



Australian Government

Australian Institute of  
Health and Welfare

# Injury in Australia

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Karen Bishop, AIHW

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Stronger evidence,  
better decisions,  
improved health and welfare

# Injury is a major cause of mortality & morbidity

## Injury in Australia

- **Deaths:** >10,000/year (7%)  
51% of all deaths at ages 1-44y
- **Hospitalised cases:** nearly 500,000/year  
not including complications of care
- **Burden (DALYs):** 9%; ranked as the 5<sup>th</sup> major cause  
after cancer, cardiovascular, mental and musculoskeletal

## Overview of injury in Australia

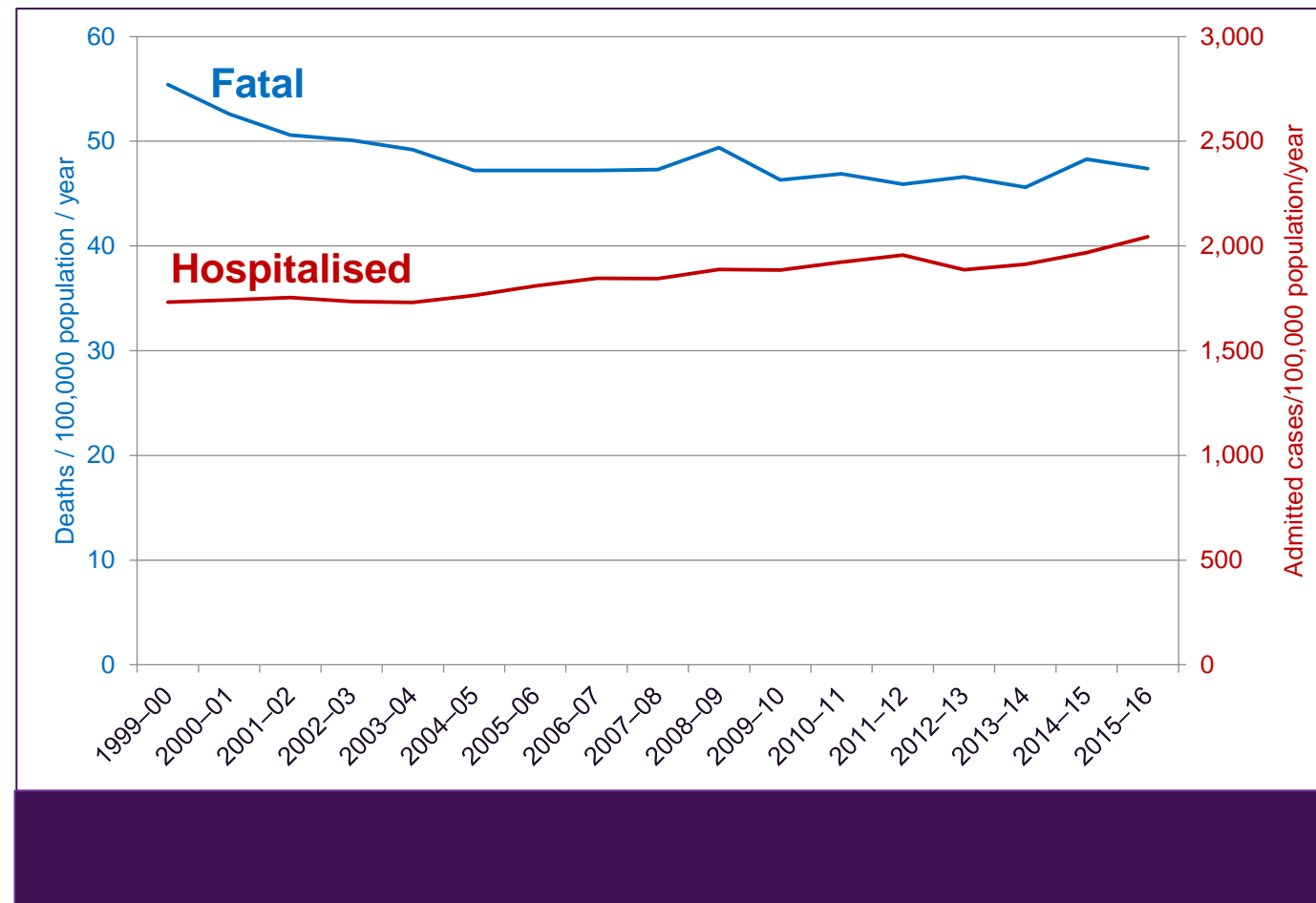
# The impact of injury is more than is usually realised

Follow-up of cohorts of people who have survived serious injury shows that most are not fully recovered 2 years or longer after onset.

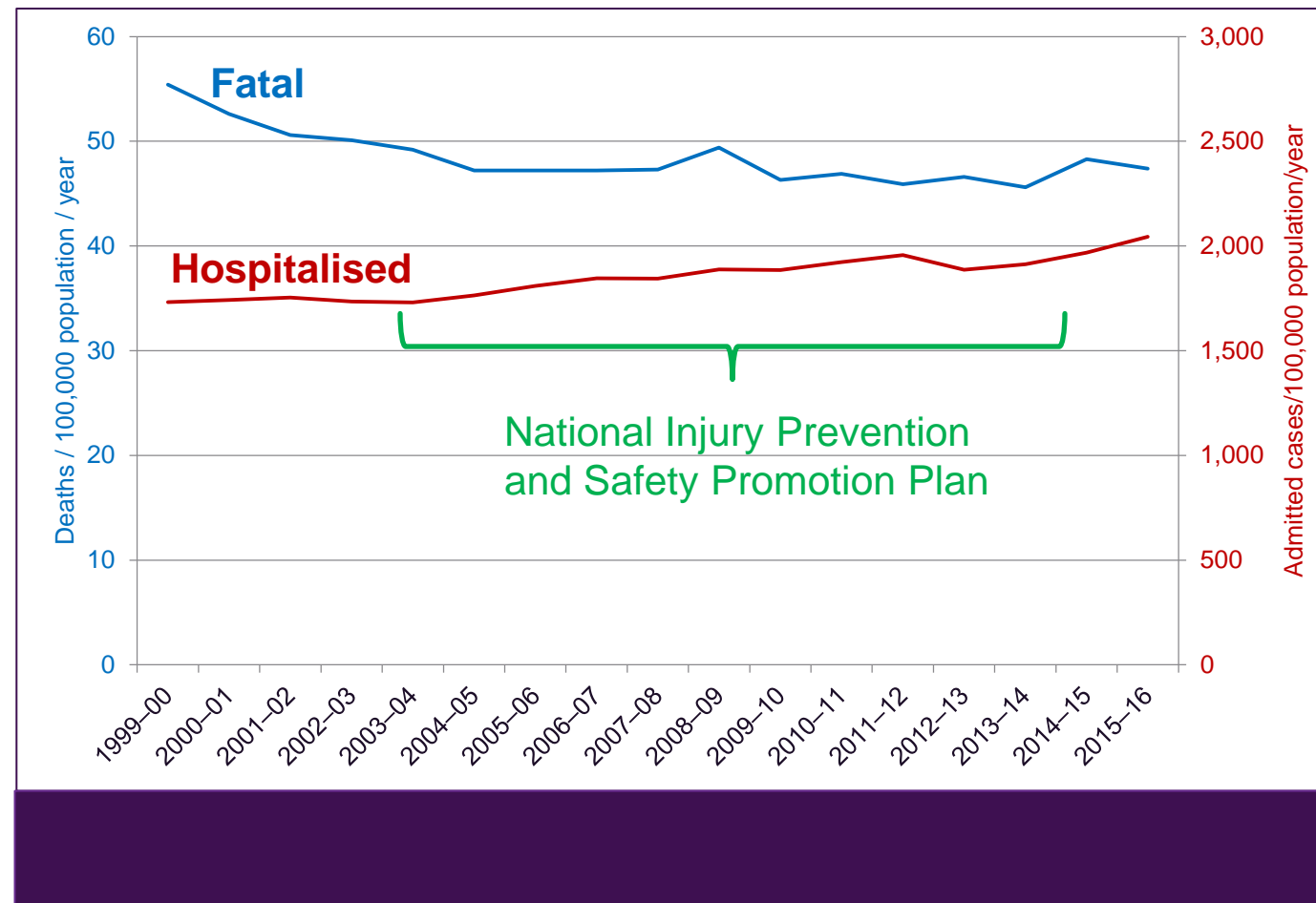
- Long-term disability was common with most types of injuries.
- Study disability weights were mostly higher than corresponding weights used by the Global Burden of Disease 2013 study
- “Injury is often a chronic disorder”

