



CCREM
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in Emergency Medicine

A comparison of metropolitan vs rural major trauma in Western Australia



**Royal Perth
Hospital**

Prof Daniel Fatovich



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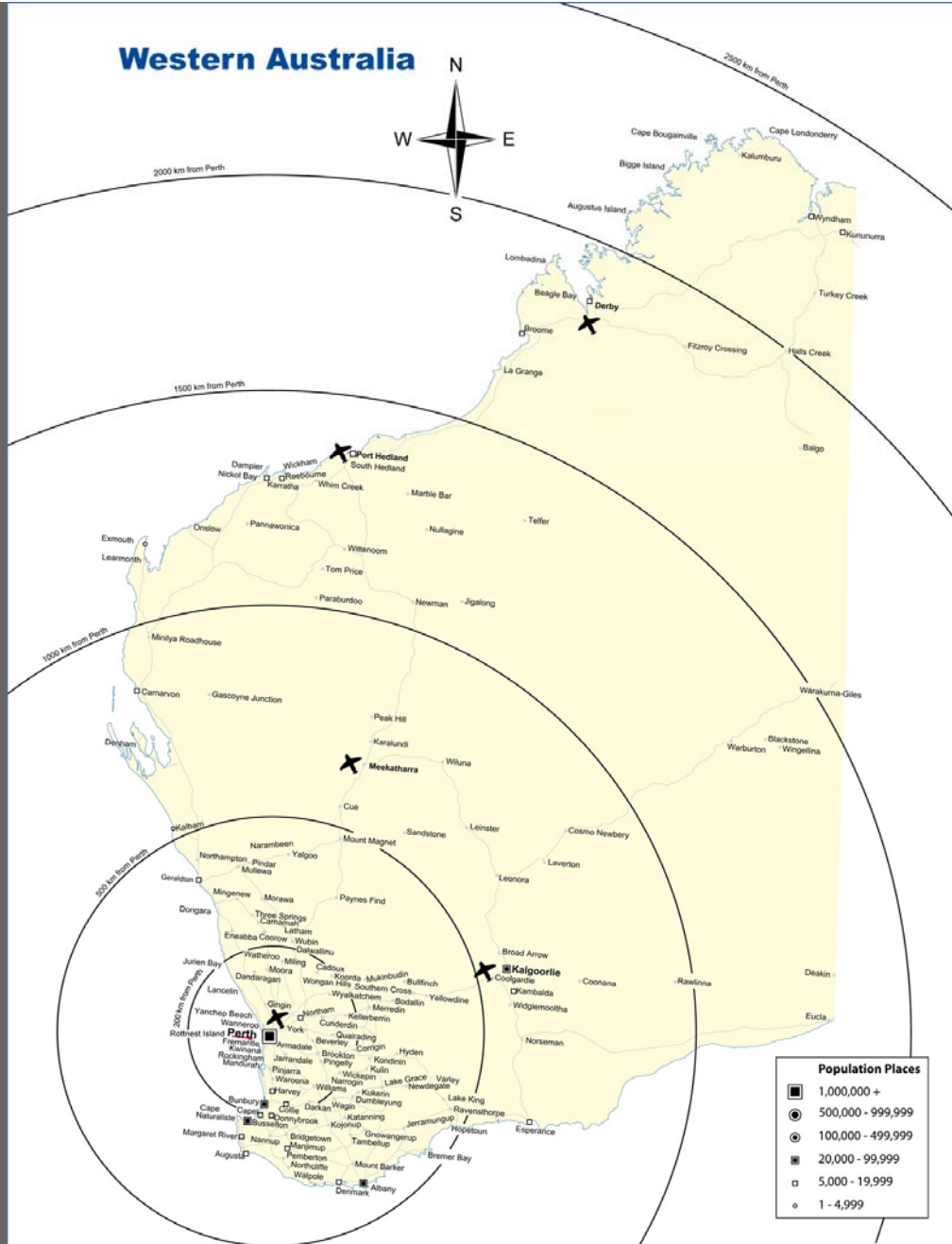


WAIMR
Western Australian Institute
for Medical Research
FOR HEALTHIER LIVES





Western Australia



Statistics based on Australian Bureau of Statistics' "2018 Regional Population Growth, Australia, 2005-09" Estimated resident population at June 2005. Produced by Medical Illustration Department, Royal Perth Hospital. Job No. 15/007003

