



AGENCY FOR  
CLINICAL  
INNOVATION

# Are highway constructions associated with increased transport incidents?

A case study of NSW Pacific Highway construction zones 2011-16

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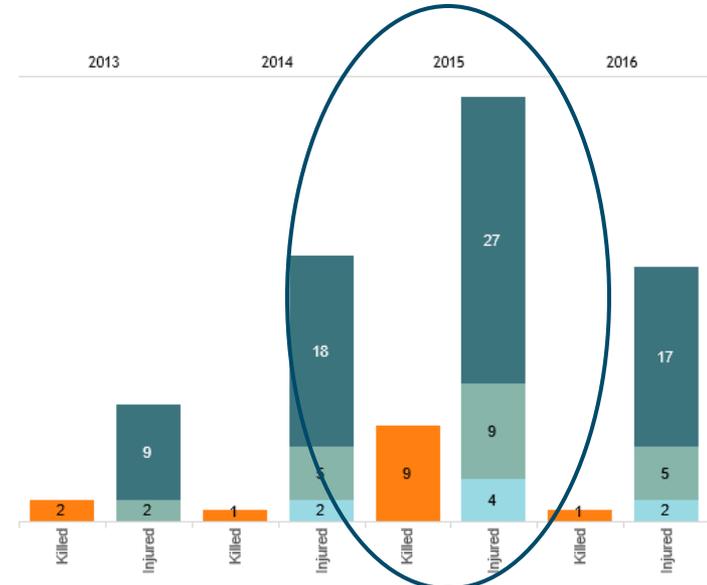
# Background

## What I noticed

### Crash and Casualty Summary - Nambucca



		Casualties				
		2013	2014	2015	2016	Total
Killed		2	1	9	1	13
Injured	Seriously Injured	9	18	27	17	71
	Moderately Injured	2	5	9	5	21
	Minor/Other Injured	0	2	4	2	8
		11	25	40	24	100
<b>Total</b>		13	26	49	25	113



# What the general public thought



## ✚ TWO DIE IN HORROR HIGHWAY HEAD ON

FOUR people have died in five hours in three separate crashes on NSW roads.



PHOTO: Traffic is queued for kilometres, with the Pacific Highway closed north of Port Macquarie. (A



- US Studies; higher rates
- variance in inclusion data with these studies
- **Australian data limited** on the effects of high way construction zones on the rate of transport incident
- Trauma data collection report; MNCLHD
- Possible link with a cluster of major highway incidents coinciding with peak construction on the actual highway

### Accident Analysis and Prevention

Statistical comparisons of the crash characteristics on highways between construction time and non-construction time

