers are killed in truck-related incidents each year

Table 11 also shows that 72% of the deceased workers specifically employed as truck drivers were working at Transport, postal & warehousing workplaces at the time of the incident. Notable numbers of truck driver fatalities also occurred at Construction (27 fatalities), Manufacturing (23 fatalities) and Wholesale trade (22 fatalities) workplaces. Not surprisingly, 80% of the truck drivers killed while working, died in a crash on a public road.

These data also show that 281 workers were killed while working in and around a truck but not specifically employed as a truck driver. These workers were mainly working in Construction (51 fatalities),

Agriculture, forestry & fishing (48 fatalities) and Transport, postal & warehousing (37 fatalities) workplaces. Incidents on public roads accounted for 62% of the fatalities, which is a much lower proportion than for workers employed as truck drivers (80%).

Non-public road incident locations

Table 10 shows that of the 210 fatal incidents that did not occur on a public road, 22% occurred at Transport, postal & warehousing workplaces. A further 18% occurred at Construction workplaces, 16% at Agriculture, forestry & fishing workplaces and 13% at Mining workplaces.

Three quarters of the workers killed in incidents not on public roads were in a vehicle at the time of the incident. The remaining one quarter were workers on foot who were moving around the workplace when they were hit by a truck.

Table 10: Truck-related worker fatalities that did not occur on a public road: number by industry of workplace and vehicle type, 2003 to 2012 combined

Industry of workplace	Vehicle type			Total	% of total
	Worker in truck	Worker on foot	Worker in other vehicle		
Transport, postal & warehousing	37	5	4	46	22%
Construction	21	14	3	38	18%
Agriculture, forestry & fishing	21	9	3	33	16%
Mining	21	5	2	28	13%
Retail trade	12	5	1	18	9%
Wholesale trade	7	3	1	11	5%
Manufacturing	6	5	0	11	5%
Electricity, gas, water & waste services	8	1	0	9	4%
Other workplaces	9	7	0	16	8%
Total	142	54	14	210	100%

Workers in trucks killed in truck-related incidents at workplaces

Table 11 shows that there was not one main mechanism of incident for the fatalities involving workers in trucks at workplaces away from public roads. However there were some patterns for particular workplaces.

At Transport, postal & warehousing workplaces the mechanism with the highest number of fatalities was *Being hit by moving objects* (9 fatalities) of which 6 involved the truck driver being hit by his own truck which was not braked properly.

At Mining workplaces *Vehicle collision* (11 fatalities) accounted for the highest number of fatalities involving workers in a truck not on public roads. This is likely to be due to the rough terrain at mine sites and the need to move mining material around the worksite for processing.

Rough terrain issues also exist in at Agriculture, forestry & fishing workplaces with 5 workers in trucks killed in a *Vehicle collision* at the property.

Table 11: Truck-related worker in truck fatalities that did not occur on a public road: number by industry of workplace and mechanism of incident, 2003 to 2012 combined

Industry of workplace	Mechanism of incident						Total	% of total
	Trapped between stationary & moving objects	Being hit by falling objects	Vehicle collision	Being hit by moving objects	Falls from a height	Other		
Transport, postal & warehousing	6	6	0	9	6	10	37	26%
Agriculture, forestry & fishing	4	5	5	2	4	1	21	15%
Construction	4	3	4	4	1	5	21	15%
Mining	1	4	11	2	2	1	21	15%
Retail trade	4	1	0	1	2	4	12	8%
Other workplaces	7	5	3	4	7	4	30	21%
Total	26	24	23	22	22	25	142	100%

Workers on foot killed in truck-related incidents at workplaces

Table 12 shows that of the 54 workers on foot who were killed at workplaces, 21 involved a stationary truck. In a further 18 incidents the truck was reversing and in 15 the truck was moving in a forward direction. Construction workplaces accounted for the greatest number of fatalities involving workers on foot (14) followed by Agriculture, forestry & fishing workplaces (9).

Table 12: Truck-related pedestrian worker fatalities that did not occur on a public road: number by movement of truck and activity at time of incident, 2003 to 2012 combined

Truck movement	Activity at time of incident			Total	% of total
	Loading/unloading	Repair/maintenance	Other activity		
Stationary	9	11	1	21	39%
Reversing	6	2	10	18	33%
Forward	8	4	3	15	28%
Total	23	17	14	54	100%

Table 12 shows that in 11 of the incidents where the truck was stationary the worker was repairing the truck when they were hit by a component of the truck or another vehicle. Examples include:

The deceased was repairing a truck. He lowered the bull bar and then raised the cabin to access the engine. The deceased climbed into the engine and under the cabin and commenced draining the oil. At some point it is believed he knocked the locking arm with his leg causing the cabin to drop on top of him.

The deceased climbed between the lifting boom of the truck and the rear axles within the chassis frame. Due to mechanical failure the boom has lowered crushing the deceased against the rear axle assembly.

Stationary truck incidents also included 3 workers who were killed by falling cargo, 2 workers who fell after climbing onto the truck to assist with unloading and 2 workers who were electrocuted when the tipper on the truck was raised and came into contact with overhead power lines while they were touching the metal body of the truck.