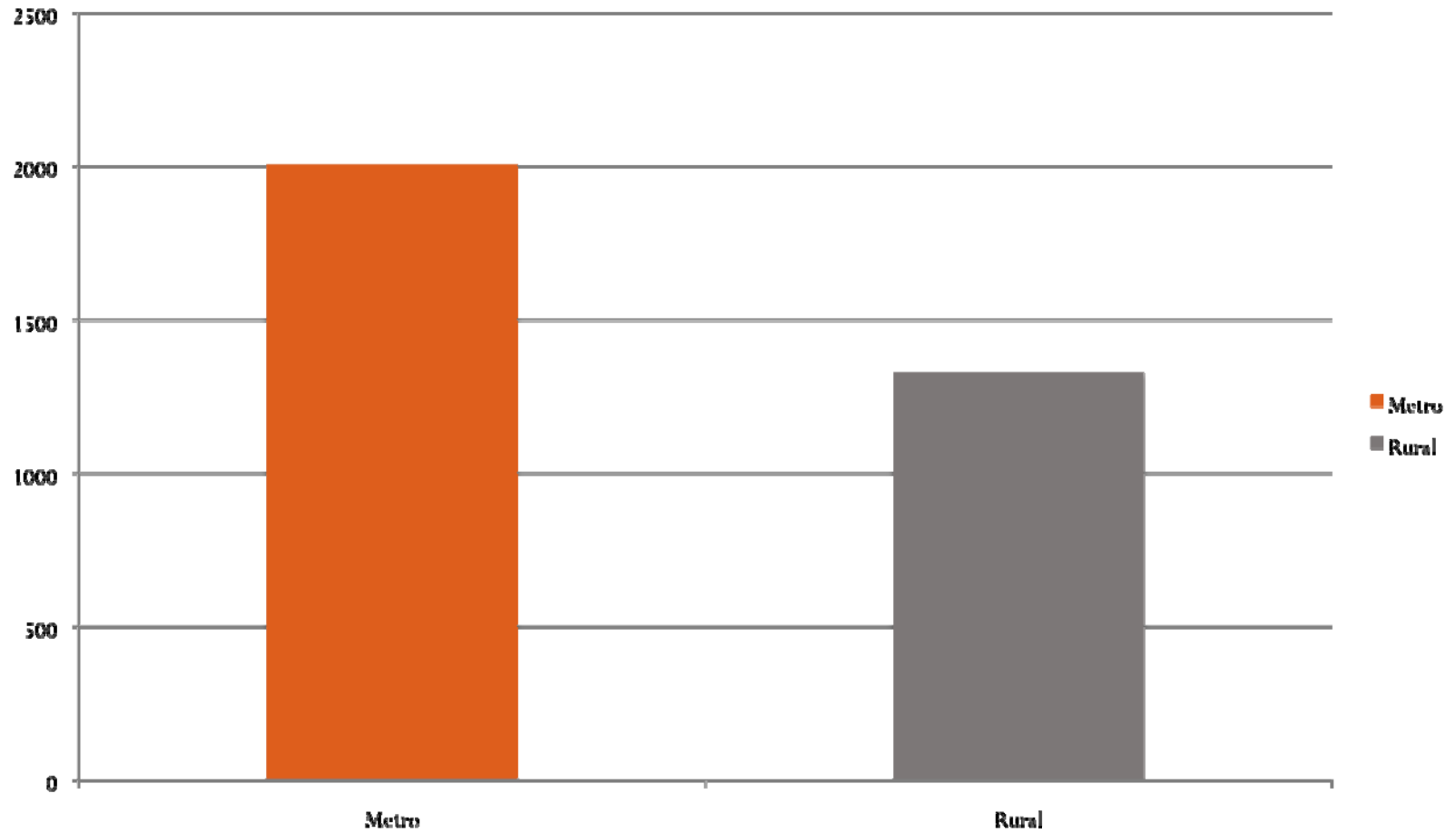




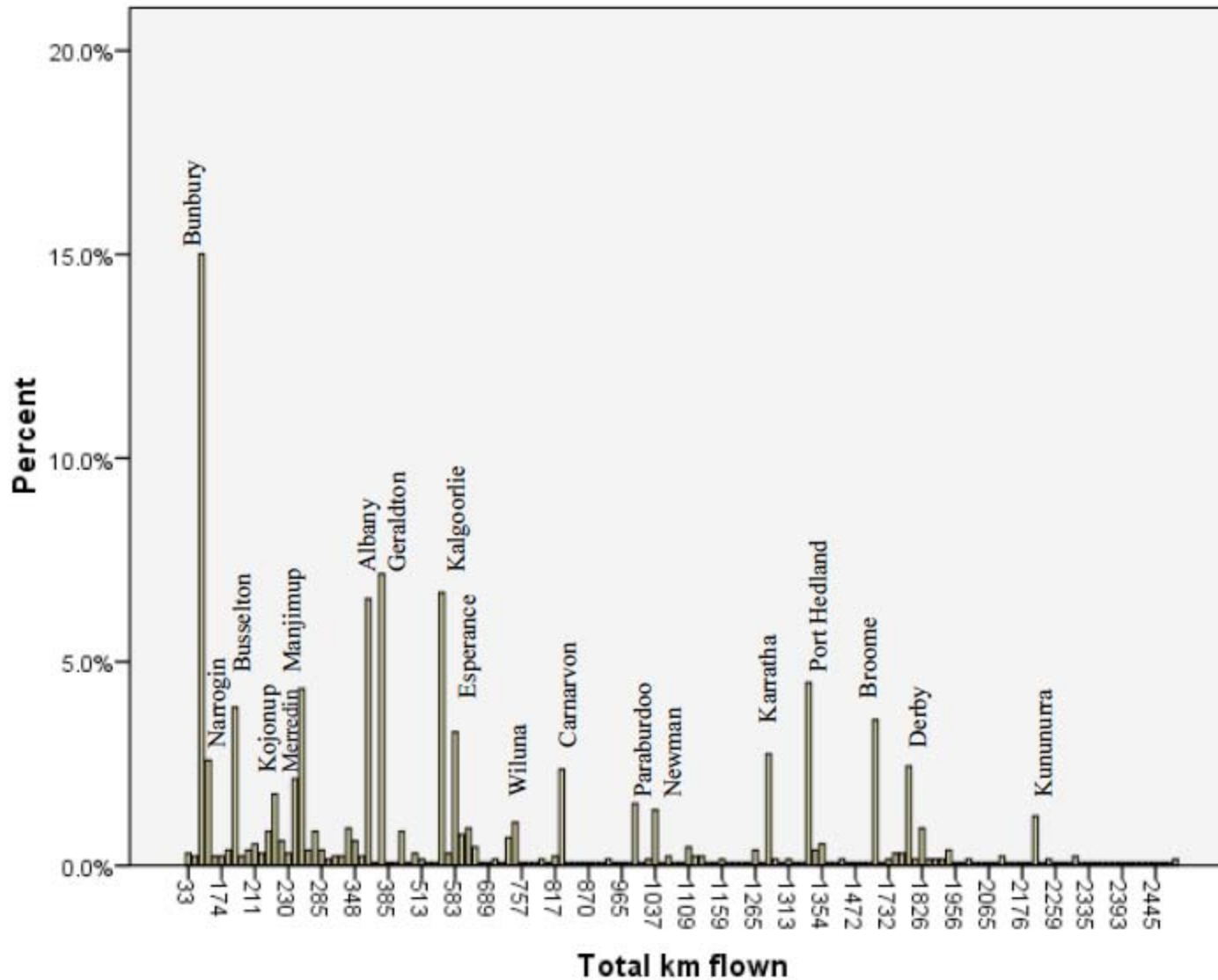
Study design: population based cohort study

- 1 July 1997 – 30 June 2006
- Major trauma (ISS > 15)
 - RFDS data
 - Metropolitan Perth Trauma Registry
 - Linked by the WA Data Linkage Branch
- Additional data
 - Death Registry
 - Australian Bureau of Statistics
- Approved by ethics committees
 - University of WA
 - WA Dept of Health HREC
 - + all Trauma Registry hospitals & each Registry

Numbers (2005 vs 1328)



The distribution of distances flown by the Royal Flying Doctor Service for the 1328 major trauma patients.



LEGEND

ARIA Boundaries

Major Trauma Cases by Postcode (count)

