Is prehospital mortality inevitable?

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Background

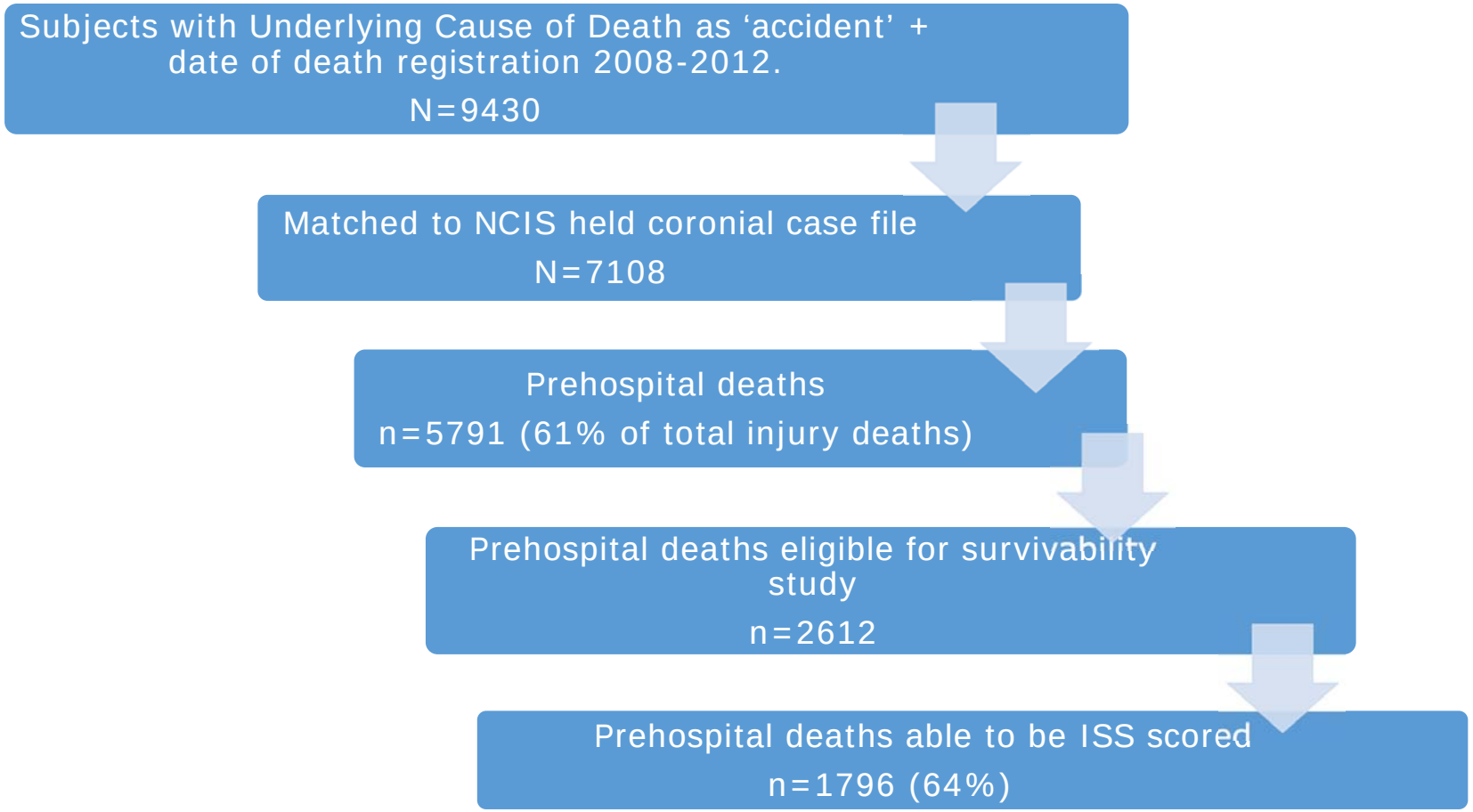
- ~1,800 people die from trauma annually in NZ
- ~ $10 billion NZD (social and economic costs)
- ~ 65% of injury deaths in NZ occur prehospital
- Up to 45% could be survivable/potentially survivable
- Considerable variation in fatal injury rates by DHBs
- Timely presentation of critically injured patients to advanced hospital services is critical