Of the 18 incidents involving reversing trucks, 6 workers were killed while undertaking loading activities, 5 while undertaking traffic control duties and 3 workers were simply moving around construction sites when they were hit by a truck. Examples include:

A plumber was unloading from his truck when a courier truck reversed into an industrial estate. The deceased was pinned between the two vehicles.

A truck driver was crushed when a truck he was assisting to load reversed and pinned him against a loading dock.

Industry of employer

People may be killed while working at worksites that have a different industry classification to the industry they are employed in. For example, a person employed in the Road freight transport industry may be killed at a Retail industry worksite while unloading the truck. The statistics presented previously relate to the industry of the worksite where the worker was killed. However fatalities can also be considered from the perspective of the industry that employed the person killed i.e. the industry of the employer.

Table 13 shows that 91% of deceased workers were employed by the industry of the worksite where the fatal incident occurred. The industries with the highest number of fatalities involving workers who were at other workplaces were Transport, postal & warehousing which had 34 fatalities at sites other than within its own industry and Construction with 12 fatalities at other sites.

Of the deceased workers employed within the Transport, postal & warehousing industry, 9 were working at Agriculture, forestry & fishing worksites at the time of the incident, with 7 each at Mining and Retail trade worksites.

Table 13: Truck-related worker fatalities: number by industry of employer and whether working in same industry, 2003 to 2012 combined

Industry of employer	Working in same industry	Working in different industry	Total	% of total
Transport, postal & warehousing	396	34	430	55%
Construction	71	12	83	11%
Agriculture, forestry & fishing	55	1	56	7%
Wholesale trade	31	5	36	5%
Manufacturing	32	3	35	4%
Electricity, gas, water & waste services	22	1	23	3%
Retail trade	22	0	22	3%
Mining	19	0	19	2%
Public administration & safety	14	5	19	2%
Administrative & support services	12	6	18	2%
Professional, scientific & technical services	12	0	12	2%
Rental, hiring & real estate services	10	2	12	2%
Other industries	22	0	22	3%
Total	718	69	787	100%

Of the deceased workers employed within the Construction industry, 6 were working at Retail trade workplaces at the time of the incident.

These data indicate that half of the deceased workers employed within the Administrative & support services industry died in incidents outside of their industry. This is not unexpected as this industry includes labour hire workers.

State/territory of incident

The three most populous states accounted for 77% of the Australian workforce and 81% of the truck-related worker fatalities in the 10 years 2003–12. Table 14 shows that of the fatalities that occurred at worksites (not on public roads) New South Wales and Queensland had the greatest number (54 each) followed by Victoria (42).

The spread was quite different for incidents on public roads. Over the ten year period, 199 workers in New South Wales were killed in truck-related incidents on public roads while 147 were killed in Queensland and 140 in Victoria.

Table 14: Truck-related worker fatalities: number by state/territory of incident, public road status and year

State/territory	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Not on a public road											
New South Wales	4	8	2	10	3	7	3	5	6	6	54
Queensland	6	3	7	3	5	7	5	7	3	8	54
Victoria	3	3	5	8	6	8	2	3	3	1	42
Western Australia	2	4	2	2	5	6	3	4	0	1	29
South Australia	2	5	0	3	1	2	2	4	1	0	20
Tasmania	1	1	2	0	0	1	0	0	0	0	5
Northern Territory	0	0	0	0	0	1	1	0	0	2	4
Australian Capital Territory	0	1	0	0	0	0	1	0	0	0	2
Total not on public road	18	25	18	26	20	32	17	23	13	18	210
On a public road											
New South Wales	22	21	22	21	20	23	15	18	13	24	199
Queensland	10	14	13	12	27	19	20	6	15	11	147
Victoria	17	21	10	14	22	7	18	13	10	8	140
Western Australia	2	5	1	4	3	5	8	5	3	5	41
South Australia	1	2	1	1	2	1	4	2	2	5	21
Tasmania	1	2	0	3	1	1	5	1	2	2	18
Northern Territory	1	1	1	1	3	0	1	0	1	1	10
Australian Capital Territory	0	0	0	0	0	0	1	0	0	0	1
Total on public road	54	66	48	56	78	56	72	45	46	56	577
Total											
New South Wales	26	29	24	31	23	30	18	23	19	30	253
Queensland	16	17	20	15	32	26	25	13	18	19	201
Victoria	20	24	15	22	28	15	20	16	13	9	182
Western Australia	4	9	3	6	8	11	11	9	3	6	70
South Australia	3	7	1	4	3	3	6	6	3	5	41
Tasmania	2	3	2	3	1	2	5	1	2	2	23
Northern Territory	1	1	1	1	3	1	2	0	1	3	14
Australian Capital Territory	0	1	0	0	0	0	2	0	0	0	3
Total	72	91	66	82	98	88	89	68	59	74	787

Ideally a state/territory comparison would be carried out in reference to the number of workers in each state/territory who are likely to come into contact with trucks during their normal working day. As was shown in previous sections of this report it is not just workers in the transport industry that drive or work with trucks. Another complication is that while a long distance truck driver may be employed by a company in Queensland, that worker may be involved in a traffic incident on a road in New South Wales. In these situations the decedent would be counted as a worker in Queensland but the fatality would be recorded against New South Wales. Most long distance truck drivers pass through New South Wales to make their deliveries, possibly inflating the number of truck-related deaths occurring in that state. Therefore only a rough comparison can be undertaken on a state/territory basis.