1 - 5

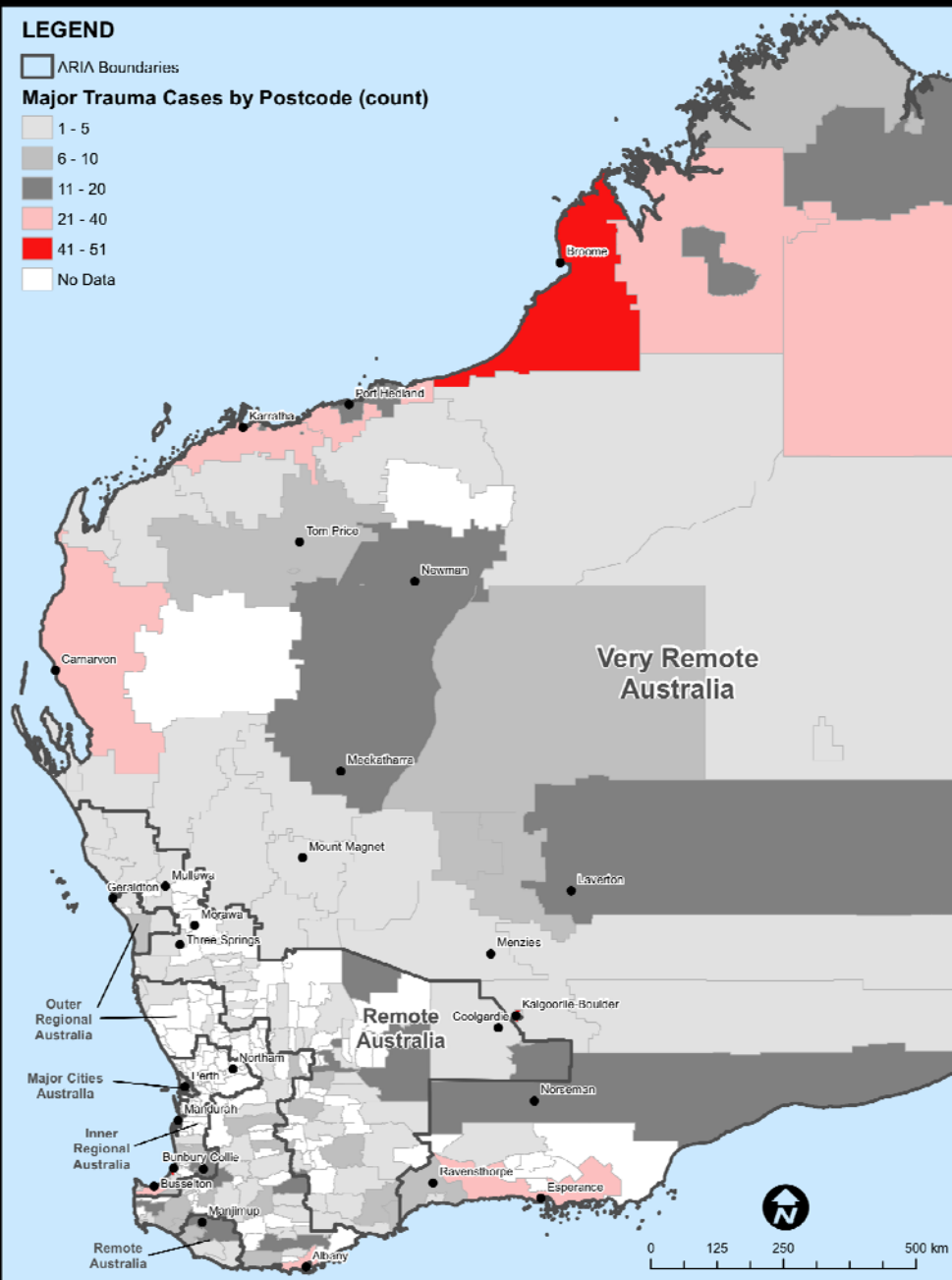
6 - 10

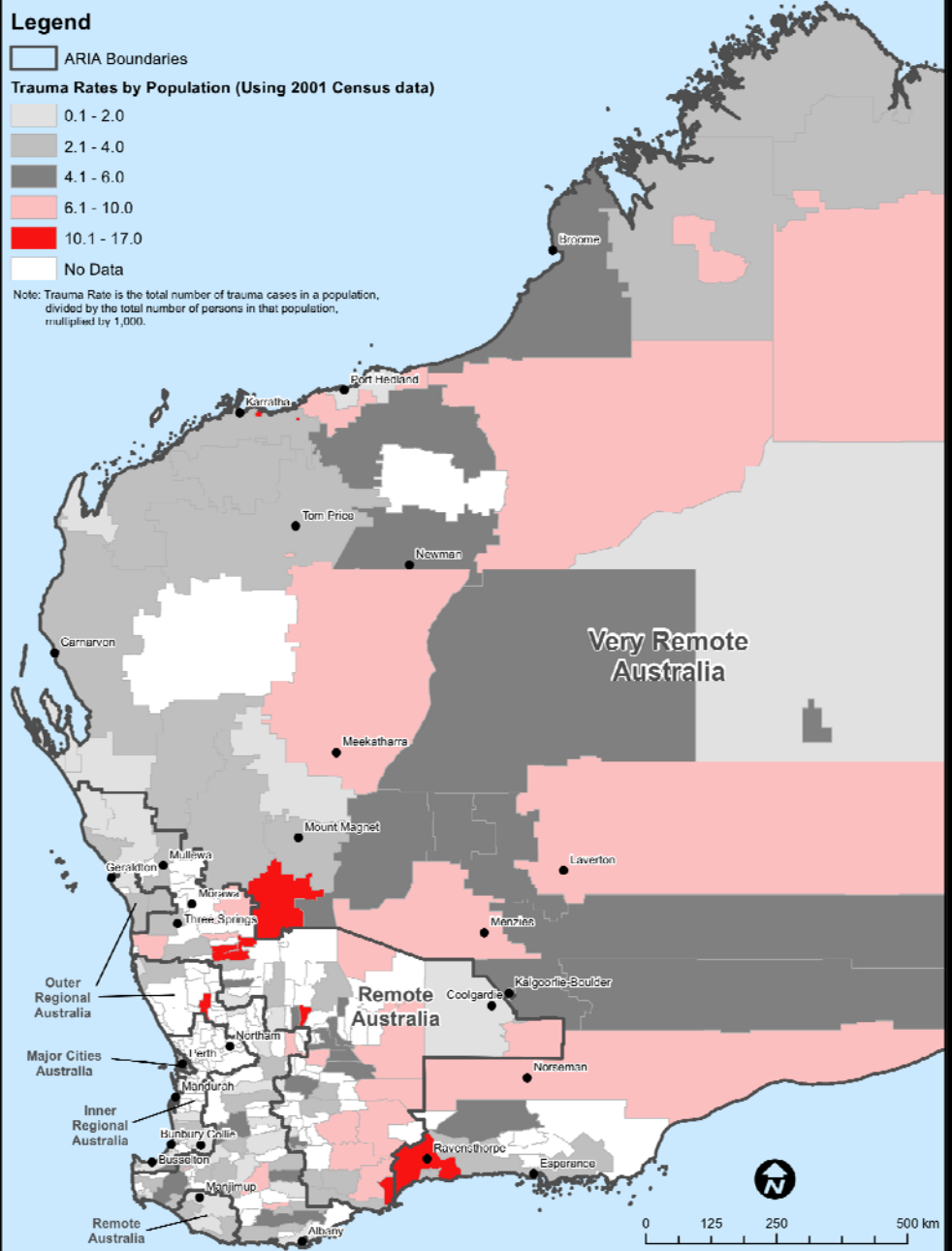
11 - 20

21 - 40

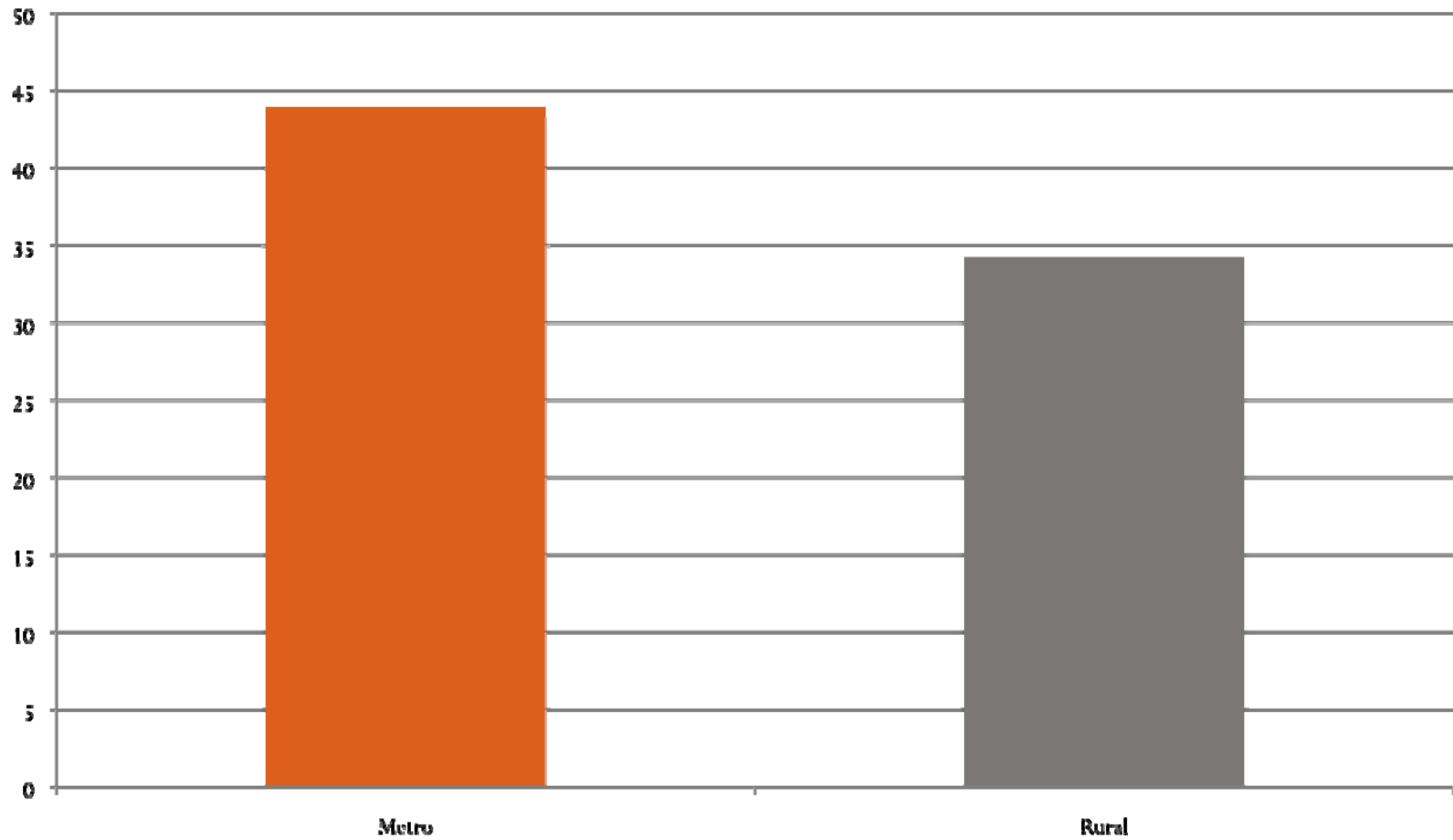