Gabbe et al (WHO Bulletin, 2016)

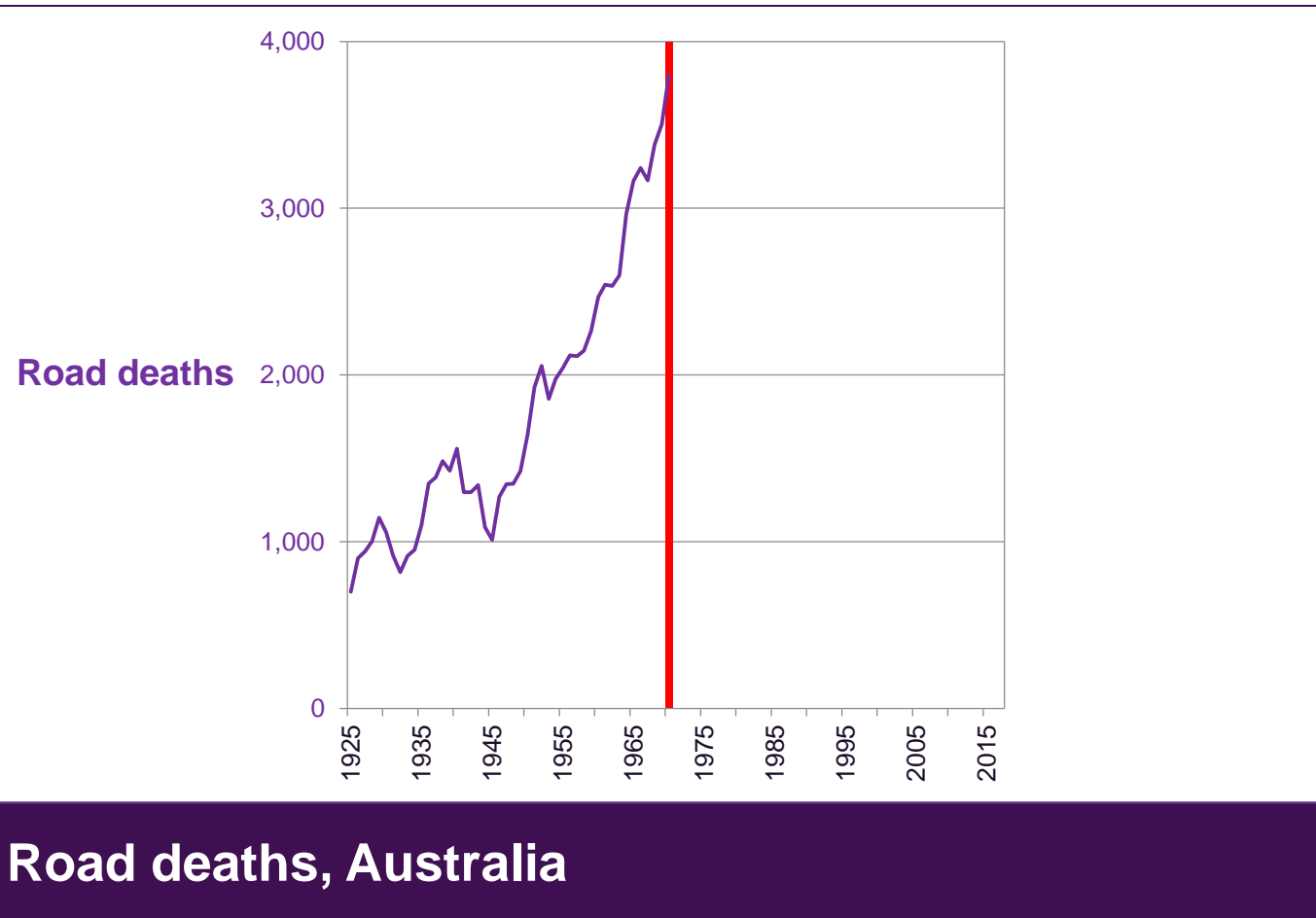
Overall,  
injury isn't  
going away



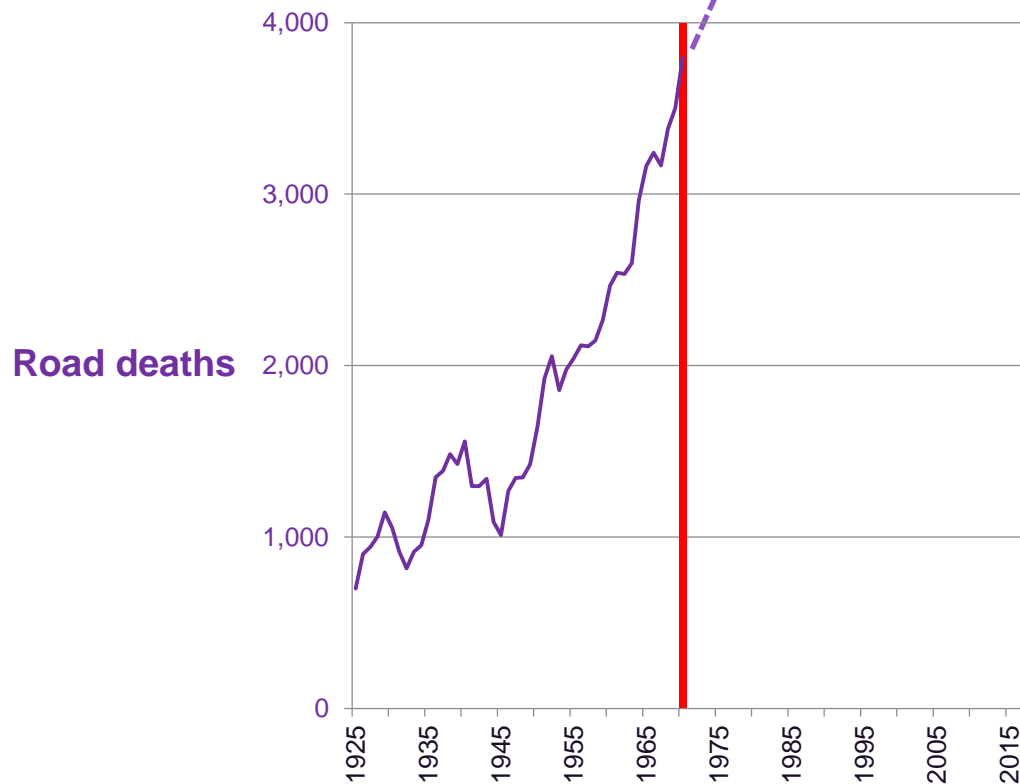
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# Prevention is possible