Table 15 shows that while New South Wales accounted for 32% of the Australian workforce, it accounted for 34% of truck-related worker fatalities on public roads and 26% of truck-related worker deaths not on public roads. This indicates that the rate of truck-related fatalities in New South Wales is unlikely to be relatively much higher than the other states and territories.

In contrast Western Australia has a lower proportion of truck-related fatalities on public roads than the proportion of the workforce but a higher proportion of fatalities at worksites.

Table 15: Truck-related worker fatalities: percentage by state/territory of incident and public road status, 2003 to 2012 combined

State/territory	% of workers	% of truck-related public road worker fatalities	% of truck-related non-public road worker fatalities
New South Wales	32%	34%	26%
Victoria	25%	25%	26%
Queensland	20%	24%	20%
Western Australia	10%	7%	14%
South Australia	8%	4%	10%
Tasmania	2%	3%	2%
Northern Territory	1%	2%	2%
Australian Capital Territory	2%	0%	1%
Total	100%	100%	100%

State of death by industry of employer

Table 16 provides a breakdown of the truck-related worker fatalities for the largest states of Australia by the industries with the highest number of truck-related fatalities.

The Transport, postal & warehousing industry accounted for the highest number of truck-related public road fatalities in all states. The same was nearly true for non-public road fatalities except that the Queensland Construction industry recorded more non-public road fatalities than the Transport, postal & warehousing industry (16 in Construction compared with 12 in the Transport, postal & warehousing industry). The Construction industry in Victoria recorded only slightly fewer fatalities than the Transport, postal & warehousing industry (10 compared with 13 respectively).

Table 16: Truck-related worker fatalities: number by the largest states, public road status and the industries with the largest number of fatalities, 2003 to 2012 combined

Industry of employer	New South Wales	Victoria	Queensland	Western Australia	South Australia
Not on public road					
Transport, postal & warehousing	23	13	12	15	8
Construction	8	10	16	2	4
Agriculture, forestry & fishing	6	3	5	2	3
Mining	0	3	4	7	1
Wholesale trade	4	2	4	1	1
Other industries	13	11	13	2	3
Total not on public road	54	42	54	29	20
On a public road					
Transport, postal & warehousing	128	82	98	20	17
Construction	16	9	10	1	0
Agriculture, forestry & fishing	11	9	6	3	1
Manufacturing	6	9	9	2	0
Wholesale trade	5	7	5	4	1
Retail trade	8	5	1	2	0
Electricity, gas, water & waste services	5	6	4	1	0
Other industries	20	13	14	8	2
Total on public road	199	140	147	41	21

Bystander fatalities involving trucks

Around 30 members of the public are killed each year in truck-related incidents

Bystanders are members of the public who are killed as a result of a worker’s activity. Bystanders can be non-working occupants of trucks as well as pedestrians or car drivers hit by trucks.

Over the 10 years 2003–12, 298 bystanders were killed in truck-related incidents where a worker’s activity has been the major contributing factor. All but 8 of these occurred on public roads.

Table 17 shows that 175 (59%) of the bystanders were male and 123 (41%) were female.

Table 17: Bystanders killed in truck-related incidents: number by sex and year

Year	Female	Male	Total
2003	9	13	22
2004	13	9	22
2005	13	13	26
2006	11	14	25
2007	12	22	34
2008	13	22	35
2009	13	12	25
2010	9	26	35
2011	13	19	32
2012	17	25	42
Total	123	175	298

Figure 2 shows that there was no pattern by age of the bystanders killed in a truck-related incident. Although the 65 years and over age group accounted for a greater percentage of truck-related bystander fatalities, this age group also contains more people than the other groups.

Figure 2: Bystanders killed in truck-related incidents: percentage by age group, 2003 to 2012 combined

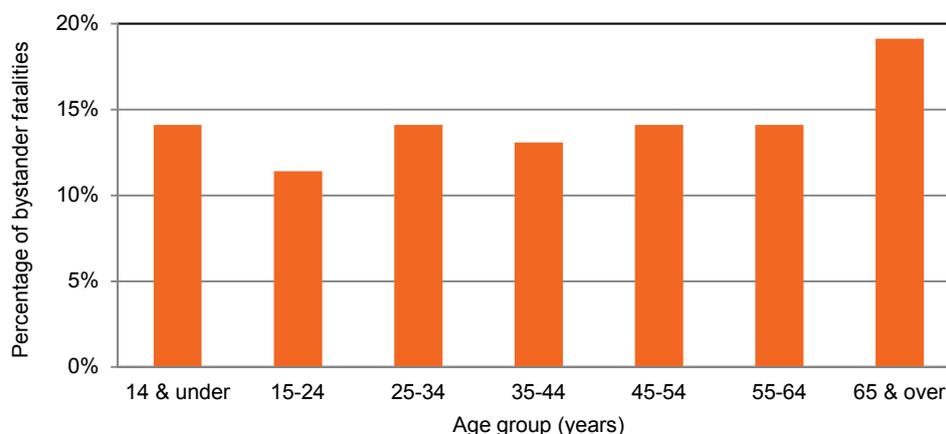


Table 18 shows that the most common type of truck-related incident involving a bystander was a crash between a car and a truck. These incidents accounted for 45% of the truck-related bystander fatalities.