41 - 51

No Data

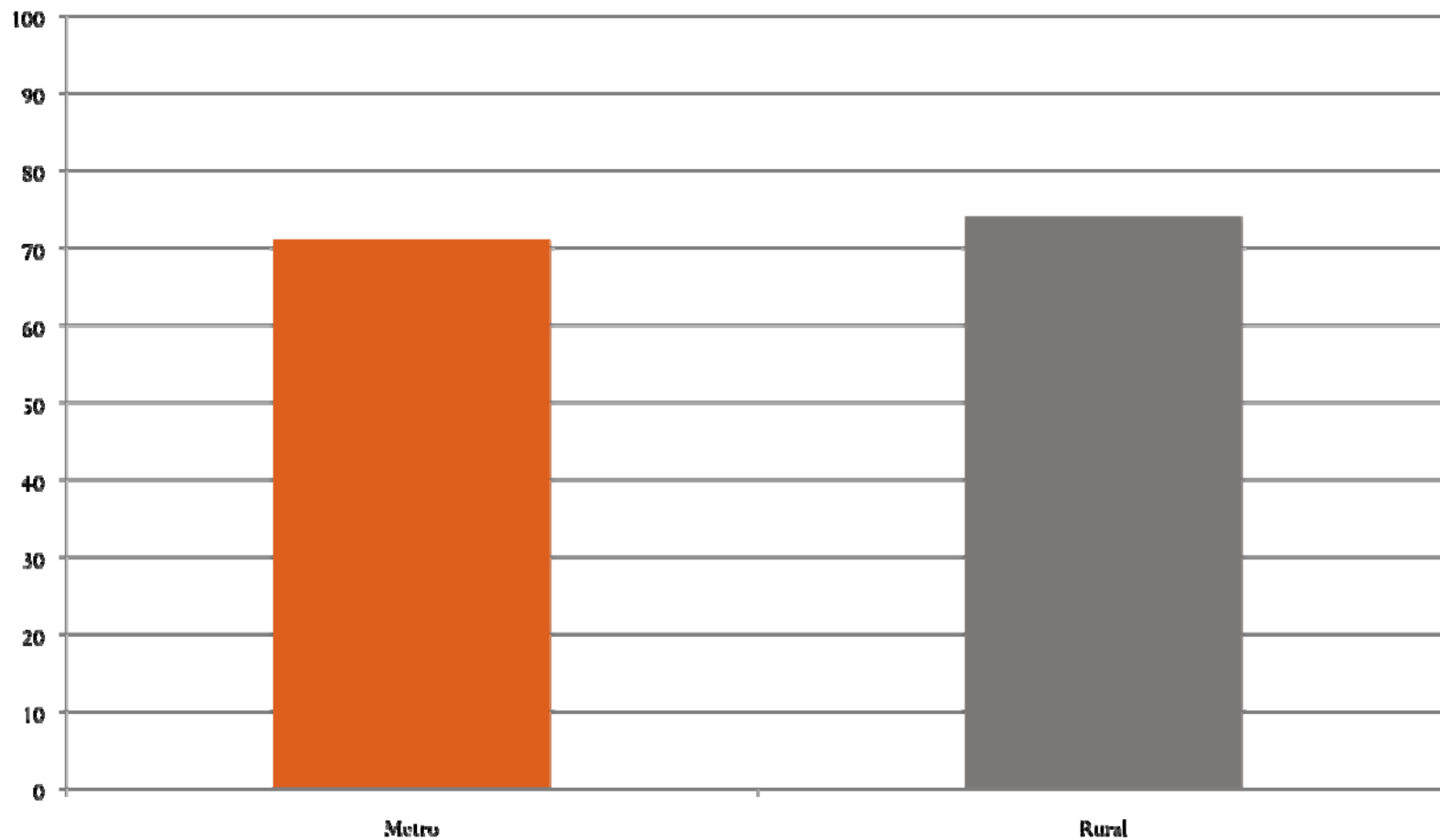




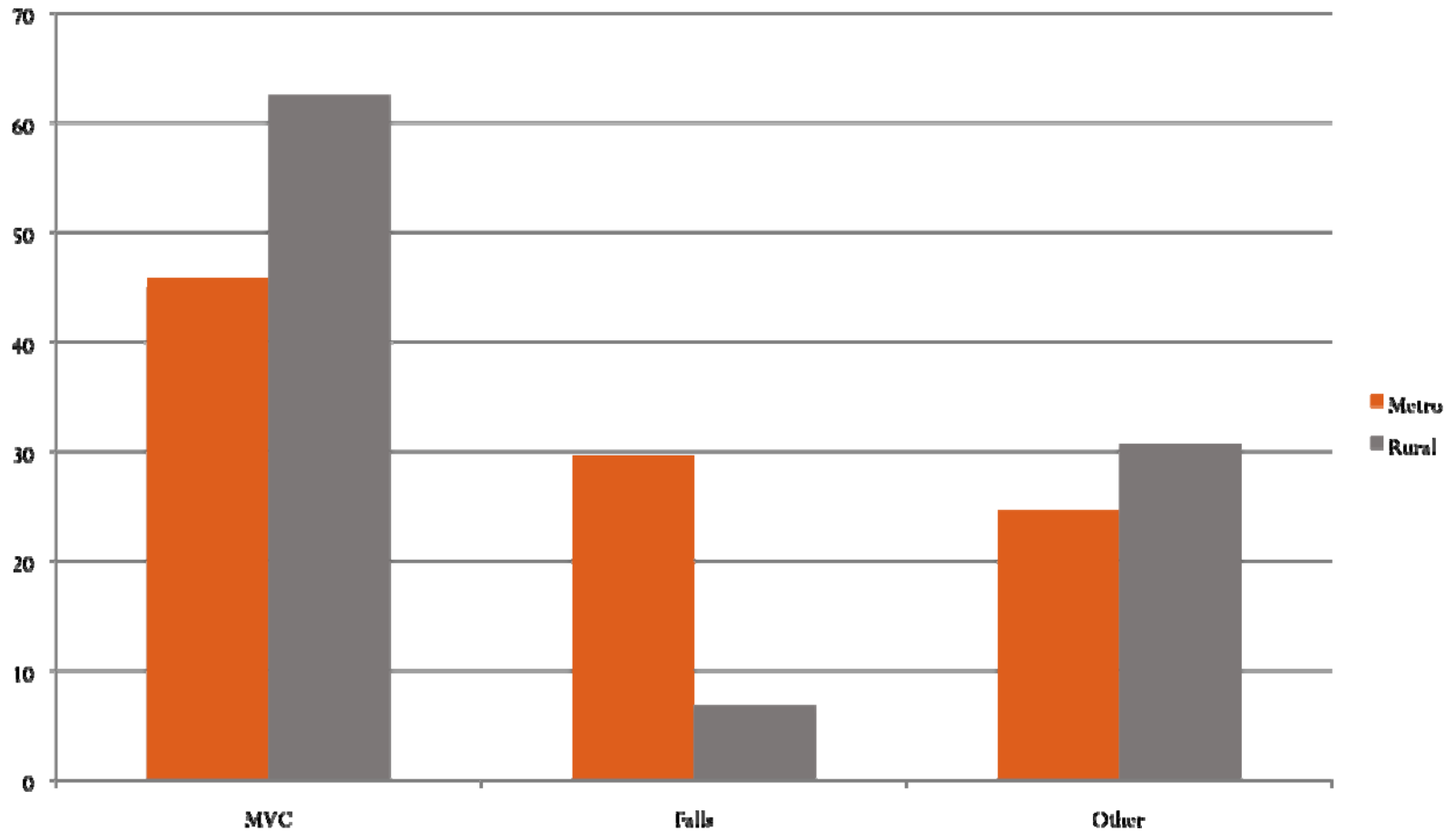
Mean age (yrs)



