Burden of road traffic injuries in Pacific Island countries and territories:

Implications for road safety initiatives in low and middle-income countries in this region

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Road Traffic Injuries Research Network
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Background

- Global burden of road traffic injuries (RTI)
- >90% low and middle-income countries
- Pacific Island countries and territories
  - Burden of RTIs and risk factors significant but poorly quantified

Objective

To conduct a systematic review of the literature:

to determine the burden of RTI and its

attendant risk factors in low and middle-income

Pacific Island countries and territories.

Results: studies n=19

	Number of studies
Study design	
Case series	15
Ecological	3
Case control	1
Study setting	
Papua New Guinea	15
Fiji	2
Yap	1

Results: PNG studies n=15

- Deaths
  - All cause (40%), trauma-related (60%)
  - Male (83%)
  - Prior to hospital admission (66%)

- Characteristics
  - passengers/pedestrians (50%/35%)
  - head injuries (40%)
  - drivers (chest 65%), pedestrians (head 71%)
  - alcohol (49%)
  - utility vehicle overloading (25-60%)

Summary

- RTI burden significant, risks poorly quantified.
- likely risk factors - alcohol/vehicle type
- need rigorously conducted studies

Traffic Related Injuries in the Pacific (TRIP)

International collaborative grant

Wellcome Trust (UK)

Health research council of New Zealand

TRIP objectives

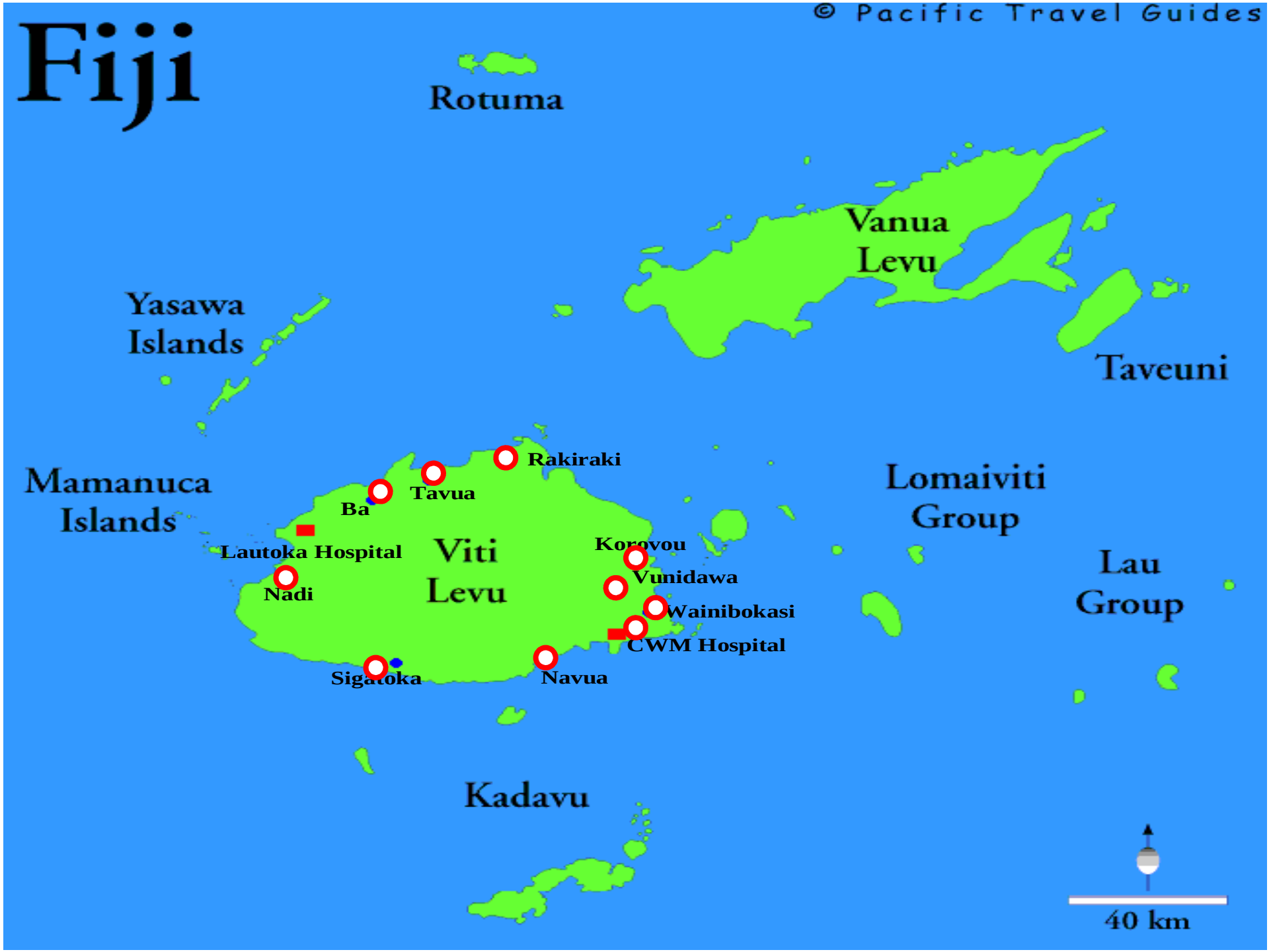
- undertake an epidemiological investigation on injury focusing on road crashes
- identify priorities for injury prevention and control in Fiji, Samoa, and Palau; and
- increase Pacific workforce capacity and capability to address the burden of RTI