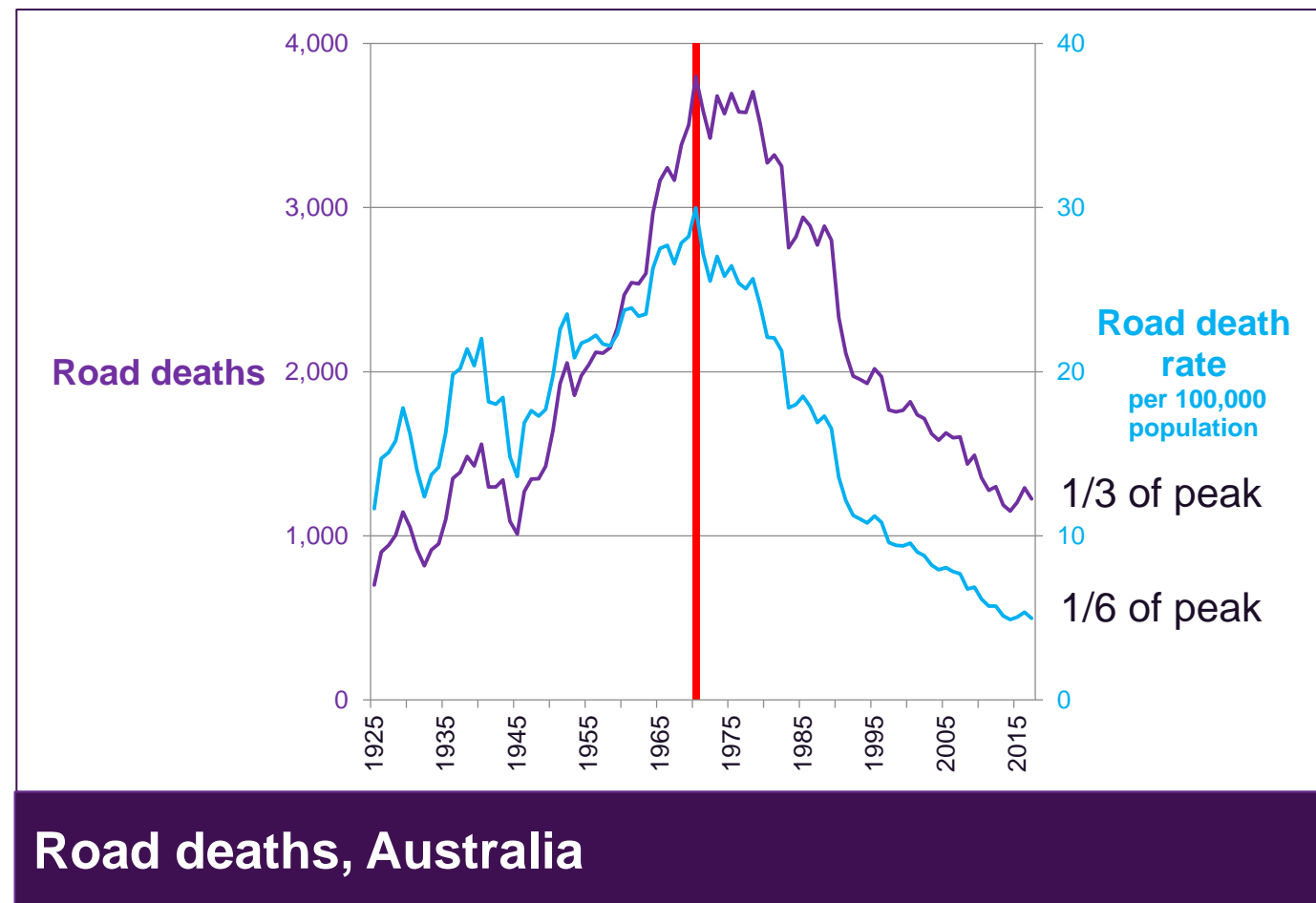


Prevention  
is possible



Road deaths, Australia

# Prevention is possible





Challenges to prevention:

Injury is diverse

	Fatal			Hospitalised		
	Trend	Change/y (%)	% of cases (2014-15)	Trend	Change/y (%)	% of cases (2014-15)
<b>Unintentional injuries</b>						
Transport	↓	−3.9	10.8	↔		12.1
Drowning	↓	−2.8	1.8	↓	−0.3	0.1
Poisoning	~		13.4	↓	−3.0	2.0
Falls	↔		37.3	↑	1.8	41.1
Thermal	~		0.9	↓	−0.5	1.2
<b>Intentional injuries</b>						
Self-harm	↔		23.1	↑	0.5	5.8
Assault	↓	−2.6	2.0	↓	−0.9	3.9
<b>Other &amp; unspecified</b>			10.7			33.8

Overview of injury trends 1999-00 to 2014-15

Challenges to prevention:

Injury is diverse

	Fatal	Hospitalised
	Some characteristics are fairly general (major exceptions will be mentioned)	
Unintentional	<ul style="list-style-type: none"><li>• Rates and counts higher for males than females</li><li>• Rates rise with remoteness of place of residence</li><li>• Rates decline with rising socio-economic status</li></ul>	
Transport		
Drowning		
Poisoning		
Falls		
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Intentional		
Self-harm		
Assault		
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Overview of injury trends 1999-00 to 2014-15

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Unintentional	<ul style="list-style-type: none"><li>• Rates and counts higher for males than females</li><li>• Rates rise with remoteness of place of residence</li><li>• Rates decline with rising socio-economic status</li></ul> But types also have distinct features...	
Transport		
Drowning		
Poisoning		
Falls		
Thermal		
Intentional		
Self-harm		
Assault		
Other & unspecified	10.7	33.8

Overview of injury trends 1999-00 to 2014-15

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Overview of injury trends 1999-00 to

Overall:

- nb adult male vehicle controller

Fatal:

- marked rise with remoteness

Hospitalised:

- trends differ by road user type
  - ↑↑ pedal cyclist cases
  - ↓ motor vehicle occupants
- high energy → severe cases

Challenges to prevention:

Injury is diverse

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Overview of injury trends 1999-00 to

Overall:

- relatively small case numbers

Fatal:

- adult males; children 0-4y
- also c 20% ISH or undet. intent

Hospitalised:

- 38% children 0-4y (nb pools)

Challenges to prevention:

Injury is diverse

	Fatal			Hospitalised		
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Overview of injury trends 1999-00 to

Fatal:

- >70% pharmaceuticals
- rising rate at 45-64y  
also at 65y+ (other substances)

Hospitalised:

- rates highest 0-4y & 75y+
- drop in child rates has ceased

Challenges to prevention:

Injury is diverse

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Overview of injury trends 1999-00 to

Overall:

- large case numbers, esp 65y+

Fatal:

- must use multiple cause data
- remoteness, SES *not* assoc.