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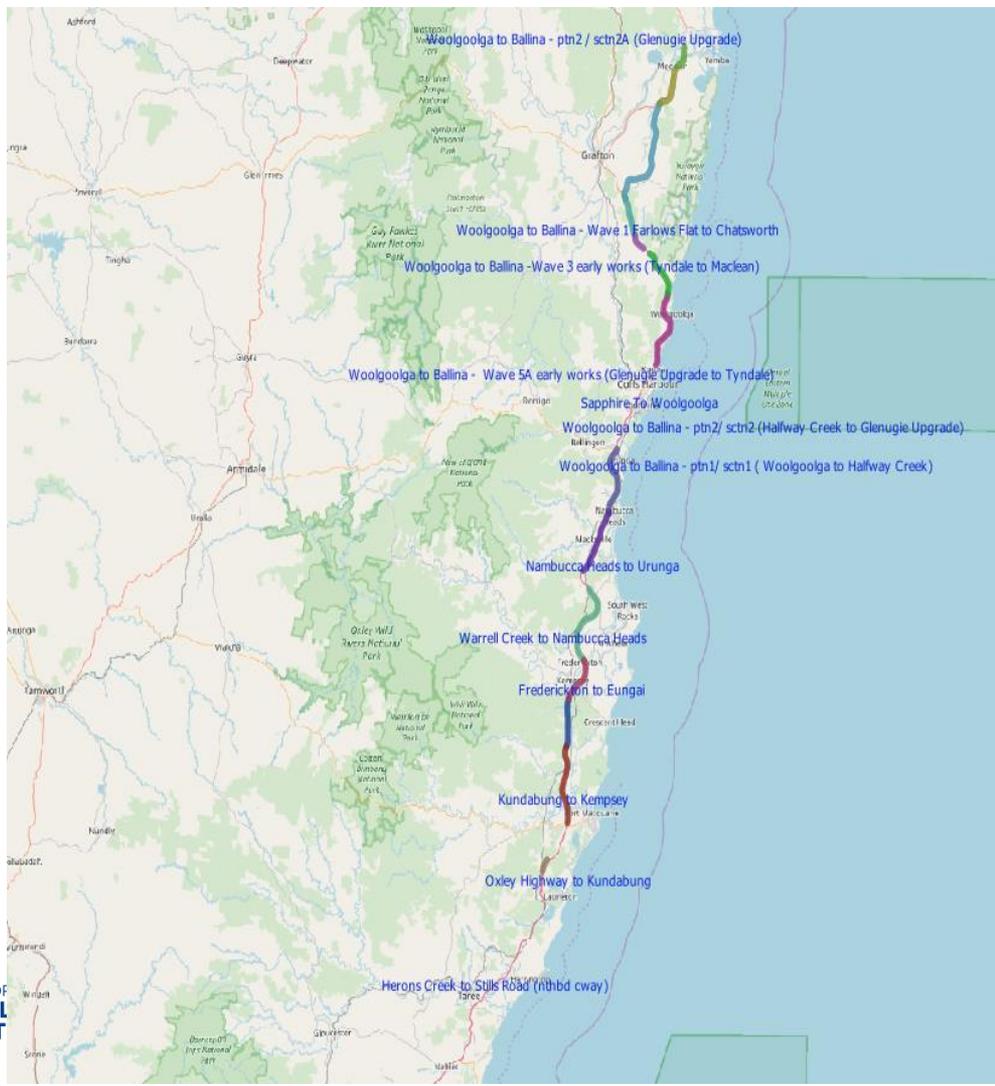
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## Method - Research questions

Retrospective study; construction zones and periods along Pacific Highway Mid North Coast 2011 to 2016 inclusive

1. Was the rate of people who had a transport incident in a highway construction zone higher than when there was no highway construction being conducted? ?
2. Was there any difference in the mortality rate and level of injuries sustained by people who had a transport incident in a highway construction zone, and those who had a transport incident when there was no highway construction being conducted?

Map obtained from the NSW Roads and Maritime Services (RMS) Pacific Highway project office.