Table 18: Bystanders killed in truck-related incidents: number by type of incident, 2003 to 2012 combined

Type of incident	No. of fatalities	Percentage
Vehicle crashes	244	82%
Bystander in car hit by truck	135	45%
Bystander on motorbike hit by truck	30	10%
Bystander in other vehicle hit by truck	26	9%
Bystander on bicycle hit by truck	18	6%
Bystander (passenger) in truck killed in single vehicle incident	14	5%
Bystander in train hit by truck	13	4%
Bystander (passenger) in truck killed in multi-vehicle incident	8	3%
Other incidents	54	18%
Pedestrian hit by truck	47	16%
Other	7	2%
Total	298	100%

Of the 244 bystander fatalities that involved a vehicle crash, 41% (100 fatalities) involved head on collisions, 24% (58 fatalities) involved a side on collision at an intersection and 11% (28 fatalities) involved a truck rear-ending the bystander's vehicle. Common examples include:

A truck has braked suddenly causing the truck behind to jack-knife into path of a transit van and a car killing both drivers.

A passenger in a car was killed when the car was hit from behind by semi-trailer. The car had slowed due to smoke from a bushfire.

The deceased had parked his vehicle 1.2 metres off the road to change a flat tyre. Whilst placing the spare wheel on the vehicle an unknown south bound heavy vehicle has crossed the unbroken eastern edge line and collided with the deceased.

The truck was not always at fault in bystander incidents. In the 10 years, 17 of the 298 were due to the actions of another vehicle. An example is:

A cattle truck swerved to avoid a car which suddenly turned in front of it. The truck went down an embankment and the passenger was killed.

Of the non-vehicle crash incidents, 47 involved pedestrians hit by trucks. Examples include:

The deceased was standing on the edge of the footpath with his back to the traffic while using his mobile phone. An Iveco prime mover and trailer combination slowly turned the corner and the rear set of tyres of the trailer mounted the edge of the kerb and struck the deceased.

The driver of a Mitsubishi truck forgot to retract the HIAB crane fitted to the rear of the truck after making a delivery. While the truck was moving down the road the crane struck the back of the head of the deceased who was walking on the verge.

Road fatalities involving a heavy vehicle

The Australian Roads Death Database (ARDD)¹ compiled by BITRE separately identifies fatalities on public roads that involved a rigid or articulated truck of 4.5 tonne or greater. The ARDD data in Table 18 show that on average 233 people die each year in a crash on a public road that involved a heavy vehicle. This is 16% of all road fatalities each year.

Table 19: Australian Road Deaths involving a heavy vehicle by year

Year	No. of ARDD heavy vehicle fatalities	Total ARDD fatalities	% involving a heavy vehicle
2005	239	1627	15%
2006	246	1598	15%
2007	261	1603	16%
2008	239	1437	17%
2009	214	1491	14%
2010	217	1353	16%
2011	206	1277	16%
2012	241	1299	19%

Detailed data from the ARDD were obtained for the 2008 to 2012 period. These were matched to coronial records and in turn to Traumatic Injury Fatalities (TIF) records. The records were identified as either work-related, not work-related (generally the fault of a non-working vehicle or person) or other. The 'other' category included cases where the coronial information did not indicate the presence of a heavy vehicle in the incident, the death was considered the result of natural causes (heart attack) or suicide or the case could not be matched with a coronial record.

Similarly there were a number of fatalities in the TIF database that were not recorded in the ARDD as involving a heavy vehicle. The location of each of these additional incidents was checked to confirm that it occurred on a public road. BITRE was able confirm that most of these incidents were in its database but just did not have the flag to indicate that the incident involved a heavy vehicle.

Table 20 shows the results of this analysis.

Table 20: Road fatalities involving a heavy vehicle by work-related status and year

Work-related status	2008	2009	2010	2011	2012	Total
Not work-related	147	115	132	129	152	675
Work-related (in TIF)	85	89	76	71	88	409
Other	9	10	8	6	2	35
Total	241	214	216	206	242	1119
Percentage work-related	35%	42%	35%	34%	36%	37%
Additional records found in TIF	4	10	3	5	9	31

Note: The slight differences in the ARDD data presented in this table compared with Table 18 are due to the supply of more detailed data to Safe Work Australia that were more recent than those on the website at the time of this analysis.

¹ <www.bitre.gov.au/statistics/safety/fatal_road_crash_database.aspx> accessed 13 March 2014

Only one-third of incidents involving heavy vehicles were work-related

The comparison concludes that only 37% of the fatalities involving heavy vehicles in the 2008 to 2012 period were work related. There are a number of reasons for this. The ARDD heavy vehicle fatalities include single vehicle truck crashes, multi-vehicle crashes in which one of the vehicles is a truck and pedestrians hit by a truck. However, it also includes occupants of vehicles who die after crashing into a stationary truck, those who lose control of their vehicle after overtaking a truck, or occupants of vehicles hit by vehicles while overtaking a truck. Clearly, not all of these incidents were the fault of the truck and this partially explains why only one-third of fatalities involving heavy vehicles are considered work-related.