Study aims & research questions

To identify opportunities for improving survival from serious injuries in the prehospital phase through the use of epidemiological and geospatial methods

1. What are the incidence and characteristics of prehospital injury deaths in NZ?
2. What proportion of prehospital injury deaths in NZ is survivable/ potentially survivable?
3. What proportion of the NZ population have timely emergency access (land and air) to advanced level hospital care?
4. In the event of serious injury, how many survivable or potentially survivable prehospital injury deaths in NZ occur in geographic areas with/without timely access to advanced level hospital care?

Phase 1: Identifying the prehospital fatalities



Injury Severity Score (ISS)

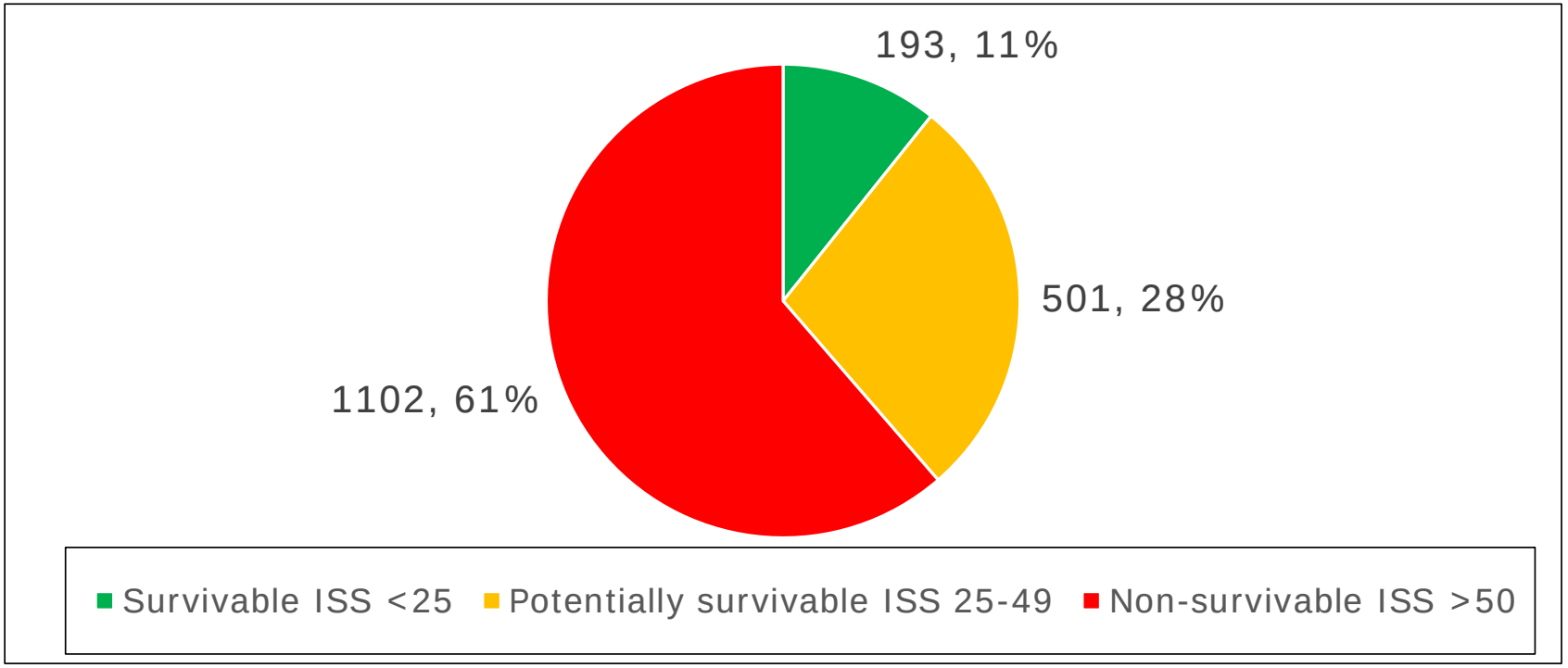
Body Region	Injury	MAIS	AIS²
Head/Neck includes cervical spine	Compound # base of skull	3	9
	SAH	2	
	Small focal cerebral haemorrhages	3	
	Pituitary injury	3	
Face			
Thorax/Chest includes thoracic spine	Contusions both lungs	3	9 ✓
Abdomen includes lumbar spine	Grade V laceration spleen	5	25 ✓
Extremities Includes scapula, clavicle & pelvis	Compound # bilateral sacroiliac joints	3	
External all skin	Multiple lacerations, (R) ear, (R) hand + chin	1	
	Multiple abrasions (L) chest wall, (L) abdominal wall, knees (R) shins	1	
	Extensive bruising (R) thigh + (L) shin	1	