Postcodes within these zones identified

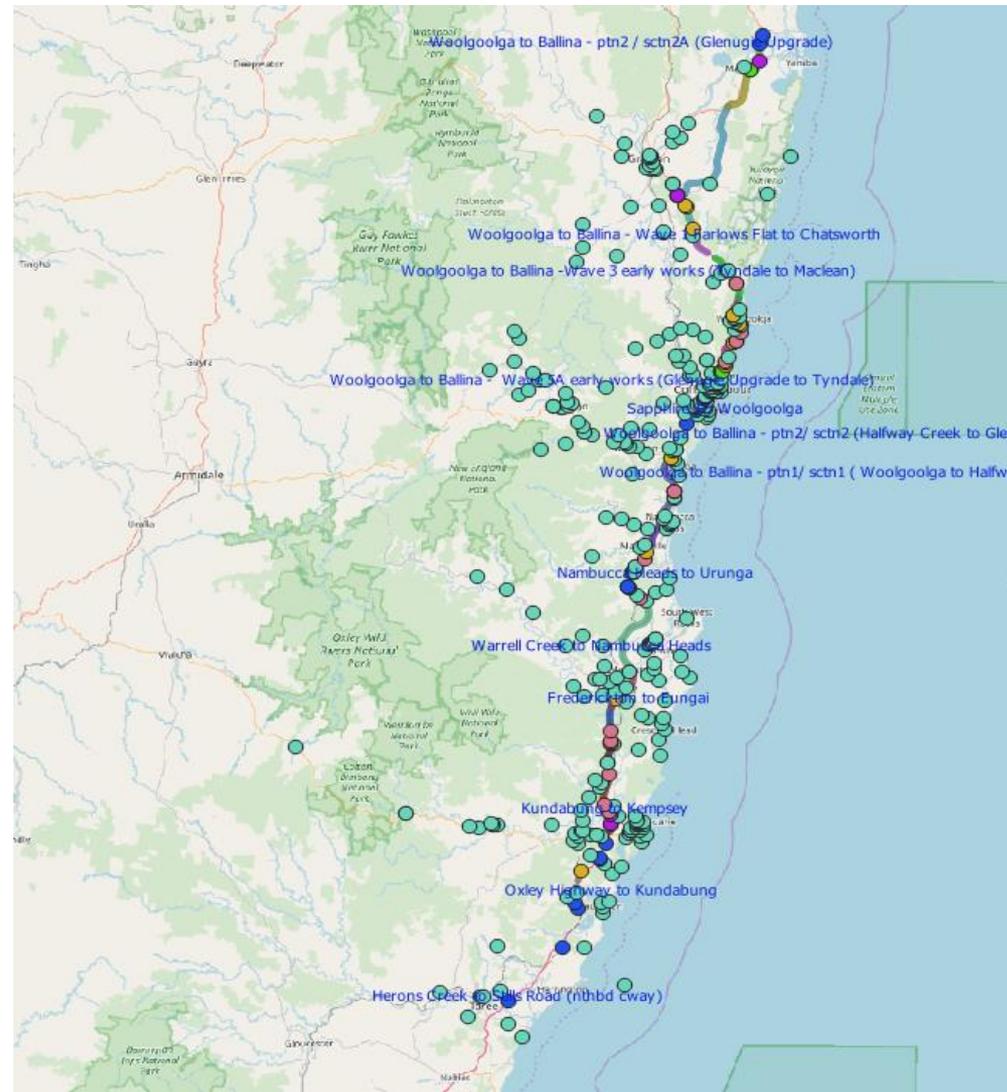


# Results

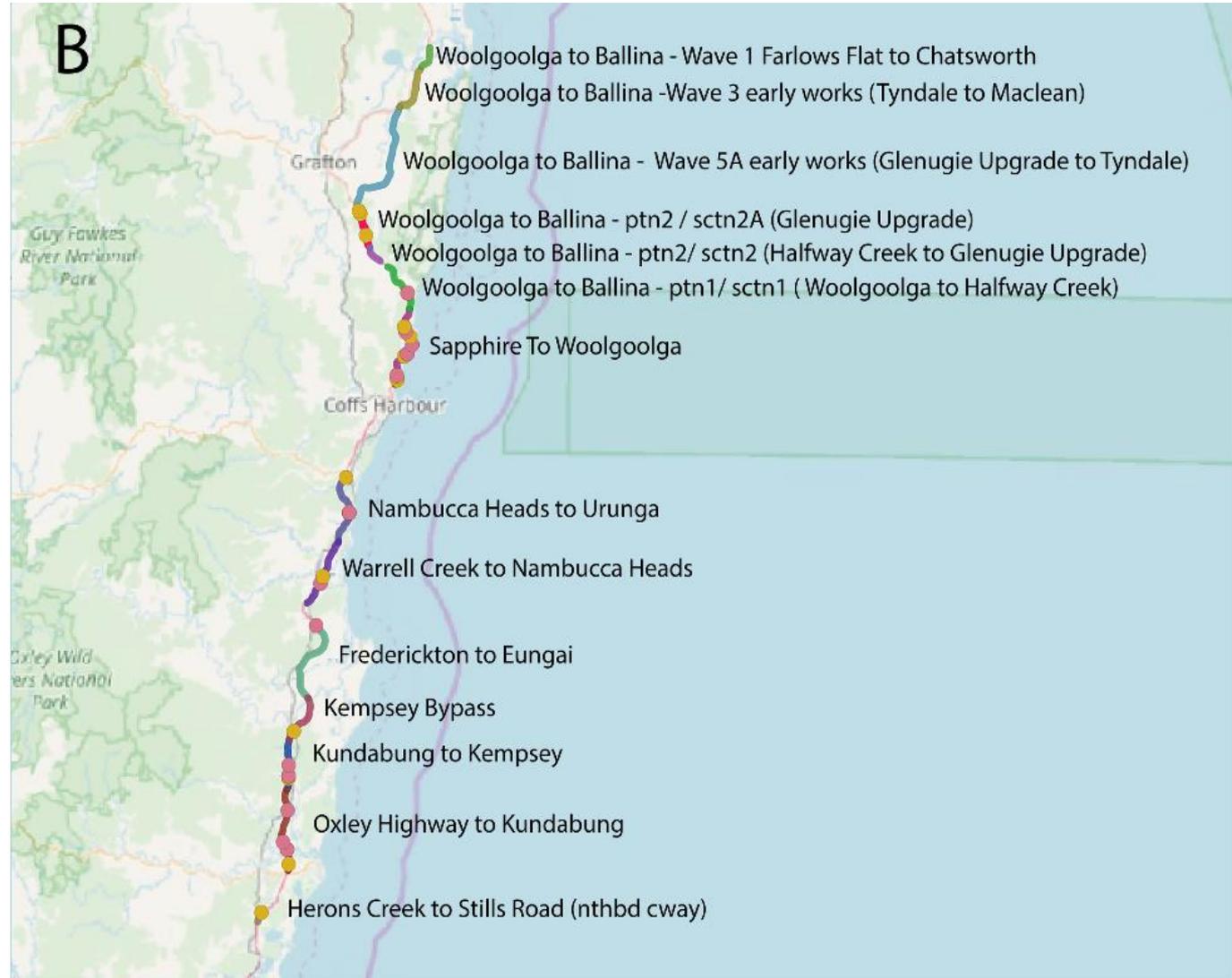
Each incident located; Lat/long recorded