TRIP research programme

- Situational analyses: burden of injury in Fiji, Samoa and Palau;

- In Fiji, undertake population–based studies focusing on road user injuries.
  1. establish a trauma register to identify cases of serious fatal and non-fatal injury;
  2. Conduct cross-sectional studies to estimate the prevalence of major risk factors for road user injury;
  3. Conduct case-control analyses to quantify the contribution of potentially modifiable risk factors for road user injury & population attributable risks

TRIP Collaboration


Fiji
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Rotuma
Vanua Levu
Taveuni
Yasawa Islands
Mamanuca Islands
Rakiraki
Tavua
Ba
Lautoka Hospital
Nadi
Viti Levu
Korovou
Vunidawa
Wainibokasi
CWM Hospital
Sigatoka
Navua
Lomaiviti Group
Lau Group
Kadavu
40 km

Study 1: the burden of RTI in Fiji

- Fiji Injury Surveillance in Hospitals (FISH) database
  - Established in all 12 trauma-admitting hospitals in Viti Levu
  - Based on WHO Injury surveillance guidelines
  - Injury surveillance forms: demographic, injury and outcome variables

- Selection of cases
  - mechanism of injury classified as '*road traffic accident*'

- Eligible cases
  - any person involved in a motor vehicle crash (all road users) on a public road in Viti Levu resulting in death or an injury requiring hospital admission for 12 hours or more.

Results: burden of RTI in Fiji

- FISH database: n=2,233

- RTI
  - n=374 (17% of all injuries)
  - Third common cause of injury (falls/hit)
  - Deaths (n=67)
    - 27% of all injury fatalities (n=246)
    - 2/3 prior to hospital admission

Results: burden of RTI in Fiji

	n	proportion (%)
• **Age**		
– **0-14**	56	(15%)
– **15-29**	122	(33%)
– **30-44**	114	(31%)
– **> 45**	82	(22%)
• **Sex**		
– **Male**	269	(72%)
• **Ethnic group**		
– **Fijian**	185	(50%)
– **Indian**	176	(47%)
– **Others**	13	(3%)

Results: burden of RTI in Fiji

- Nature of injury – All cases
  - Commonest presentations
    - Fracture (n=175, 47%);
    - Head injury/concussion (n=100, 27%)
  - Deaths
    - injuries of chest/abdomen, 74% died
    - head injuries, 33% died
    - Fractures, 10% died