ISS = 43

Probabilities of survival:

- **Survivable:** ISS score <25
- **Potentially survivable:** ISS 25-49
- **Non-survivable:** ISS>49

Figure 1: Overall survivability, n= 1,796



- 39% survivable/potentially survivable (n=694) cf. 55% Falconer study
- ~ 139 lives per year
- Estimated societal costs $580m/year

Figure 2: Survivability by age group

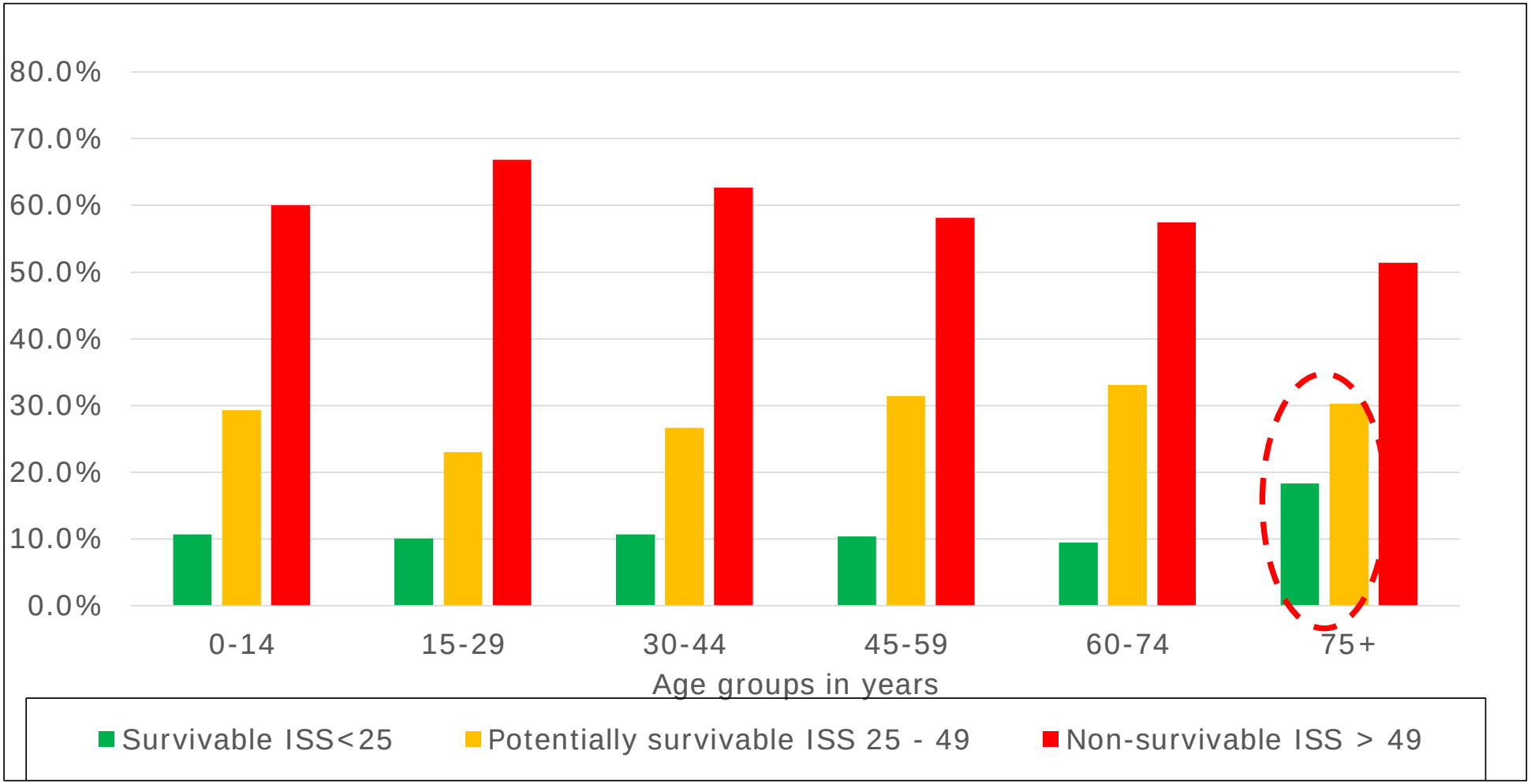
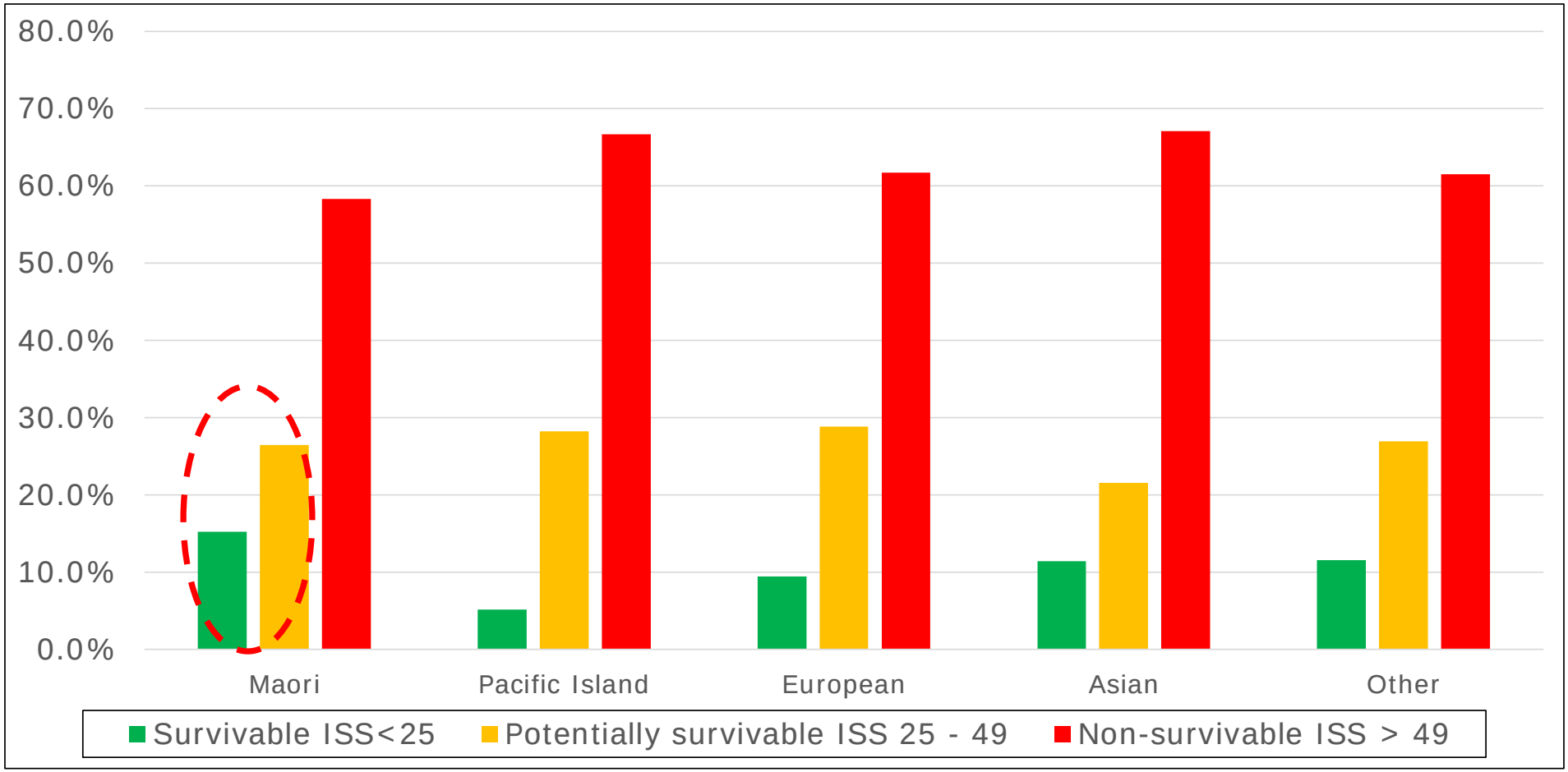