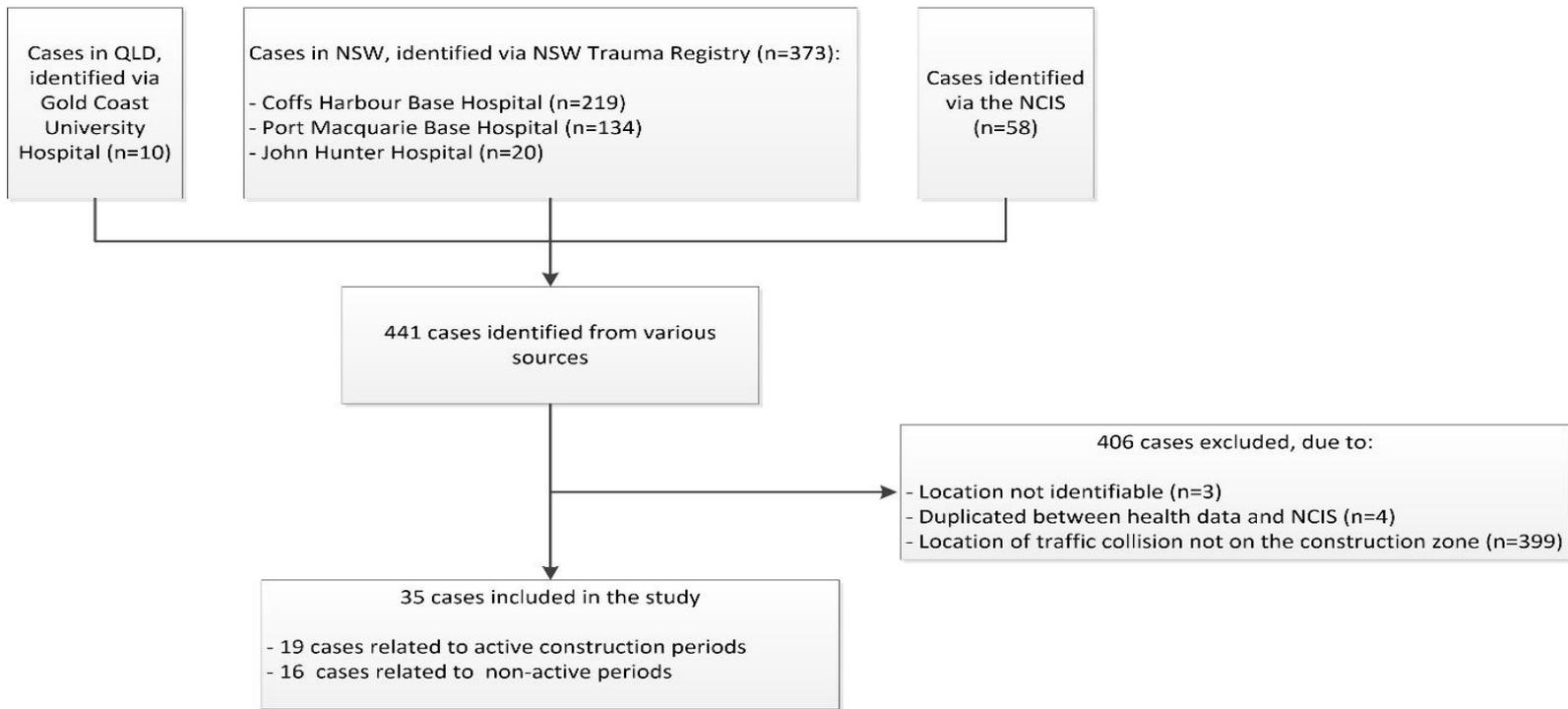
- Coffs Harbour Base Hospital n=219,
- Port Macquarie Base Hospital n=134
- John Hunter Hospital n= 20
- Gold Coast University Hospital n= 10
- National Coronial Information Sys (died at the scene) n= 51
  