Hospitalised:

- cases most numerous:
  - 0-14y (boys>girls)
  - 65y+ (women>men) Max: 80s
- rates rise with age, esp. 65y+
- hip & thigh ↔, other types ↑

Challenges to prevention:

Injury is diverse

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Fatal:

- male >> female
- 57% hanging, 23% poisoning

Hospitalised:

- female >> male, esp. in teens
- over 80% poisoning
- ↑ rate females 15-24y (drugs)

Overview of injury trends 1999-00 to 2014-15



Challenges to prevention:

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Overview of injury trends 1999-00 to 2014-15

Overall:

- nb males about 15 to 50 years
- nb Indigenous men & women

Fatal:

- 37% sharp objects, 18% by bodily force, 13% firearms

Hospitalised:

- 2/3 head & neck injuries
- 60% by bodily force, 14% blunt object, 12% sharp object
- Indigenous women > men

**Challenges to prevention:**

**Injury is diverse**

- Alcohol as a risk factor
- Most sports injury
- Much occupational injury
- Consumer product injuries
- Specific substances involved in poisoning
- Circumstances of crashes (linkage with crash data helps)
- Types of intentional self-harm (not all is suicidal)
- Injury types likely to predict problems (e.g. fracture into joint)

**Some aspects are harder to see**

**Challenges to prevention:**

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- Specific substances involved in poisoning
- Circumstances of crashes (linkage with crash data helps)
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**Some aspects are harder to see**

What we *can* see includes the life-threatening cases and most of the serious non-fatal cases.

## Challenges to prevention:

## Causal complexity

- Many and diverse risk-factors and causal mechanisms.  
No general and actionable common factor  
(c.f. communicable diseases; tobacco).
- Some prominent factors: e.g. alcohol, propensity to risk-taking and violence. These also tend to be complex.
- 'Obvious' aspects of causal mechanisms are not necessarily those with the greatest potential for control.

# Description of burden

Slides based on the  
Australian Burden Of Disease Study

# Burden of disease analysis:

YLD (illness)  
+ YLL (death)  
= DALY

non-fatal  
burden

number of  
cases  
(prevalence)

duration,  
remission &  
excess mortality



disability weight

years lived in  
less than full  
health

years  
lived with  
disability  
(YLD)

fatal  
burden

number of  
deaths

age at  
death



years lost from  
premature death

years of  
life lost  
(YLL)

total  
burden

YLL + YLD =

disability  
adjusted  
life year  
(DALY)

# ABDS injury methods - two perspectives

Nature of injury	External cause
Traumatic brain injury	Road traffic injury- motor vehicle occupants
Spinal cord injury	Road traffic injury- motorcyclists
Internal and crush injury	Road traffic injury- cyclists
Poisoning	Road traffic injury- pedestrians
Drowning and submersion injuries	Other land transport injuries
Hip fracture	Poisoning
Tibia and ankle fracture	Falls
Humerus fracture	Fire, burns and scalds
Other fractures	Drowning
Dislocations	Other unintentional injuries
Soft tissue injuries	Suicide and self-inflicted injuries
Burn injuries	Homicide and violence
Other injuries	All other external causes of injury

## Injury cause list by nature of injury and external cause of injury

Sources: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Australia in 2011, Table A.1

<https://www.aihw.gov.au/reports/burden-of-disease/fatal-burden-2015-preliminary-estimates/contents/summary>

# Injury is a leading cause of burden

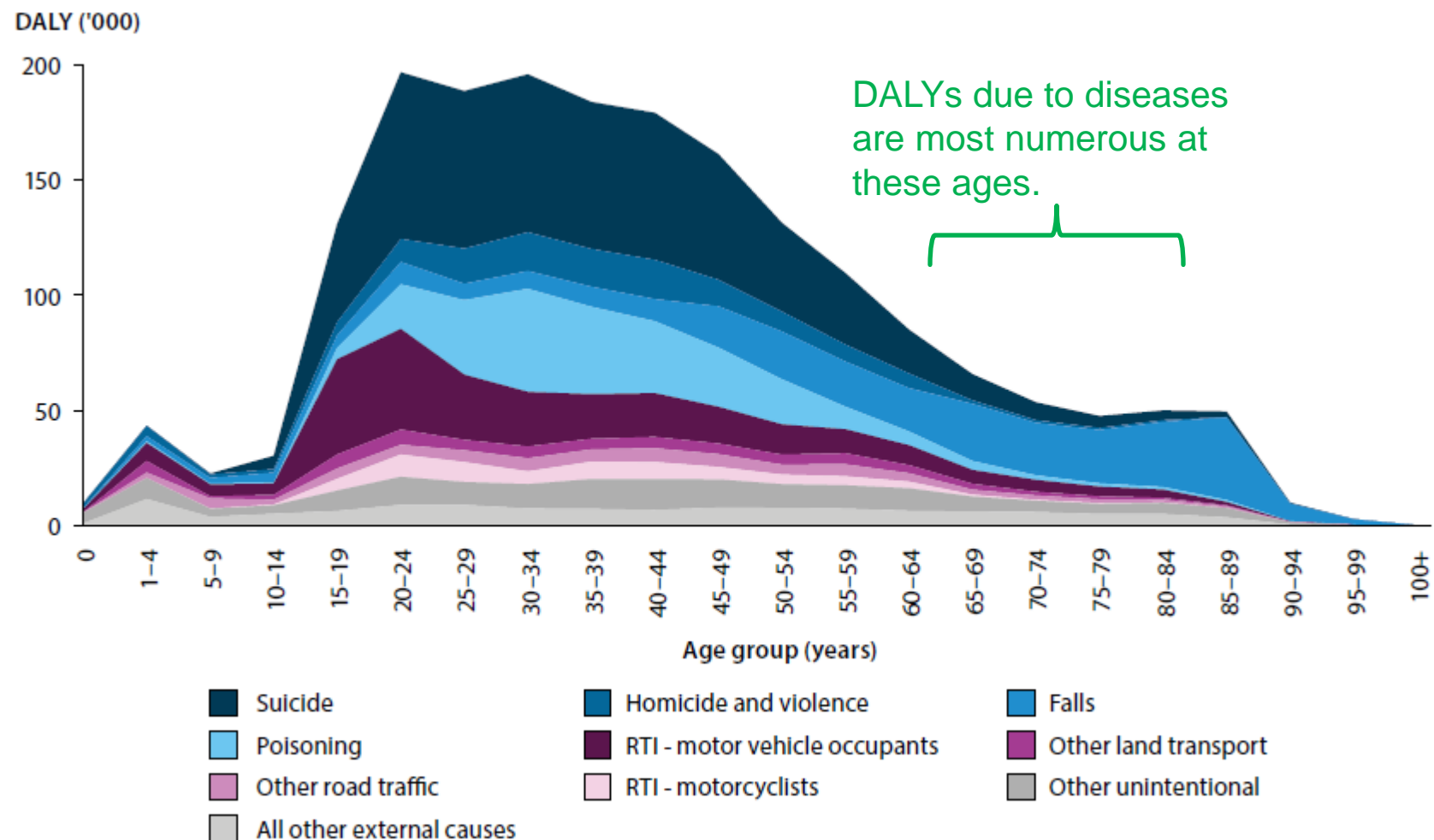
Burden type	Injury burden (years)	Rank (injury)	% of all-cause burden	All-cause burden (years)
Non-fatal (YLD)	84,260	8th	4%	2,224,326
Fatal (YLL)	310,194	3rd	14%	2,270,101
Total (DALY)	394,454	5th	9%	4,494,427