The incidents that were not considered work-related included 582 multi-vehicle collisions (82%), 101 pedestrian deaths (14%) and 27 single vehicle incidents (4%). In contrast the work-related deaths on public roads included 248 multi-vehicle collisions (61%), 122 single vehicle incidents (30%) and 39 pedestrian deaths (9%).

While detailed analysis was not undertaken on the non-work-related cases, most involved a car driving into the path of a heavy vehicle or a pedestrian stepping into the path of a heavy vehicle. Some of these were deliberate suicide attempts.

The ARDD data relating to heavy vehicle incidents leave the casual reader with the perception that 16% of deaths on public roads are the fault of the truck. This analysis has shown that just 6% of fatalities on public roads are the fault of the heavy vehicle. Heavy vehicles have come under scrutiny in recent times, but this analysis has shown that it is also important to focus on other driver and pedestrian behaviour around trucks.

It is also important to note 710 heavy vehicle drivers over five years have been involved in fatal crashes that were not their fault. This means that there are significant numbers of truck drivers that are likely to be coping or dealing with potential exposure to a traumatic incident. This is a work health and safety concern that may impact on a worker's ability to do their job.

What went wrong

The analyses in this report have identified some common themes where action could be taken to prevent fatalities.

Non-public road fatalities

Table 20 provides an indication of what went wrong in the situations that resulted in fatalities at worksites not on public roads.

Table 21: Non-public road truck-related fatalities: number by cause of incident, 2003 to 2012 combined

Cause of incident	No. of fatalities	Percentage
Pedestrian worker issues	39	19%
Operator error with equipment	38	18%
Failure to brake	34	16%
Equipment failure	30	14%
Failure to drive to conditions	25	12%
Lack of fall protection	19	9%
Unrestrained cargo	13	6%
Other	12	6%
Total	210	100%

Pedestrian workers

Of the 210 fatalities that occurred at worksites not on public roads, 19% involved a pedestrian worker being hit by a vehicle, with a reversing vehicle involved in nearly half (46%) of these incidents. While many trucks have reversing alarms, some do not and the ambient noise in the workplace may prevent the pedestrian worker from hearing the alarm. Visibility around trucks is also limited making it difficult for drivers of large trucks to see around the complete area of their vehicle.

What is most telling in these situations is that half (54%) of the deceased workers were not directly working with the truck at the time of the incident. This means the worker may not have been alert to the fact that trucks were working in the vicinity. Common themes include workers engaged in traffic control duties being hit by construction or passing trucks and workers undertaking loading or unloading activities and being hit by other trucks at the worksite.

Operator error with equipment

The incorrect usage of the truck or other equipment accounted for 18% of the non-public road fatalities. In 8 of the 38 incidents, the fatality occurred when a piece of mobile plant was being loaded onto a tray-back truck and that piece of plant fell. In another 9 incidents, the truck overbalanced due to boggy conditions or the way in which cargo was being unloaded.

Other common issues were being caught in moving parts of trucks with crane or other attachments and being hit by cargo when chains or other restraining devices were removed before unloading equipment was in place.

Incorrect braking

Another area that needs attention is making sure that a vehicle is braked properly before exiting the vehicle even it is only for a short period of time. This analysis shows that 16% of workers killed in non-public road incidents died because they or another worker failed to adequately brake a vehicle. Most (25 of the 34 fatalities) involved a truck driver who had exited the vehicle to undertake a task and had not put the brakes on properly. Loading/unloading activities were involved in 12 of the incidents while in 10 the worker was performing repair or maintenance on the truck. In 8 incidents the truck driver was crushed trying to re-enter a vehicle that had unexpectedly begun to move. Some of these incidents involved air brakes that did not have the correct pressure to hold the vehicle.

Equipment failure

Equipment failure was associated with the deaths of 30 workers at worksites other than public roads. Mechanical failure with the operation of the tray of a truck was associated with 12 of the fatalities. There were 6 fatal incidents involving the repair of tyres while they were still on trucks with 4 of them involving the explosion of the tyre or rim. The TIF database has a number of other records of incidents involving exploding tyres that are not in scope for this report because they were not attached to the truck at the time of the incident.

Other fatalities involving equipment failure included chains or other fastening equipment snapping and striking the worker and the failure of jacks to support vehicles under repair.

Failure to drive to conditions

The method of driving around a worksite is different to that of driving on a public road due to additional hazards and more cramped conditions. Failure to adjust driving style resulted in 25 fatalities with driving too fast for the conditions identified as the cause of 15 fatalities. Most of these deaths occurred at Mining, Agriculture or Construction worksites.

Lack of fall protection on trucks

This analysis identified 19 worker deaths directly attributed to falling off trucks. A different report prepared by Safe Work Australia identified that falls from seemingly minor heights can be fatal (SWA, 2013). Most trays of trucks are around 1 to 2 metres off the ground but if the fall involves a head injury then it can be fatal. More than half of the fatalities (11) involved loading or unloading activities and only some of them were a tray-back style of truck. Other falls occurred while undertaking repair activities to the outside of the truck.

Unrestrained cargo

Heavy cargo items falling off trucks claimed the lives of 13 workers. Many of these involved hay bales and steel items that may have shifted during transportation. In 4 of the incidents forklifts were being used to move the products from the truck when the item fell off the forklift killing the truck driver.