- **75% male**
- **Average age 46yrs**

Identified 441 patients with major trauma (SS>12) as a result of a transport crash in the postcodes attributable to the NSW Pacific Highway.



After excluding cases that were not on the construction zones, we identified 35 cases who were involved in a transport incident in the construction zones (during construction periods or before or after that).





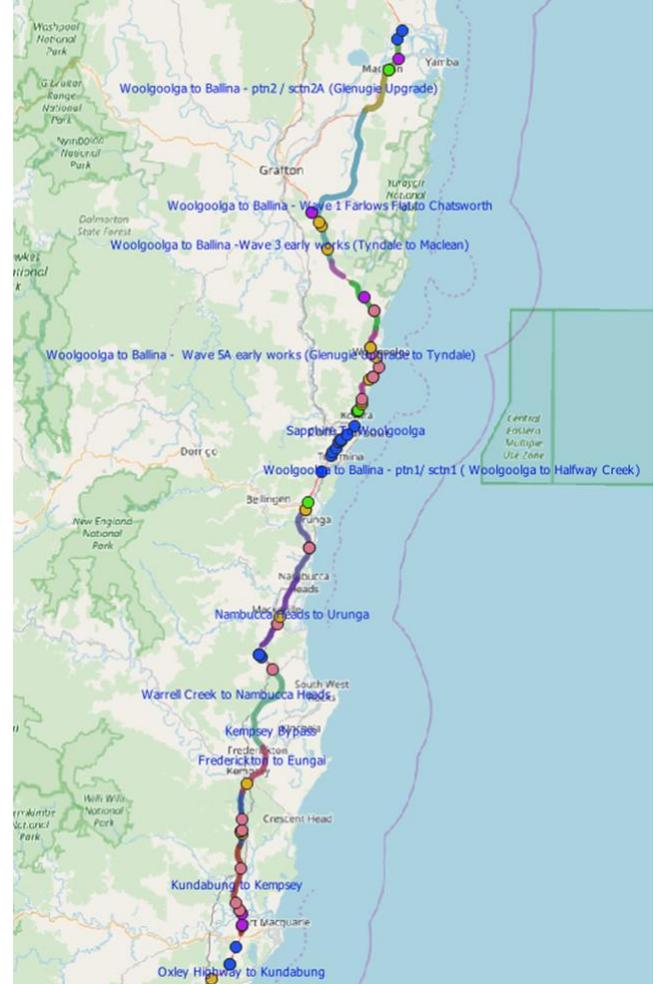
# Screening the cases

## Including:

- Casualties on the construction zones while the construction zones were **active**
- Casualties on the construction zones while the construction zones were **non-active**

THEN

Calculated the casualty rate per 1000 days in each group



# Answer for research Question 1

1. Is the number of patients who have a transport crash in Highway construction zones higher than those out of construction zones?