Sex (% male)



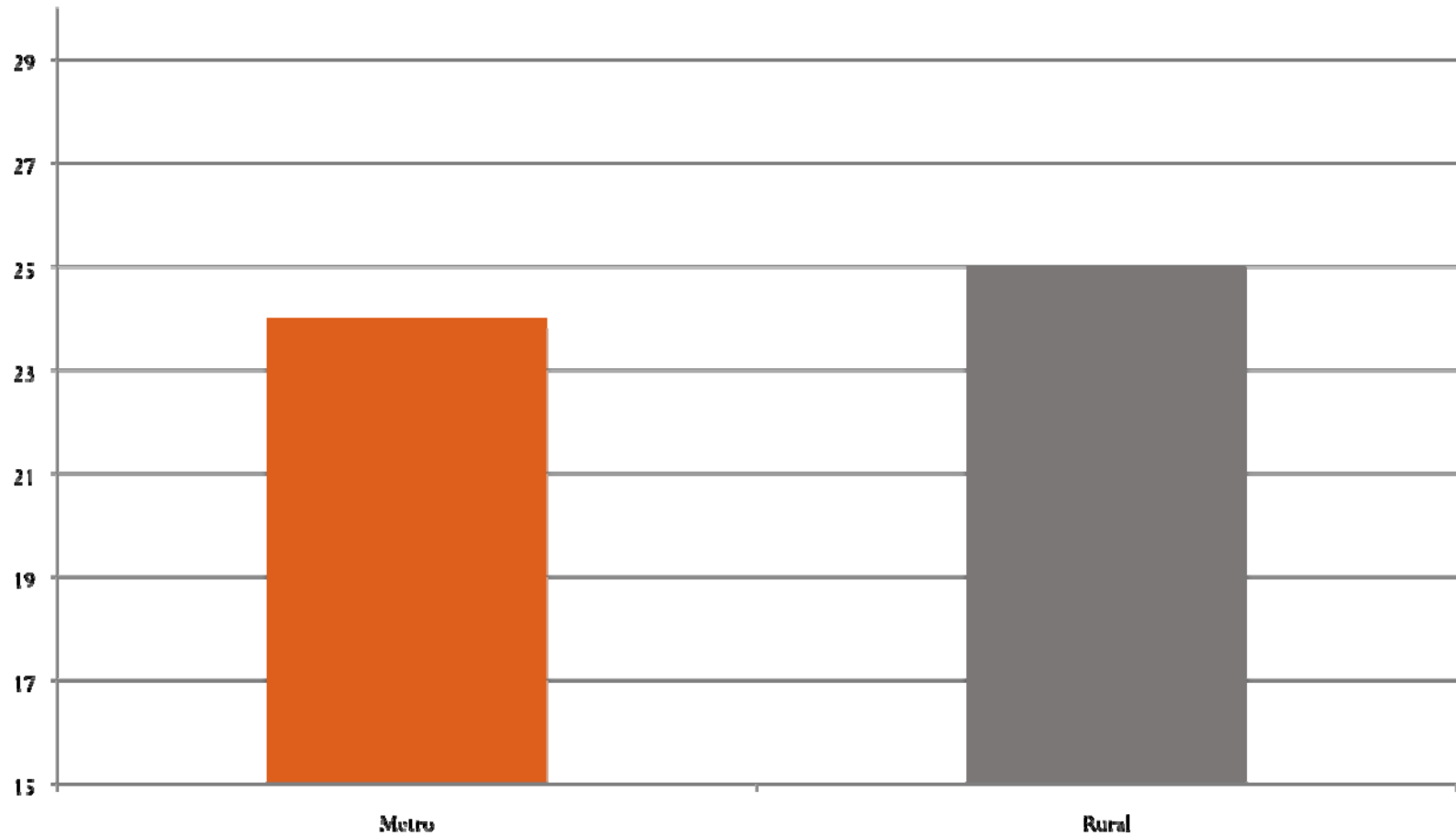
Cause (%)



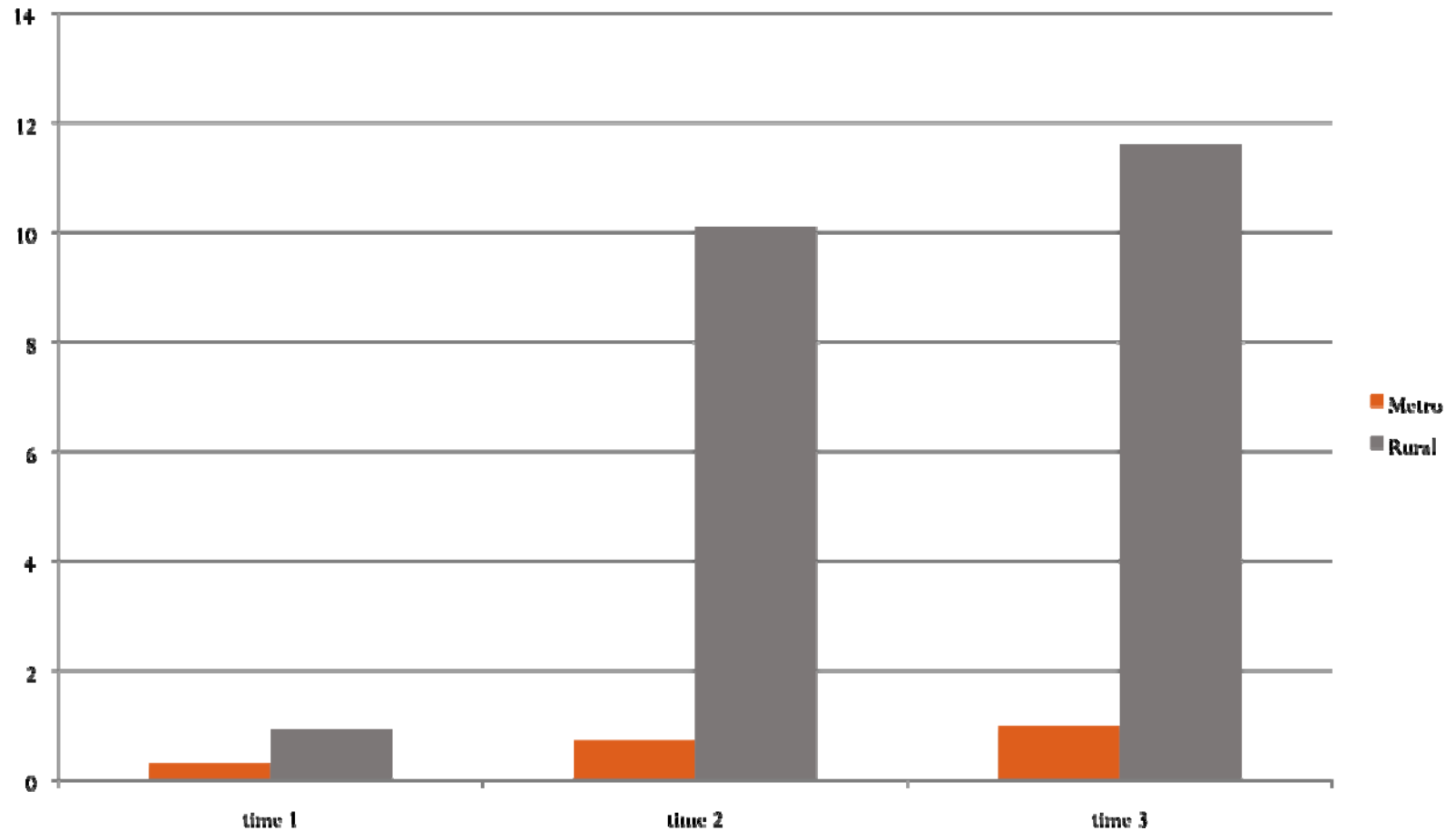
MVC = Motor Vehicle Crash.