RTI-related mortality rates

- Generally higher
  - males and Indians across all ages
  - those aged 30 to 44 years
  - 3 times in males relative to females
  - 1.5 times higher in Indians compared to Fijians

- Mortality rate (per 100,000 persons)
  - 10.3 (95% CI, 10.1-10.6)
  - 10.7 (95% CI, 10.1-11.4) std WHO

Study 2: Cross-sectional roadside survey

- Two-stage cluster sampling
  - designed to recruit a random population-based sample of motor vehicles being driven on public roads in Viti Levu, Fiji
  - Representative of ‘motor vehicle driving time’
  - All public roads
  - Randomly selected roadside sites (n=50)
    - By travel direction, day, and time

- Eligible vehicles
  - All motorised four-wheel vehicles being driven on public roads in Viti Levu
  - Excluded: buses, two-wheel vehicles, emergency response and diplomatic Corp vehicles

Recruitment and data analysis

- Recruitment
  - Drivers recruited from roadside survey (Fiji Police)
  - Study brochure provided, invitation to participate
  - Informed consent
- Interview
  - Interviewer-assisted, questionnaire self-report
- Data analysis
  - STATA 12
  - Adjust for cluster sampling design
  - Adjust for differences in traffic flow at sites (selection probability) weighting - inverse of sampling fraction of motor vehicles travelling past

Results: Roadside survey study numbers

Variables	Motor vehicle drivers recruited
Number	752
Response rate	84%
Interviews (face to face)	49%

Results: demographics

Variables	Driving time	
Sex	**n**	**(%)**
Male	717	(95.4)
Female	35	4.7)
Age group (years)		
15 – 24	84	(11.2)
25 – 34	220	(29.3)
35 – 44	223	(29.7)
≥ 45	223	(29.7)

Results: demographics

Variables	Driving time	
Ethnicity		
Fijian	154	(20.5)
Indian	551	(73.3)
Other	47	(6.3)
Vehicle type		
Cars	468	67.3
Other 4-wheel vehicles	257	29.8
4-wheel trucks	27	2.9

Results: seatbelt use

Variables	Driving time	
	n	(%)
Are seatbelts fitted in the vehicle		
Front and rear	435	64.3
Front only	317	35.7
Were you wearing your seatbelt?		
No	83	9.7
Yes	669	90.3

Results: speed and alcohol

Variables	Driving time	
	n	(%)
Speed: How fast do you think you were travelling?		
≤50 km/hour	502	74.4
51 to 60 km/hour	160	21.2
≥ 61 km/hour	90	4.5
Alcohol use in the 12hrs before the survey		
No	734	96.5
Yes	18	3.5

Study 3: Case control study

- Selection of cases
  - Two-step process
    - RTI case identification from FISH/crash register
      - All road users (drivers, passengers, and pedestrians)
    - RTI drivers identified
      - drivers died, hospitalised, not injured
- Selection of controls
  - Study base representative of driving time
  - Motor vehicle sample from cross sectional roadside survey

- Exposures under investigation
  - driver sleepiness to injury-involved crashes
  - Kava use to injury-involved crashes

Results: Study numbers

Variables	Cases (n=142)	Controls (n=752)
Sex		
Male	136 (95.8)	717 (93.2)
Female	6 (4.2)	35(6.8)
Age group (years)		
15-24	20 (14.0)	84 (12.9)
25-34	48 (33.8)	220 (31.8)
35-44	37 (26.1)	223 (29.2)
45+	37 (26.1)	223(25.9)
missing	0	2(0.3)
Ethnicity		
Fijian	42 (29.6)	154 (21.9)
Indian	98(69.0)	551 (70.1)
Other	2 (1.4)	47 (8.0)

Kava and road crash injuries

- Kava
  - Sedative and anxiolytic properties
  - Commonly consumed in Fiji and other Pacific Island countries
- Kava and RTI
  - Scant information