## Calculation of casualty rates in construction and non-construction periods

Construction zones	Number of casualties during construction periods	Duration of construction periods (days)	Rate of casualties per 1000 days during construction periods	Number of casualties during non-construction periods	Duration of non-construction periods (days)	Rate of casualties per 1000 days during non-construction periods
<u>Oxley Highway to Kundabung</u>	4	822	4.87	1	1370	0.73
<u>Kundabung to Kempsey</u>	2	791	2.53	3	1401	2.14
<u>Frederickton to Eungai</u>	1	1004	1.00	0	1188	0.00
<u>Warrell Creek to Nambucca Heads</u>	1	761	1.31	1	1431	0.70
<u>Nambucca Heads to Urunga</u>	3	994	3.02	2	1198	1.67
<u>Sapphire To Woolgoolga</u>	6	1306	4.59	5	886	5.65
<u>Woolgoolga to Ballina - ptn1/ sctn1 ( Woolgoolga to Halfway Creek)</u>	1	579	1.73	1	1613	0.62
<u>Kempsey Bypass</u>	0	1010	0.00	1	1182	0.85
<u>Hérons Creek to Stills Road (nthbd cway)</u>	0	920	0.00	1	1272	0.79
<u>Woolgoolga to Ballina - ptn2 / sctn2A (Glenugie Upgrade)</u>	1	404	2.48	1	1788	0.56
<b>Total</b>	<b>19</b>	<b>8591</b>	<b>2.21</b>	<b>16</b>	<b>13320</b>	<b>1.20</b>

<b>Construction zones</b>	<b>ratio of casualties to time in active time</b>	<b>Active zone ratio of casualties per 1000 days</b>	<b>ratio of casualties to time in non-active time</b>	<b>Non-active zone ratio of casualties per 1000 days</b>
Oxley Highway to Kundabung	0.005	4.87	0.001	0.73
Nambucca Heads to Urunga	0.003	3.02	0.002	1.67
Total	0.002	2.21	0.001	1.20

The corresponding rate ratio, 1.84 (95% confidence interval based on the mid-p exact test: 0.94-3.63), was significantly higher than one based on one-tailed mid-p exact test (p-value: 0.037).

## Answer for research Question 2

1. Difference in the mortality rate of construction and non-construction groups was not statistically significant (odds ratio: 0, 95% CI: 0-2.29; mid-p exact test, p value=0.18).

2. Difference between the average Injury Severity Score of non-construction (ISS: 24.2) and construction periods (ISS: 21.4) was not statistically significant (T-test, p-value: 0.51).

NO statistically significant differences between the outcomes of the two groups

# Discussion

- The findings align with studies undertaken in the USA (Graham et al., 1977, 1978; Khattak et al., 2002; Pigman & Agent, 1990)
- This study shed light on the potential risk that highway construction might have for road traffic safety.
- Further studies should aim to explore the association between highway constructions and road traffic injuries and understand what factors contribute to such collisions.
- Findings might help trauma and emergency health services can have a better opportunity for planning and preparation for similar occasions.

# Limitations

- Did not have access to detailed information such as the exact time of the incidents.
- Sample size did not permit further statistical analyses.
  - It could be useful to identify the difference between fatal and non-fatal collisions (Li & Bai, 2008),
  - Between collisions occurring in night versus day time (Arditi, Lee, & Polat, 2007),
  - Explore the effects of seasons on incident rates (Graham et al., 1978).
- Explored **major** injuries and fatalities only and we did not have access to data of transport incidents that were not leading to casualties or were the cause of minor injuries (ISS<12).
  - Therefore, we were not able to capture a potentially more substantial number of cases with minor injuries or incidents with no injuries.
  - Having access to different sources of data would be ideal.

# Conclusions

- The rate of transport incidents had increased during the construction periods.
- We did not identify any differences between the average age of casualties or their ISS or mortality rate.

# Output

- Oral presentation at Road Safety Conference
- Poster presentation at the Trauma Conference
- Paper published at the Road Safety Journal

Sarrami, P., et al. (2021). "Are highway constructions associated with increased transport incidents? A case study of NSW Pacific Highway construction zones 2011-16." Journal of Road Safety 22(1): 17-23.

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