Figure 4: Survivability by ethnicity

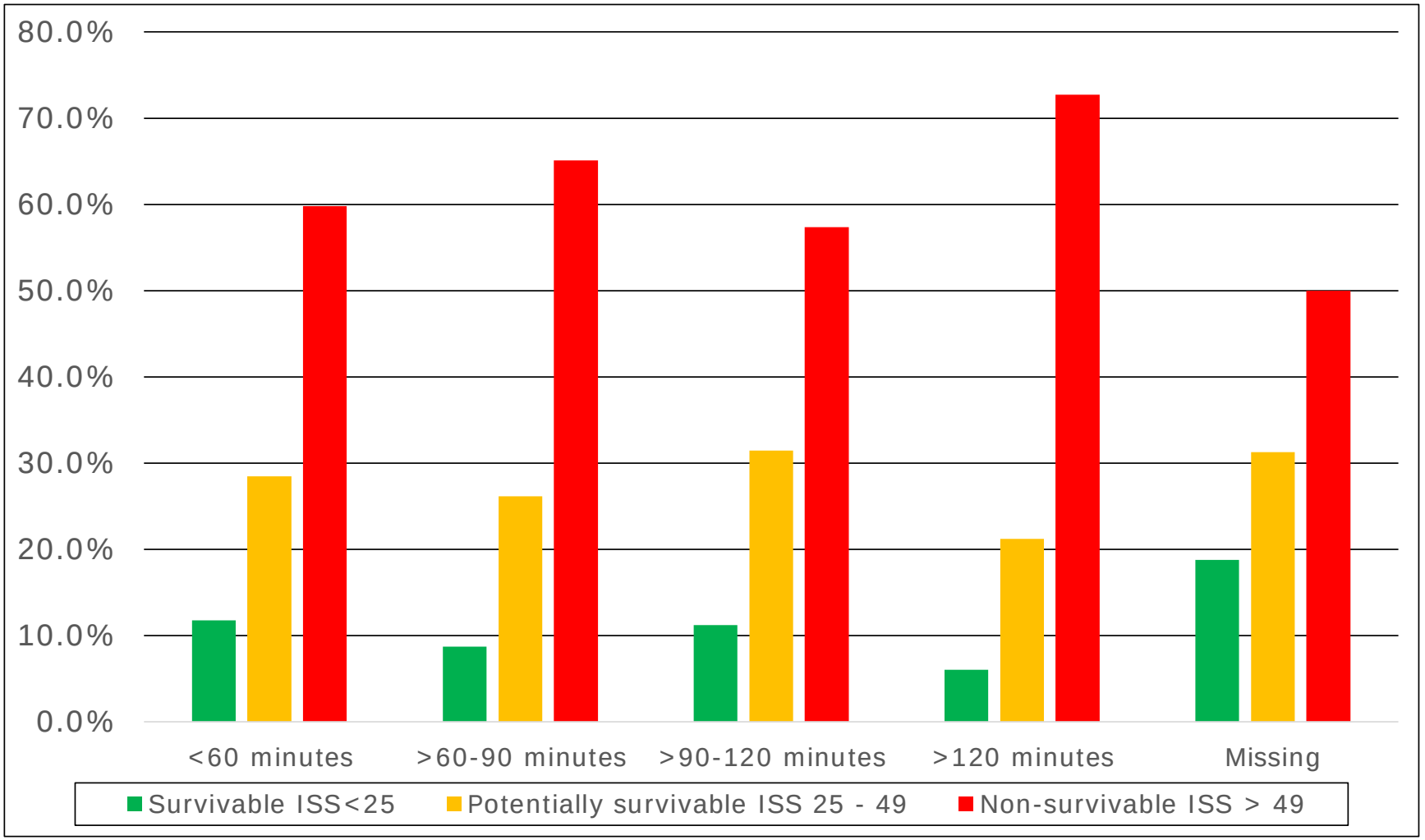


Mechanism of injury

	TOTAL (Column %)	Survivable ISS<25 (Row %)	Potentially survivable ISS 25 – 49 (Row %)	Non-survivable ISS > 49 (Row %)
Transport related	**1115 (62.1)**	**102 (9.2)**	**250 (22.4)**	**763 (68.4)**
Motor Vehicle Traffic	950	85 (8.9)	205 (21.6)	660 (69.5)
Other Land Transport	54	7 (13.0)	21 (38.9)	26 (48.1)
Other Transport	71	4 (5.6)	10 (14.1)	57 (80.3)
Pedal Cyclist, other	14	2 (14.3)	6 (42.9)	6 (42.9)
Pedestrian, other	26	4 (15.4)	8 (30.8)	14 (53.8)
Firearm	**187 (10.4)**	**2 (1.1)**	**98 (52.4)**	**87 (46.5)**
Fall	**157 (8.8)**	**21 (13.4)**	**53 (33.8)**	**83 (52.9)**
Cut/Pierce	**105 (5.9)**	**42 (40.0)**	**22 (21.0)**	**41 (39.0)**
Other specified	**209 (11.7)**	**23 (11.0)**	**65 (31.1)**	**121 (57.9)**
Unspecified	**19 (1.1)**	**3 (15.8)**	**11 (57.9)**	**5 (26.3)**

Little variation by day of week or season

Figure 6: Survivability by distance from advanced level trauma care



Findings in relation to other studies

- 61% of injury deaths occurred prehospital, consistent with 59.%5 of deaths in Florida study (Keris, 1986)
- 30% of RTC related deaths in this study were survivable/potentially survivable cf. 33% in an Australian study(Ryan, 2004) and 35% in a Swedish study(Henriksson, 2001)
- Current study found 27.9% of trauma deaths were potentially survivable similar to 28.5% of cases in a US study (Davis, 2014)

Strengths and limitations

Strengths:

- Novel research for NZ
- Population based
- Trained coder
- Aligned with methodology used by others