Other includes: struck by object, stabbing, fire, gunshot, recreational, crushing, electrical, explosion.

Median ISS (p = 0.001)



Time variables (mean hrs)

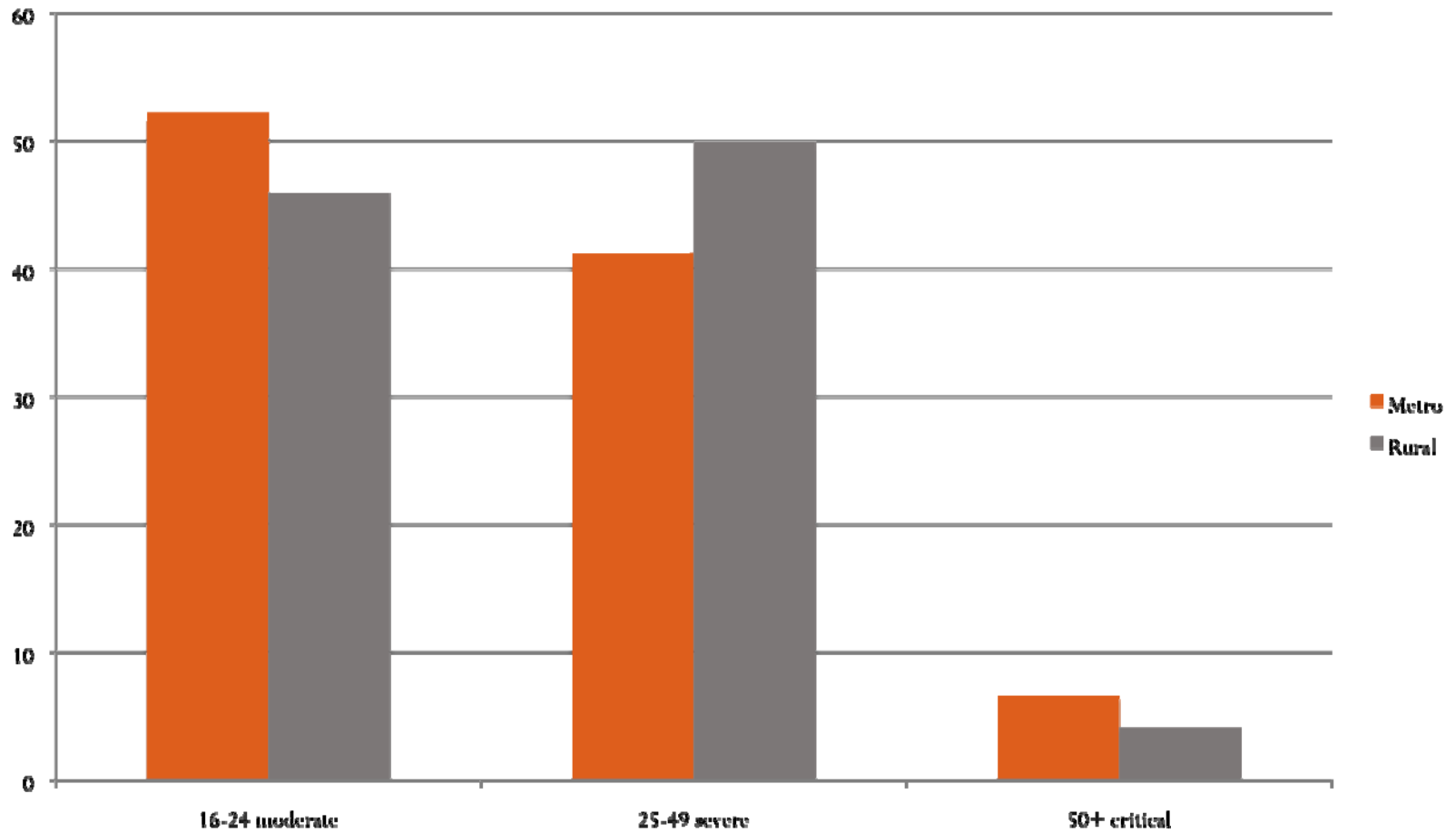


Time 1: time of trauma to time of first provider input (usually ambulance).