Public road fatalities

As three-quarters of truck-related worker fatalities occur on public roads it is essential to have reliable information on the circumstances of these events if prevention initiatives are to be developed. However, detailed information on the circumstances surrounding a public road crash are not always available. While coroners' records exist for each of these incidents, police reports are not always loaded to the record and the coroner's findings may not include details of the incident. Coroners only conduct an inquest where investigations from the police or other authorities indicate that something contributed to the death that needs changing such as road markings or traffic signals. Where no suitable information was available in the coroners' records, media articles have been used to assist in the coding of the cause of the incident.

Table 22 provides an indication of what went wrong in situations that resulted in fatalities on public roads. These data show that for half (49%) of the incidents there was either insufficient information or no particular reason for the crash. It is likely that many of these incidents were the result of fatigue or lack of concentration on the part of the driver/s.

Table 22: Public road truck-related fatalities: number by cause of incident, 2003 to 2012 combined

Cause of incident/ worker type	Multi-vehicle incident	Single vehicle incident	Total	Percentage of total
Driving too fast for the conditions	13	107	120	21%
Truck driver	5	106	111	19%
Other	8	1	9	2%
Give way errors	43	0	43	7%
Truck driver	18	0	18	3%
Other	25	0	25	4%
Failure to see slowing or stationary vehicle	27	2	29	5%
Truck driver	14	0	14	2%
Other	14	0	14	2%
Failure to see parked vehicle	28	0	28	5%
Truck driver	7	0	7	1%
Other	14	0	14	2%
Equipment failure	5	16	21	4%
Failure to see pedestrian worker	8	7	15	3%
Failure to see hazard on road	5	5	10	2%
Medical event	4	4	8	1%
Failure to brake	0	8	8	1%
Other known causes	2	14	16	3%
Unknown causes	134	146	280	49%
Total public road fatalities	263	314	577	100%

Driving too fast for the conditions

Of the incidents where the cause could be classified, 21% were put down to driving too fast for the conditions. This does not mean

the drivers were exceeding the speed limit but that they were not adjusting their speed to take into account upcoming hazards such as bends in the road or traffic lights about to change to red. Of the 120 fatalities in this group, 108 resulted in the truck rolling over and killing the driver.

Give way errors

Failure to obey Give Way and Stop signs as well as other right of way road rules resulted in the deaths of 43 workers in truck-related incidents over the 10 years. Table 22 shows that most of the deaths involved non-truck drivers (25 of 43). Analysis of the incidents shows that half of the incidents involved trucks failing to give way while half were considered the fault of the other vehicle.

Failure to see slowing or stationary vehicles

Not noticing that the vehicle in front had slowed or stopped resulted in the deaths of 16 truck drivers and 13 drivers of other vehicles. Around 40% of these incidents occurred at intersections with vehicles stopped waiting to turn right, being rear-ended by inattentive drivers. Trucks were considered to be at fault in 22 of the 29 incidents while there were 7 car drivers killed when they hit a stationary or slowing truck. Speed is a factor in the ability to stop a vehicle with trucks requiring a greater distance to stop due to their greater weight.

Failure to see parked vehicles

Driving into parked vehicles claimed the lives of 14 truck drivers and 14 drivers of other vehicles. Why these drivers did not see that the vehicle ahead was in fact parked on the side of the road cannot be determined but fatigue is likely a factor.

Equipment failure

Equipment failure was known to be the cause of 21 fatalities on public roads, of which 15 were single vehicle truck incidents. Tyre failures such as blow outs resulted in 9 fatalities with a further 3 workers killed when tyres came loose off passing trucks. Faulty brakes or inoperative brakes were identified in the deaths of 7 workers.

Failure to see pedestrian workers

Public road deaths include incidents that occur in rest areas on the sides of roads, the loading or unloading of vehicles on the side of the road and road work areas. Of the 15 workers killed while working on public roads, 7 were vehicle drivers who had exited their vehicle to load or unload cargo or to check securing ropes when hit by a passing vehicle. There were also 3 traffic control workers hit by construction vehicles that were entering the worksite.

Heavy vehicle safety initiatives

There have been a number of initiatives undertaken to reduce fatalities and injuries while using heavy vehicles on public roads. These include:

- The National Heavy Vehicle Regulator was established in January 2013 (www.nhvr.gov.au) to administer new regulations, including fatigue management, for heavy vehicle over 4.5 tonne. The regulator will administer the new Heavy Vehicle National Law (HVNL) and Regulations which commenced on 10 February 2014 in Queensland, New South Wales, Victoria, South Australia and Tasmania. The Australian Capital Territory and Northern Territory will commence the new national law at a later date. Western Australia will not commence the HVNL at this time.
- The introduction of the Road Safety Remuneration Bill 2012 and the creation of the Road Safety Remuneration Tribunal (www.rsrt.gov.au) to make decisions about pay and related conditions for road transport drivers and hear and help resolve disputes between road transport drivers and their hirers or employers.
- The construction of new roadside rest areas and other road freight related infrastructure funded under the federal Nation Building fund (www.nationbuildingprogram.gov.au).
- The New South Wales Environment Protection Authority (EPA) has issued a determination requiring tanker trailers manufactured on or after July 1 2014 to be fitted with electronic stability control (ESC). The EPA is also developing a mechanism to retro-fit existing vehicles so that all tanker trailers used in New South Wales would have ESC installed by January 2019.
- The creation of the Council on Transport and Infrastructure (COTI). This council brings together Commonwealth, State, Territory and New Zealand Ministers with responsibility for transport and infrastructure issues, as well as the Australian Local Government Association and has developed an options paper to help identify potential improvements to the Chain of Responsibility regime under the HVNL.