Results: Distribution of Kava use

Variables	Cases (n=140)	Controls (n=752)
Acute kava use (previous 12 hrs)		
No	108 (77.1)	698 (92.8)
Yes	32 (22.9)	54 (7.2)
Usual kava use (past 12 months)		
No	96 (68.6)	595 (79.0)
Yes	44 (31.4)	157 (21.0)

Results: Kava

Variables	Crude OR* (95% CI)	Multivariable adjusted OR† (95% CI)	PAR (95% CI)
Acute kava use (previous 12 hrs)			
No	1.0	1.0	
Yes	**6.6 (2.9 - 14.8)**	**3.2 (1.3 – 8.0)**	**15.0 (8.5 – 20.4)**
Usual kava use (past 12 months)			
None to monthly	1.0	1.0	
Daily to more than monthly	**2.4 (1.5 - 3.9)**	1.7 (0.9- 2.9)	**12.9 (1.9- 22.7)**

•Adjusted for sampling design

† Adjusted for age, sex, ethnicity, income, acute kava use (previous 12hrs), usual kava use (past 12 months), acute alcohol use (previous 12 hrs), car type, wet conditions, type of driving licence, time of crash, and driver in a crash in past 5 yrs

Driver sleepiness and road crash injuries

- studies in high-income countries
  - 3 to 6 fold odds of crash injury
  - population attributable risk 22%
  - acute driver sleepiness

- studies in low and middle-income countries
  - SR of the published English literature
  - Scant (n=10) none in Pacific
  - 2 to 3 fold odds of crash injury
  - population attributable risk 18%
  - chronic driver sleepiness

Results: Driver sleepiness

Variables	Crude OR* (95% CI)	Multivariable adjusted OR† (95% CI)	PAR (95% CI)
TRIP sleepiness scale			
Active, wide awake	1.0	1.0	
Sleepy or not fully alert	3.1 (2.0 – 4.8)	**5.7 (2.7 – 12.3)**	**33.8 (30.0 – 37.5)**
Adequate sleep in previous 24 hrs			
≥ 6 hours	1.0	1.0	
< 6 hrs	4.6 (1.8 – 11.5)	**5.9 (1.7 – 20.9)**	9.2 (6.3 – 11.9)
≥ 2 sleep apnoea symptoms			
No	1.0	1.0	
Yes	3.5 (1.5 – 8.12)	2.9 (0.6 – 13.6)	7.6 (89.8 – 95.0)

•Adjusted for sampling design

† Adjusted for age, sex, ethnicity, income, number of work hours per week, vehicle speed prior to survey/crash, day of survey/crash, self-reported alcohol use, vehicle type, and time of survey/crash

Significance of TRIP study

- Landmark for road safety research in the Pacific
- Rigorous epidemiological approach to test a hypothesis never before undertaken in a Pacific Island country
- Based conceptually on previous study, it is the different context and setting, unique to low and middle-income countries
- Provided new information to address a critical knowledge gap

Study limitations

- Selection bias
  - Small study
  - Case ascertainment
  - Response rate
- Information bias
  - Self report – no objective measures
  - No blinding of interviewer to outcome
- Confounders
  - Alcohol, speed, time (excluded 2-5am)

Summary

- Regarding driving time in Viti Levu
  - 18% is undertaken by drivers reporting feeling sleepy or not fully alert
  - 4% is undertaken by drivers reporting consuming kava within 12 hours of the survey

- Acute driver sleepiness and acute kava use are independently associated with road crash injuries in Fiji

- Challenges
  - research-policy disjoint
  - legislation - inconsistent enforcement
  - infrastructure - roads less tolerant of driver error

Implications

- Research
  - context-specific Pacific
  - drivers of vehicles involved in crashes as well as those not
  - develop validated tools to measure driver sleepiness/kava use
- RTI surveillance systems
  - global health surveillance/health information systems
  - standardise definitions, evaluation framework
- Road safety leadership and policy
  - UN road safety collaboration Pacific focal points (2012)
  - Establish a Pacific road safety network

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