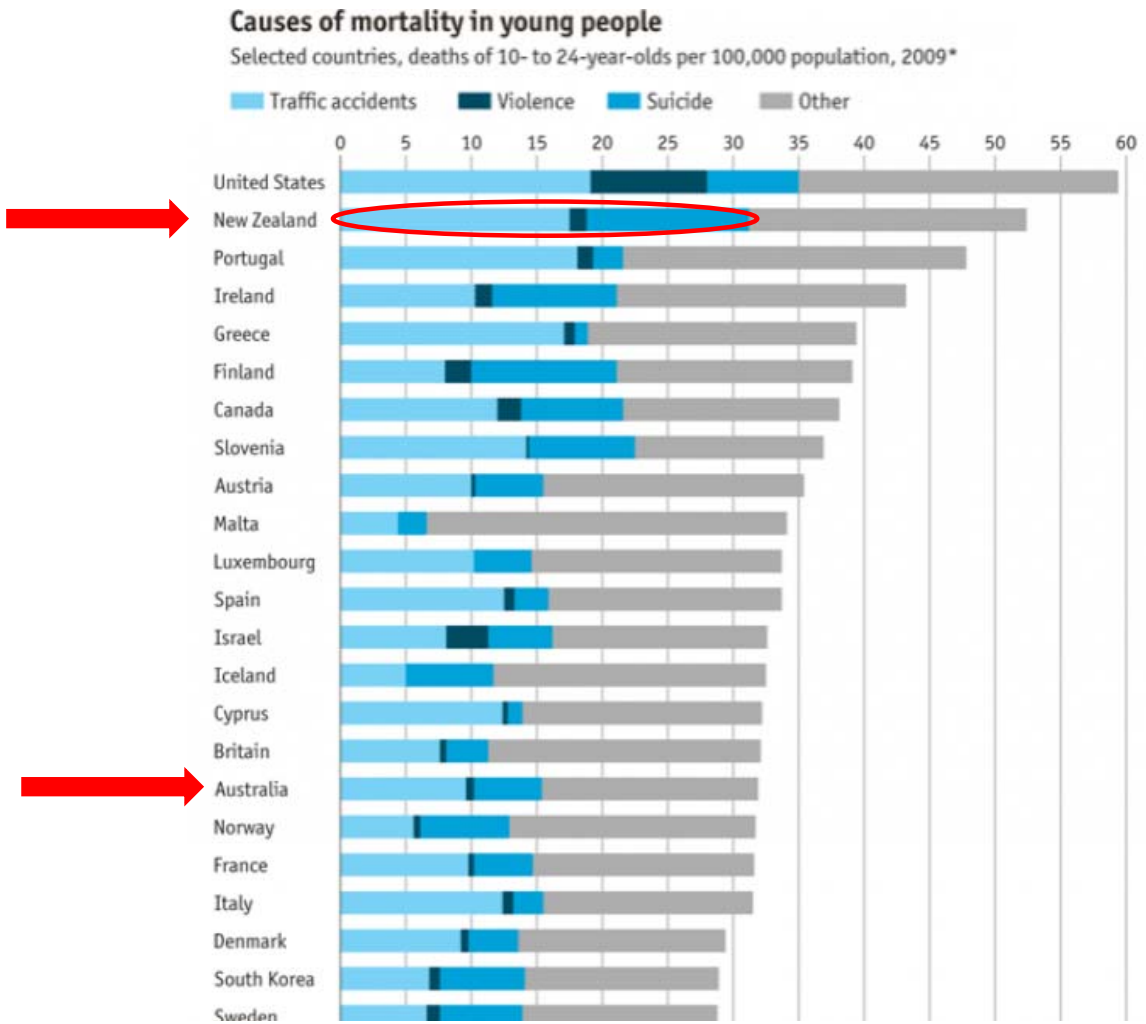
Limitations

- Limited to post-mortem results, known to under record spinal cord injury
- Only those cases with injuries able to be ISS scored included
- No contextual information available to be considered e.g. comorbidities, physiological status, length of time before found, if a multiple casualty scenario, weather, physical isolation, etc.

Conclusions

- *Preliminary results*
- 694 survivable/potentially survivable deaths (~ 139/year)
- Additional analyses will look at body regions injured and nature of injuries *e.g. 80.6% of non-survivable injuries had a head injury as a component*
- Estimated average social cost $2.9B (~ $580m/year)
- Continued primary prevention efforts required
- Patterns and potential survivability of prehospital injury deaths combined with the geographic coverage of existing EMS can provide insights that can inform the optimisation of a mature emergency response system for NZ

Prevention is better than cure



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