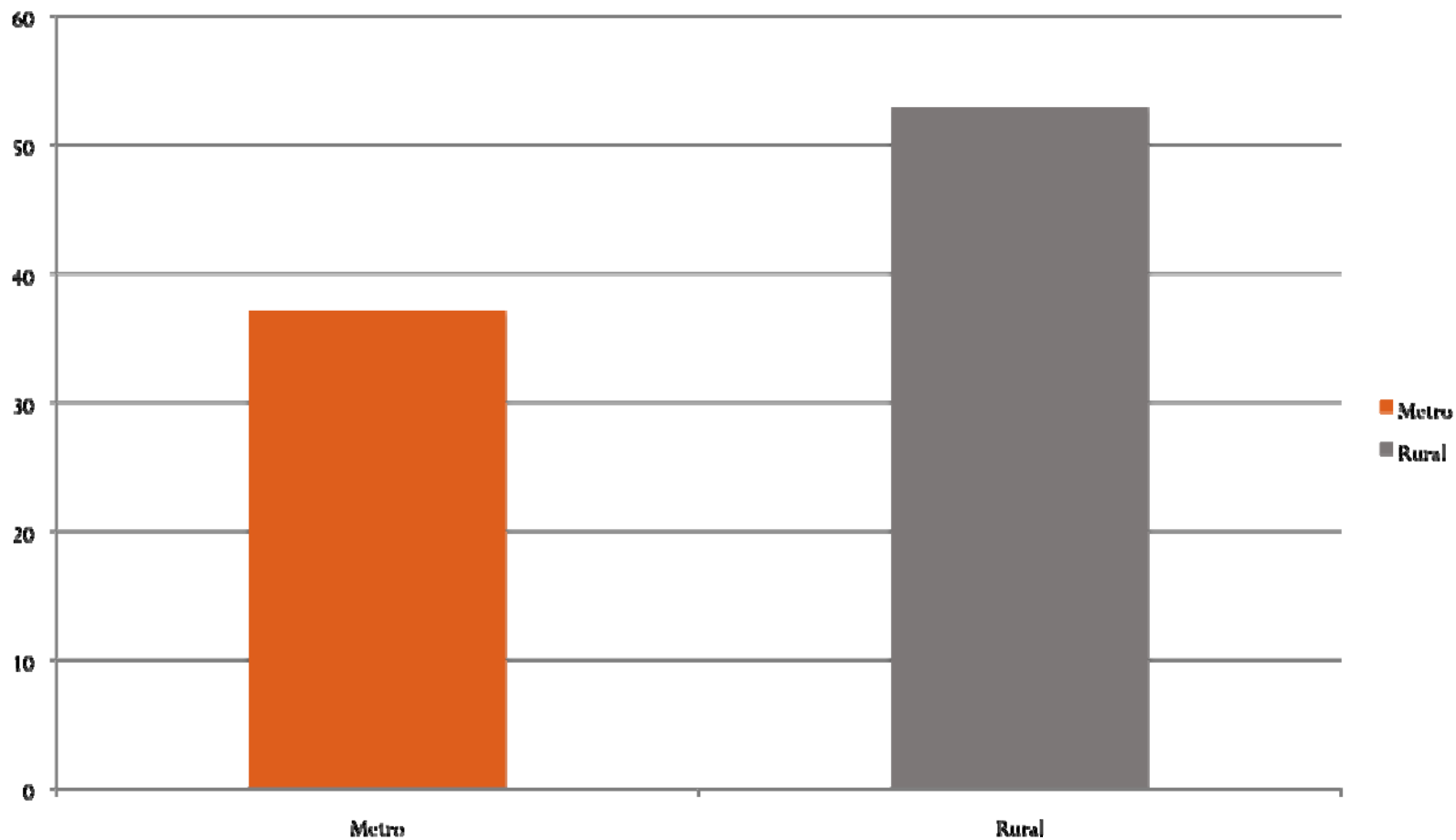
Time 2: time of first provider input (usually ambulance) to time of arrival at tertiary hospital. In the Rural group, this time includes prehospital care, rural hospital care and RFDS retrieval care.

Time 3: time of trauma to time of arrival at tertiary hospital Emergency Department.

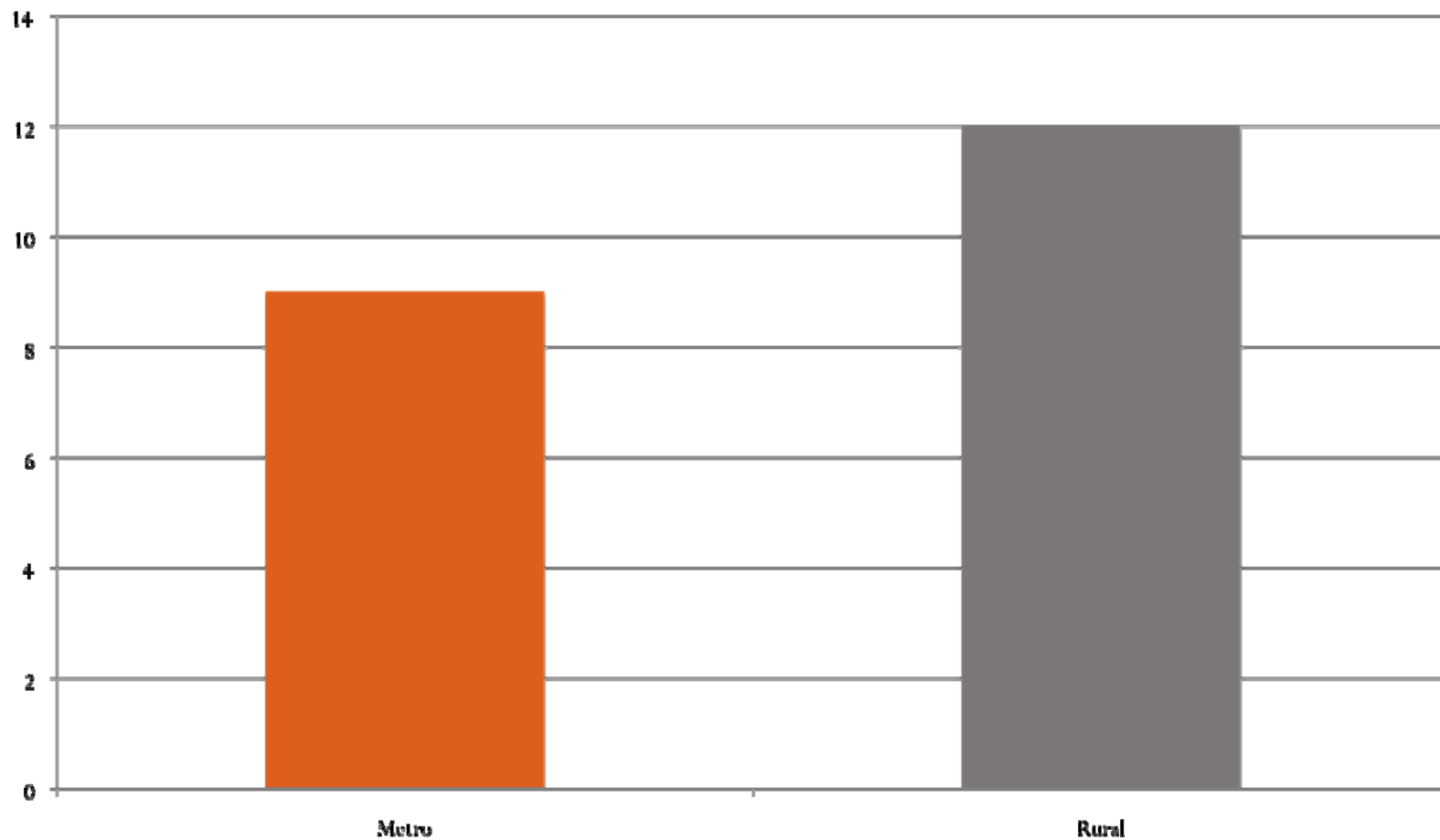
Injury severity (ISS) categories (%)