**Injury burden compared with all-cause burden**

Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Australia in 2011



The most impact of injury is on young people

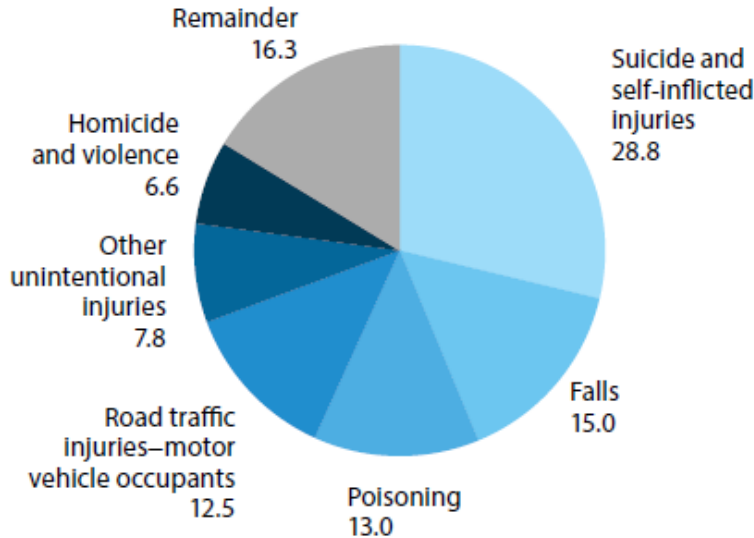


Injury burden (DALY), number by age and external cause, 2011

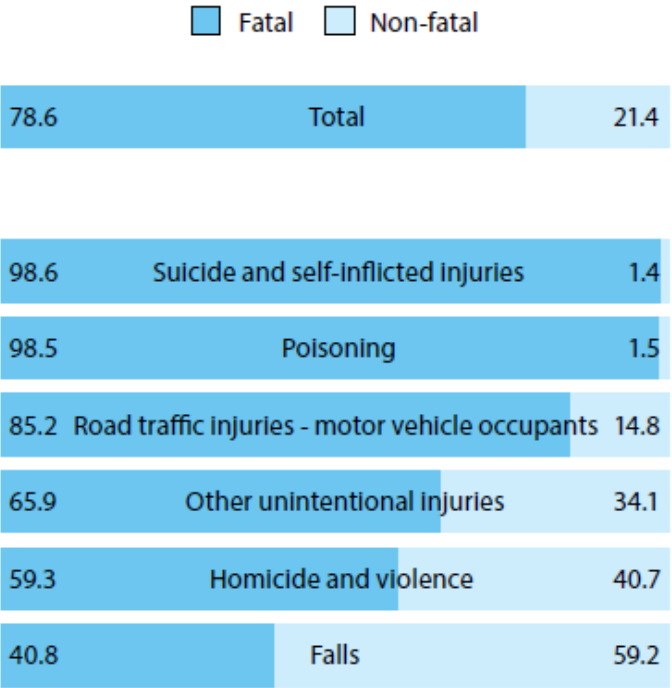
Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Australia in 2011, Figure 3.5a

ABDS 2011  
estimates  
show most  
burden is  
fatal

(a)



(b)



Injury burden (DALY) by external cause, 2011:  
proportion of disease group (a) and proportion due to fatal and non-fatal outcomes (b)

Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Australia in 2011, Figure 3.5a

# Nature of injury

Non-fatal burden (YLD)	Per centYLD	Rank	Fatal burden (YLL)	Per centYLL
<b>Males</b>				
Traumatic brain injury	66.4	1	Other injuries	58.4
Spinal cord injury	9.0	2	Poisoning	25.3
Other fractures	8.1	3	Drowning and submersion injuries	5.2
Burn injuries	6.8	4	Traumatic brain injury	5.1
Other injuries	5.9	5	Internal and crush injuries	2.6
<b>Females</b>				
Traumatic brain injury	62.3	1	Other injuries	52.7
Other fractures	7.8	2	Poisoning	27.6
Burn injuries	7.4	3	Traumatic brain injury	6.6
Spinal cord injury	6.0	4	Drowning and submersion injuries	4.4
Other injuries	5.6	5	Hip fractures	3.4

Leading 5 causes of injury burden (fatal and non-fatal), males and females, 2011

Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Australia in 2011, Table 9.12

# Injury burden varies by sex & age: males

Rank	Age group (years)								
	Under 5	5-14	15-24	25-44	45-64	65-74	75-84	85-94	95+
1st	Drowning	RTI/motor vehicle occupant	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Falls	Falls	Falls	Falls
2nd	Other unintentional injuries	Other road traffic injuries	RTI/motor vehicle occupant	Poisoning	Falls	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Other unintentional injuries	Other unintentional injuries
3rd	RTI/motor vehicle occupant	Falls	Poisoning	RTI/motor vehicle occupant	Poisoning	Other unintentional injuries	Other unintentional injuries	Suicide/self-inflicted injuries	All other external causes
4th	Other land transport injuries	Other unintentional injuries	Other unintentional injuries	Homicide/violence	Other unintentional injuries	RTI/motor vehicle occupant	RTI/motor vehicle occupant	All other external causes	Suicide/self-inflicted injuries
5th	Homicide/violence	Drowning	RTI/motorcyclist	Other unintentional injuries	RTI/motor vehicle occupant	All other external causes	All other external causes	RTI/motor vehicle occupant	RTI/motor vehicle occupant
6th	Falls	Suicide/self-inflicted injuries	Falls	RTI/motorcyclist	Homicide/violence	Other land transport injuries	Other road traffic injuries	Fire, burns and scalds	Other road traffic injuries
7th	Fire, burns and scalds	Other land transport injuries	Homicide/violence	Falls	RTI/motorcyclist	Poisoning	Other land transport injuries	Other road traffic injuries	Other land transport injuries
8th	Other road traffic injuries	Fire, burns and scalds	Other land transport injuries	Other road traffic injuries	Other road traffic injuries	Other road traffic injuries	Fire, burns and scalds	Other land transport injuries	Fire, burns and scalds
9th	All other external causes	Poisoning	Drowning	Other land transport injuries	Other land transport injuries	Fire, burns and scalds	Homicide/violence	Poisoning	Poisoning
10th	Poisoning	Homicide/violence	Other road traffic injuries	Drowning	Drowning	Drowning	Poisoning	Drowning	Homicide/violence