These measures add to the existing heavy vehicle safety activities carried out by road traffic and law enforcement authorities such as roadside heavy vehicle checking stations and average trip speed safety cameras.

Glossary

Being hit by moving objects	Part of the Mechanism classification used to describe the action of an object hitting a person. This includes pedestrians hit by vehicles as well as being hit by other moving equipment or objects.
Bystander fatality	<p>The death of a person who dies from injuries sustained as a result of another person's work activity and who was not engaged in a work activity of their own at the time of the injury.</p> <p>A traffic incident death is only classified as a bystander fatality when attributable to someone else's work activity. Typically, this means the driver of a work vehicle is at fault. Cases where fault could not be determined with sufficient confidence are excluded.</p>
Industry	A grouping of businesses that carry out similar economic activities. Fatalities data in this publication have been coded to the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006 (ABS cat. no. 1292.0) and unless specified are shown at the industry division level.
Industry of employer	The industry that directly employed the worker.
Industry of workplace	The industry in which the worker or bystander is engaged with at the time of the fatal incident.
Injury	A condition coded to 'External Causes of morbidity and mortality' and 'Injury, poisoning and certain other consequences of external causes' in the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM).
Mechanism of incident	The action, exposure or event that best describes the circumstances that resulted in the most serious injury.
Occupation	A set of jobs with similar sets of tasks. Fatalities data in this publication have been coded to the Australian and New Zealand Standard Classification of Occupations (ANZSCO) (ABS cat. no. 1220.0) First edition and unless specified are shown at the major group level.
Public road incident	A collision on a public road between any vehicle or self-propelled plant and anything else including a pedestrian. Incidents involving vehicles at worksites or on private roads are excluded. Public road incidents can be due to a Vehicle incident (crash) or being hit by a vehicle (which is included in the Mechanism of Being hit by moving object). Vehicles that are caught in bushfires while on public roads are not included as no collision occurred.

Truck	A general definition of a truck has been applied in this publication. The Australian Road Deaths Database applies a restriction to those vehicles 4.5 tonne and over, however delivery trucks that may not be this gross mass are also included in this analysis. Trucks also include cement mixers, mobile garbage compactors, street sweepers and crane trucks.
Type of occurrence classification system (TOOCS)	<p>A suite of four classifications to code the way an injury occurred, comprising:</p> <ul style="list-style-type: none"> • the Nature of injury/disease classification • the Bodily location of injury/disease classification • the Mechanism of incident classification, and • the Agency of injury/disease classification. <p>Version 3.1 is used for coding the data presented in this report. Fatalities are only coded by Mechanism and Agency.</p>
Vehicle incident	Part of the Mechanism of incident classification which identifies if the fatality occurred due to a vehicle crash and the occupant of the vehicle is killed. Vehicle crashes that occur on public roads are further classified as a Traffic incident. Vehicle incidents do not include people hit by a vehicle, which are coded to Being hit by moving object. Vehicles not only include cars and trucks but also include other motorised equipment such as aircraft, boats, loaders, tractors and quad bikes.
Worker fatality	The death of a person who dies from injuries sustained while at work, including those workers whose injury was caused by another's work activity.

Explanatory Notes

Inclusions

This report covers fatalities due to work-related injuries and explicitly excludes deaths attributable to disease and other natural causes. Among conditions specifically included as injuries are those arising from poisonous plants and animals, environmental conditions (e.g. frostbite), allergic reactions, and embolisms. Heart attacks and strokes are regarded as natural causes of death, but where available information shows that a work-related injury directly triggers a fatal heart attack or stroke, the fatality is included.

Worker fatalities

All identified cases of persons who die from injuries sustained while they are working are included in this report. For this purpose, 'working' includes travelling from one workplace to another. So a trades worker or professional killed driving from one job or client to the next counts as a worker fatality. Similarly, a worker killed in an air crash on their way to a conference would be a worker fatality.

The number of worker fatalities shown in this report is considered reliable. However, some fatalities, particularly those related to traffic incidents, may be missed due to the way these deaths are identified. The information in the National Coronial Information System (NCIS) relies heavily on information collected by the police and the police report may not include sufficient information to identify whether or not the deceased was working at the time of the incident.

Bystander fatalities

Deaths of people in the general public are included in this collection if the actions of a worker directly contributed to the death of the person. Under this definition an 'at fault' rule is applied. Information from a variety of sources including police reports is used to determine whether or not the bystander's action directly contributed to their own death. If the bystander's actions directly contributed to the death then the death is considered to be a 'bystander fault' death and is not included in the database. The most common example of this is when a non-working person drives their car into the path of a truck and is killed.