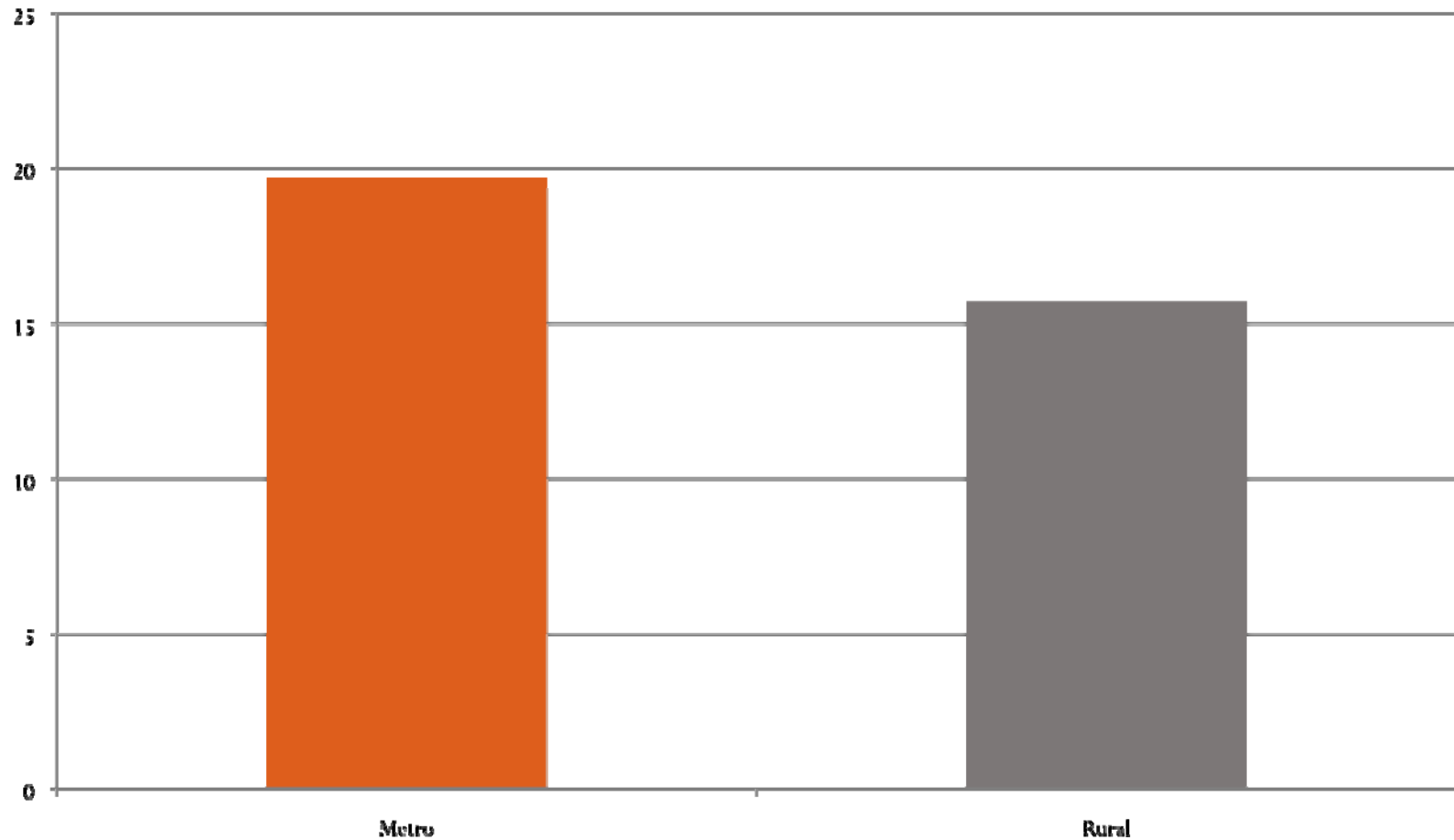
Admitted ICU (%)



Median hospital length of stay (days)



Death in tertiary hospital (%)



Predictor variables for death

- Age (OR 1.06)
- Injury severity score (OR 1.17)
- Revised Trauma Score (OR 0.44)
- Total number of regions injured (OR 0.73)

Metro vs Rural

- There was a significantly increased risk of death in the Rural group:
 - OR 2.62, 95% CI 1.05–6.53, $p = 0.039$
- For those rural patients who reached Perth, the adjusted OR for death was 1.10 (95% CI 0.66–1.84, $p = 0.708$).
- Total pre-tertiary hospital time was not a predictor ($p = 0.302$).

Effect of time

- a 19% increased risk of death per hour of time 1
 - So the longer it takes for the ambulance to arrive, the risk of death increases, and this is likely to be influenced by injury severity.
- Time 2 is associated with a decreased risk of death of 17% per hour.
 - So once the ambulance arrives, the risk of death decreases, and injury severity is not relevant.

Effect of time

- In summary, time prior to ambulance arrival is a significant predictor of the risk of death.
- The influence of higher injury severity occurs at earlier rather than later times.
- This indicates that when critical injuries are influenced by the time to first prehospital care, they cause death quickly.

Discussion

- According to the WHO, by 2020 road trauma will rank third on the list of lives lost to death and disability.
- “Traffic accidents were the largest cause and accounted for 14% of male and 5% of female deaths.”
 - Patton G. Global patterns of mortality in young people: a systematic analysis of population health data. *Lancet* 2009;374:881-892
- Yet population based studies of major trauma are few & fail to account for:
 - interhospital transfers
 - Prehospital deaths
 - Referrals from outside the base population
 - Variable definitions of major trauma
 - Different methodologies
- “The ideal system for the management of trauma remains controversial...”
- “the lack of data to allow comparison of outcomes between countries significantly impedes the identification and implementation of components of a trauma system that are effective and the discarding of those that offer little benefit.”
 - Nathens A. Development of trauma systems and effect on outcomes after injury. *Lancet* 2004;363:1794-1801

Impact of time

- “The importance of time in an organised trauma system is overstated.”

- Nathens AB, Brunet FP, Maier RV. Development of trauma systems and effect on outcomes after injury. Lancet 2004; 363 1794-801

- “Time may be less crucial than once thought.”

- Newgard CD, Schmicker RH, Hedges JR, et al. Emergency Medical Services Intervals and Survival in Trauma: Assessment of the "Golden Hour" in a North American Prospective Cohort. Ann Emerg Med 2010; 55 235-46 e4

- “*Time is traumatic*”

- Discovery time



Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



Clinical paper

A comparison of metropolitan vs rural major trauma in Western Australia[☆]

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ARTICLE INFO

Article history:

Received 2 December 2010

Received in revised form 6 February 2011

Accepted 12 February 2011

Keywords:

Trauma systems

Major trauma

Rural

Retrieval

Royal Flying Doctor Service

Mortality

ABSTRACT

Background: Metropolitan and rural Western Australia (WA) major trauma transport times are extremely different. We compared outcomes from these different systems of care.

Methods: Major trauma (Injury Severity Score, ISS > 15) data from the Royal Flying Doctor Service (RFDS) and Trauma Registries, 1 July 1997–30 June 2006. Two groups were studied: Metro (metropolitan major trauma transported directly to a tertiary hospital), and Rural (rural major trauma transferred by the RFDS to a tertiary hospital in Perth). The primary endpoint was death. We used logistic regression and multiple imputation.

Results: 3333 major trauma patients were identified (mean age 40.1 ± 22.6 yrs; Metro = 2005, Rural = 1328). The rural patients were younger, had a larger proportion of motor vehicle crashes, and higher median ISS (25 vs 24, $p < 0.001$). Mean times to definitive care were 59 min versus 11.6 h, respectively ($p < 0.0001$). After adjusting for age, injury severity and the effect of time with the initial rural deaths, there was a significantly increased risk of death (OR 2.60, 95% CI 1.05–6.53, $p = 0.039$) in the Rural group. For those rural patients who reached Perth, the adjusted OR for death was 1.10 (95% CI 0.66–1.84, $p = 0.708$).

Conclusion: There is more than double the risk of major trauma death in rural and remote WA. However, if a major trauma patient survives to be retrieved to Perth by the RFDS, then mortality outcomes are equivalent to the metropolitan area.

Conclusions

- There is more than double the risk of major trauma death in rural & remote WA.
- However, if a major trauma patient survives to be retrieved to Perth by the RFDS, then mortality outcomes are equivalent to the metropolitan area, partly reflecting the ‘self-selection’ that occurs.



Acknowledgements

- Co-authors:
 - Michael Phillips, WAIMR
 - Stephen Langford, RFDS
 - Ian Jacobs, UWA
- Trauma Registries: RPH, SCGH, PMH, FH
- Maxine Burrell, RPH Trauma Registry
- Medical Illustrations, RPH
- Sudhakar Rao, David Mountain, Gary Geelhoed, Simon Brown
- Department of Health, Western Australia
- Data Linkage Branch, Dept of Health, WA
- Raine Medical Research Foundation