Injury DALY, males, by age group, 2011

Source: ABDS 2011 Database



# Injury burden varies by sex & age: females

Rank	Age group (years)								
	Under 5	5-14	15-24	25-44	45-64	65-74	75-84	85-94	95+
1st	Other unintentional injuries	RTI/motor vehicle occupant	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Falls	Falls	Falls	Falls
2nd	RTI/motor vehicle occupant	Fire, burns and scalds	RTI/motor vehicle occupant	Poisoning	Poisoning	Suicide/self-inflicted injuries	All other external causes	Other unintentional injuries	Other unintentional injuries
3rd	Homicide/violence	Suicide/self-inflicted injuries	Poisoning	RTI/motor vehicle occupant	Falls	RTI/motor vehicle occupant	Other unintentional injuries	All other external causes	All other external causes
4th	Drowning	Other unintentional injuries	Homicide/violence	Homicide/violence	RTI/motor vehicle occupant	All other external causes	RTI/motor vehicle occupant	Suicide/self-inflicted injuries	RTI/motor vehicle occupant
5th	Other land transport injuries	Falls	Other unintentional injuries	Other unintentional injuries	Homicide/violence	Other unintentional injuries	Suicide/self-inflicted injuries	RTI/motor vehicle occupant	Homicide/violence
6th	Other road traffic injuries	Homicide/violence	Other land transport injuries	Falls	Other unintentional injuries	Poisoning	Poisoning	Poisoning	Fire, burns and scalds
7th	Fire, burns and scalds	Other road traffic injuries	Falls	Other road traffic injuries	Other land transport injuries	Other road traffic injuries	Other road traffic injuries	Other road traffic injuries	Poisoning
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Injury DALY, females, by age group, 2011

Source: ABDS 2011 Database

... and by  
where  
people live:  
fatal (YLL)

	Remoteness category				
	Major City	Inner Regional	Outer Regional	Remote	Very Remote
1st	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries
2nd	Poisoning	RTI/motor vehicle occupant	RTI/motor vehicle occupant	RTI/motor vehicle occupant	RTI/motor vehicle occupant
3rd	RTI/motor vehicle occupant	Poisoning	Poisoning	Other unintentional injuries	Homicide/violence
4th	Falls	Other unintentional injuries	Other unintentional injuries	Poisoning	Other unintentional injuries
5th	Other unintentional injuries	Falls	Falls	Homicide/violence	Other road traffic injuries
6th	Homicide/violence	Drowning	Homicide/violence	Falls	Poisoning
7th	RTI/motorcyclist	Homicide/violence	Drowning	Other road traffic injuries	Falls
8th	Drowning	Other land transport injuries	Other road traffic injuries	Other land transport injuries	Drowning
9th	Other road traffic injuries	RTI/motorcyclist	Other land transport injuries	RTI/motorcyclist	Other land transport injuries
10th	All other external causes	Other road traffic injuries	RTI/motorcyclist	Fire, burns and scalds	Fire, burns and scalds

Fatal injury burden (YLL), by remoteness, 2011

Source: ABDS 2011 Database

... and by  
where  
people live:  
non-fatal  
(YLD)

Rank	Remoteness category				
	Major City	Inner Regional	Outer Regional	Remote	Very Remote
1st	Falls	Falls	Falls	Falls	Falls
2nd	Homicide/ violence	Other unintentional injuries	Other unintentional injuries	Homicide/ violence	Other unintentional injuries
3rd	Other unintentional injuries	Homicide/ violence	Homicide/ violence	Other unintentional injuries	Homicide/ violence
4th	RTI/motor vehicle occupant	RTI/motor vehicle occupant	RTI/motor vehicle occupant	RTI/motor vehicle occupant	Fire, burns and scalds
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8th	RTI motorcyclist	RTI motorcyclist	RTI motorcyclist	RTI motorcyclist	RTI motorcyclist
9th	All other external causes	Suicide/self- inflicted injuries	Suicide/self- inflicted injuries	Suicide/self- inflicted injuries	All other external causes
10th	Suicide/self- inflicted injuries	All other external causes	All other external causes	All other external causes	Suicide/self- inflicted injuries

Non-fatal injury burden (YLD), by remoteness, 2011

Source: ABDS 2011 Database



... and the socio-economic status of areas where people live: fatal (YLL)

Lowest quintile = most disadvantaged

Highest quintile = least disadvantaged

		Socioeconomic quintile				
		1 (Lowest quintile)	2	3	4	5 (Highest quintile)
Rank	1st	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries
	2nd	RTI/motor vehicle occupant	Poisoning	Poisoning	Poisoning	Poisoning
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	4th	Homicide/violence	Other unintentional injuries	Other unintentional injuries	Falls	Falls
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	6th	Other unintentional injuries	Homicide/violence	Homicide/violence	Homicide/violence	Other road traffic injuries
	7th	Drowning	Drowning	RTI motorcyclist	Other road traffic injuries	RTI motorcyclist
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	9th	Other land transport injuries	Other road traffic injuries	Other land transport injuries	RTI motorcyclist	Homicide/violence
	10th	RTI motorcyclist	Other land transport injuries	Other road traffic injuries	Other land transport injuries	All other external causes