There are many difficulties in identifying bystander fatalities within the databases used in this study – bystanders cannot seek compensation through workers' compensation; notifications depend on the work health and safety legislation of the jurisdiction; and they are only identified in the coronial database when sufficiently detailed information on the circumstances of all parties to the death is available. Most of the bystander fatalities in this report were identified by examining NCIS records involving heavy or light commercial vehicles as these are relatively few and can be manually checked. However, due to the higher number of deaths involving cars, it is not feasible to perform individual checks and a bystander death is not likely to be identified unless the NCIS record is marked as work-

related or media has alerted the project to a possible work-related bystander death. Estimates of bystander fatalities in this collection should therefore be regarded as an undercount and movements over time interpreted with caution.

Deaths resulting from criminal activity

Persons sustaining fatal injuries as a result of someone else's criminal activity are included in this collection if the decedent was at work at the time of the incident. Where the criminal activity is incidental to legitimate work activity, for example, where a worker dies of an injury sustained while under the influence of legal or illegal substances, the fatality is also included. Non-working persons fatally injured in an incident involving criminals and law enforcement officers or security officers are included as Bystanders. In the case of a bystander who is killed while the police are pursuing a vehicle for a traffic or other violation the death will be included regardless of whether they were hit by the police car or the offender's car.

Classification of fatalities

Persons who die of injuries sustained while they are working are included among worker fatalities even when the cause of the injury is another person's work activity.

Exclusions

Deaths due to natural causes

Natural causes include heart attacks, strokes and where death is a natural progression from a disease. In NCIS a death is classed as Natural causes when the person did not die from external causes. An external cause death is defined as any death that resulted directly or indirectly from environmental events or circumstances that caused injury, poisoning and other adverse effects (WHO, 1992).

Deaths due to complications of surgical and medical care

Although the death of a patient who dies as a result of medical negligence or malpractice is in principle a bystander fatality, deaths arising from such iatrogenic injuries are specifically excluded from this collection.

Deaths of persons undertaking criminal activity

Persons fatally injured while undertaking criminal activities, such as gaining illegal entry into a building or work site or crashing a car while evading a police pursuit are excluded from this collection.

Suicide

Deaths resulting from self-harm are excluded because it is difficult to assess the extent of the connection between work and a decision to take one's own life.

Data sources

This study uses information from three datasets:

- the National Data Set for Compensation-based Statistics (NDS)
- the Notifiable Fatalities Collection (NFC), and
- the National Coronial Information System (NCIS).

The individual case records from each of the datasets are compared so that duplicates can be removed. Generally date of death and sex are used for initial matching as these data are available for most cases. Date of birth is also used to match records between the NDS and NCIS with age used from the NFC. Other data items used for matching are industry and occupation of the deceased and the coding of the incident in the NDS with narratives in the NFC and NCIS. Each of these datasets has limitations, so all three datasets are needed to estimate the total number of work-related fatalities that occur each year.

The National Data Set for Compensation-based Statistics (NDS)

The scope of the NDS is all accepted workers' compensation claims made by or for an employee (other than an employee of the defence forces). The NDS is compiled annually by Safe Work Australia from data supplied by the state, territory and Australian Government workers' compensation authorities. The NDS has consistent data from 2000–01 onwards.

Notifiable Fatalities Collection (NFC)

Since 1 July 2003, Safe Work Australia has maintained a database of work-related injury fatalities notified to work health and safety authorities in each jurisdiction under their work health and safety legislation. There are 13 work health and safety jurisdictions in Australia that report to Safe Work Australia: each of the eight states and territories; the Commonwealth (Comcare); the mining sectors in New South Wales, Queensland and Western Australia; and the National Offshore Petroleum Safety and Environmental Management Authority.

Prior to 1 January 2012 there was limited coverage of transport-related fatalities in the NFC because these deaths were generally only notified to and investigated by the police, road traffic authority or, in the case of plane crashes and marine fatalities, by Commonwealth agencies. Following the introduction of model Work Health and Safety legislation this project was reviewed and from 1 January 2012 improvements in the reporting of fatalities has occurred particularly in relation to work-related road fatalities.

National Coronial Information System (NCIS)

The NCIS was officially launched in July 2000 and is a national internet-based data storage and retrieval system of coronial cases in Australia. Each state and territory in Australia has a licence agreement with the Victorian Department of Justice permitting the transfer of coronial information for storage and dissemination via the NCIS.

Identification of work-related fatalities in the NCIS

It is necessary to examine all NCIS records that have the potential to be work-related because the work-related flag may not be finalised until the case is closed. For this project all records notified during the reference period are extracted from NCIS. From this list, deaths are excluded that do not match the scope criteria such as intentional injuries and deaths from natural causes. The remaining cases are then examined more closely. In particular, all deaths that are coded as work-related or where the activity is coded as paid work are reviewed. In addition, all deaths that involve a heavy or light commercial vehicle, aircraft or occurred at a farm, industrial or commercial workplace are reviewed.

At the end of this process there are still a number of fatalities where cause of death and other information is not yet coded. These records are monitored to ensure all work-related fatalities are identified. Therefore updates to historical numbers may be evident in future releases.

Other data sources

The media and accident investigation reports from the Australian Transport Safety Bureau relating to plane crashes, train crashes and maritime incidents are used to supplement information found in each of the datasets.

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