Fatal injury burden (YLL), by socioeconomic group, 2011

Source: ABDS 2011 Database



# ... and the socio-economic status of areas where people live: non-fatal (YLD)

Lowest quintile = most disadvantaged

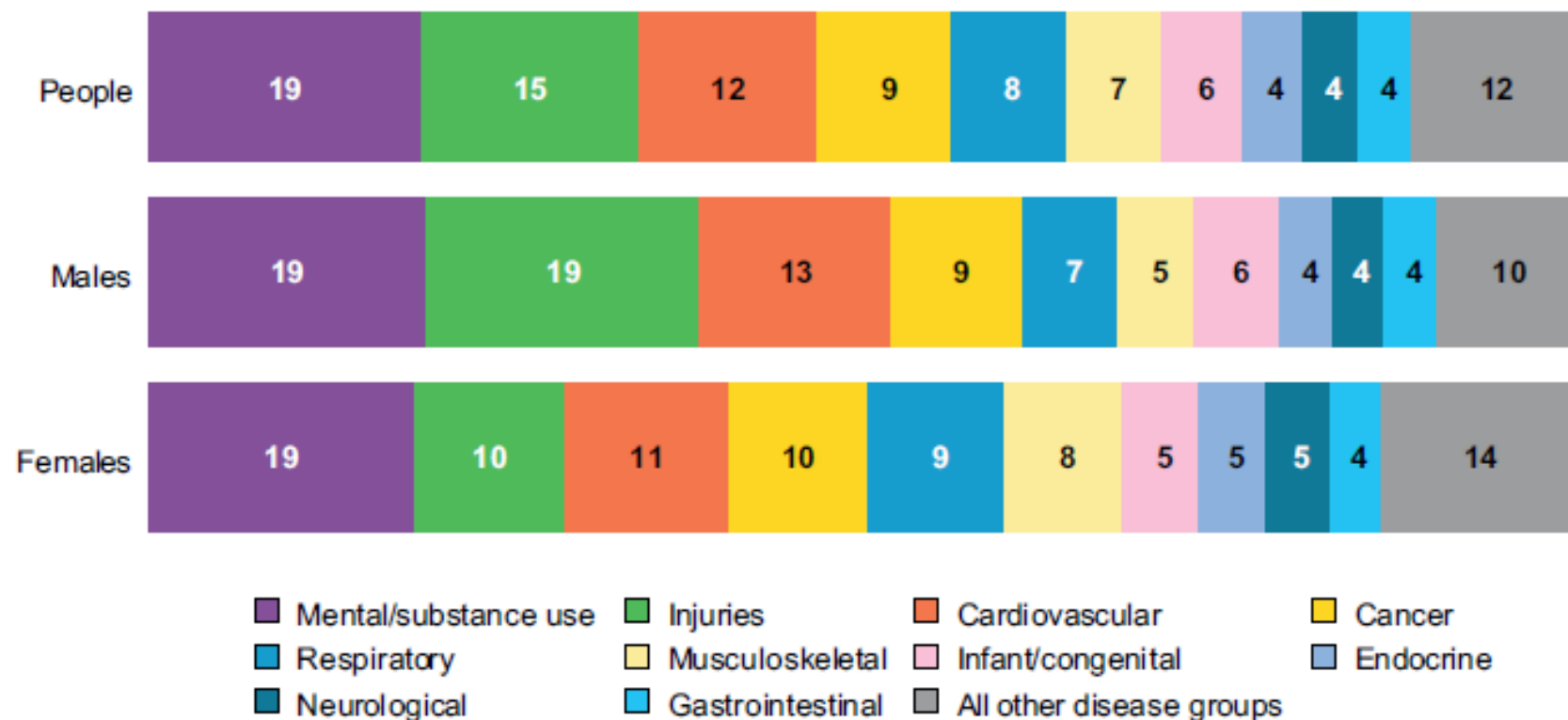
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		Socioeconomic quintile				
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Non-fatal injury burden (YLD), by socioeconomic group, 2011

Source: ABDS 2011 Database

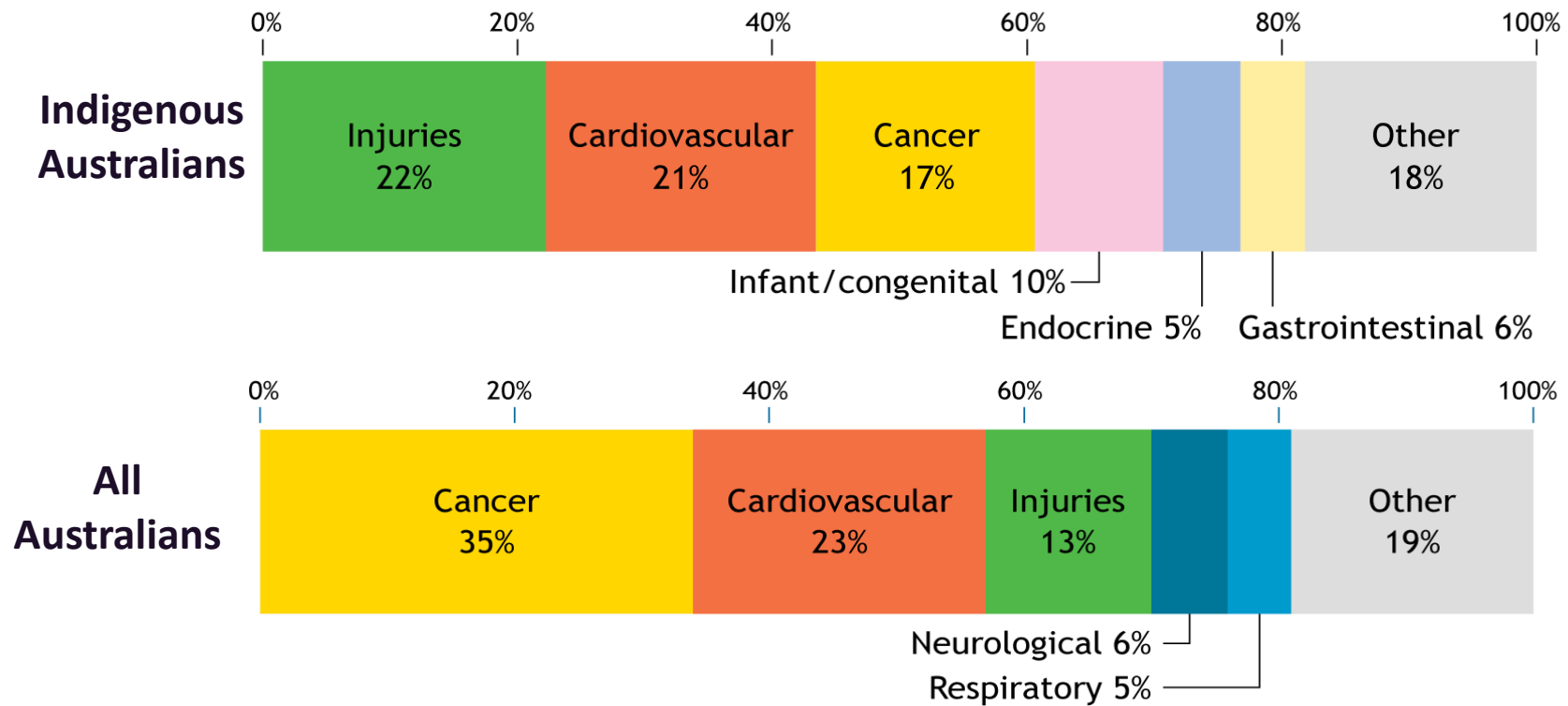
# Burden for Indigenous Australians



Proportion (%) of total burden (DALY), by disease group and sex, Indigenous Australians, 2011

Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011, Figure 4.3

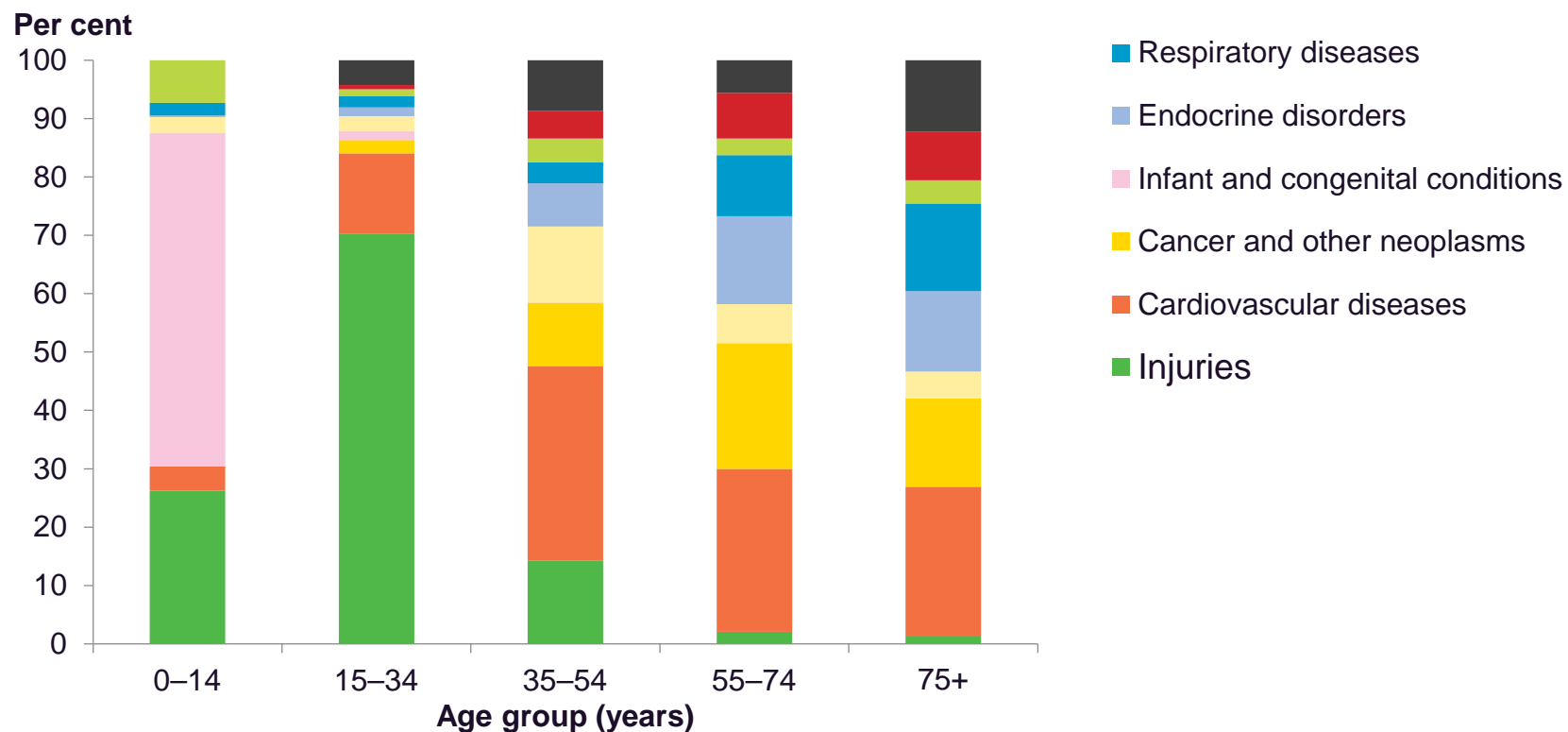
# Injury is the leading cause of fatal burden: Indigenous Australians



Proportion (%) of fatal burden (YLL) by disease group, Indigenous and all Australians, 2011

Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011, Figure 4.3

# Diseases contributing to gap in fatal burden by age



Source: AIHW 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011, AIPN 2016 presentation

# What to do?



What to do?

## Focus on avertable burden

### Avertable Burden

Disease burden that could be avoided in the presence of high-quality personal health care in addition to disease burden that could be prevented through effective public health (i.e. non-personal) interventions. (IHME)

- Includes primary, secondary & tertiary prevention

Examples:

- **Primary**: prevent falls, increase peak bone density
- **Secondary**: spinal care in retrieval after fall
- **Tertiary**: improve transition from inpatient to outpatient care

What to do?

**Focus on  
avertable  
burden**

**Burden:**

- That which we would like to avert (preferably prevent)

**Avertable burden:**

- That part of the burden for which we have reason to believe that it could be averted, given sufficient effort.

What to do?

## Focus on avertable burden

### Burden:

- The LOAD framework: injury List Of All Deficits (Lyons 2010)
- Better information on some aspects than others. We can:
  - Estimate burden-per-case (to do: improve validity of methods)
  - Measure incident cases (to do: include all relevant types)
  - Combine and summarise (e.g. as DALYs)

### Avertable:

- Action can be taken that will reduce this part of the burden  
We need: evidence of efficacy; actions that are practicable & ethical.  
Requires work. Similar to *Potentially Preventable Hospitalisations*
- Which mix of actions will avert the most burden?



# Road safety: towards an avertable burden approach

## Burden:

- Road deaths: long the basis for policy & programs
- Now recognised to be insufficient without also including serious injury (work in progress)

## Avertable:

- Strong culture of research, target setting, evaluation
- The sector is challenging itself to take avertability to the logical limit: 'Vision Zero'

# Inquiry into the National Road Safety Strategy



AIHW

1. Create strong national leadership by appointing a Cabinet minister with specific multi-agency responsibility to address the hidden epidemic of road trauma including its impact on the health system.
2. Establish a national road safety entity reporting to the Cabinet minister with responsibility for road safety.
3. Commit to a minimum \$3 billion a year road safety fund.
4. Set a vision zero target for 2050 with an interim target of vision zero for all major capital city CBD areas, and high-volume highways by 2030.
5. Establish and commit to key performance indicators in time for the next strategy that measure and report how harm can be eliminated in the system, and that are published annually.
6. Undertake a National Road Safety Governance Review by March 2019.
7. Implement rapid deployment and accelerated uptake of proven vehicle safety technologies and innovation.
8. Accelerate the adoption of speed management initiatives that support harm elimination.
9. Invest in road safety focused infrastructure, safe system and mobility partnerships with state, territory and local governments that accelerate the elimination of high-risk roads.
10. Make road safety a genuine part of business as usual within Commonwealth, state, territory and local government.
11. Resource key road safety enablers and road safety innovation initiatives.
12. Implement life-saving partnerships with countries in the Indo-Pacific and globally as appropriate to reduce road trauma.

**12 Key Recommendations**  
(September 2018)

# Summary

Injury is one of the leading sources of health burden.

Overall injury rates have not improved this century.

Injury is diverse and causally complex.

Many aspects need attention.

At least part of the burden of injury can be averted.

Achieving that will take commitment, investment and knowledge of what works, as well as good description of the problem.

