



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

Fitts, Michelle S., Palk, Gavan R., & Jacups, Susan P. (2013) Alcohol restrictions and drink driving in remote Indigenous communities in Queensland, Australia. In *Proceedings of the 23rd Canadian Multidisciplinary Road Safety Conference*, Montreal, Canada.

This file was downloaded from: <http://eprints.qut.edu.au/62561/>

© Copyright 2013 Please consult the authors

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

Alcohol restrictions and drink driving in remote Indigenous communities in Queensland, Australia

Michelle S. Fitts^a, Gavan R. Palk^a & Susan P. Jacups^b

- a. Centre for Accident Research and Road Safety – Queensland, Queensland University of Technology, Brisbane QLD 4059 Australia,
- b. The Cairns Institute, James Cook University (Cairns Campus), Smithfield QLD 4811 Australia,

ABSTRACT

Alcohol restrictions have been implemented in many Indigenous communities internationally, with the aim to reduce alcohol-related harm. Whilst a range of reviews have evaluated such restrictions using different measures, drink driving has been described in several reviews as increasing. Presently, this remains anecdotal; with limited empirical evidence to corroborate these reports. In Australia, the Queensland government introduced alcohol management plans in remote Indigenous communities, during 2002-2003, with total alcohol prohibition commencing in 2008 in some communities. Given road crashes are one of the leading causes of injuries for Indigenous peoples, this study aims to identify if the restrictions have been successful in reducing drink driving or have increased such behaviour. We examine this by reviewing changes in conviction rates and in offender and offence characteristics following the 2008 restrictions. Using de-identified Queensland court drink driving conviction data (2006-2011), from four Indigenous communities, Robust Poisson regression models compared counts of drink driving convictions pre (2006-2008) versus post SRS (2009-2011). Changes in offender characteristics and conviction details (blood alcohol concentration (BAC) and sentencing severity), were examined using chi-squares. Results indicate a decline in convictions after the 2008 SRS in three communities. However, a significant increase in convictions was identified in one study community. Community-level disparity included significant decline in BAC in one community ($\chi^2=5.58$, $p=0.02$) compared with the three other communities that did not indicate change and a significant increase the number of women convicted in two communities ($\chi^2=17.36$, $p<0.01$; $\chi^2=5.79$, $p=0.04$). Alcohol restrictions may have important implications in road safety with these reductions in convictions and BAC in some communities. However, an increase in the number of women convicted and limited changes in BAC for other communities demonstrate the complex relationship between alcohol use, remoteness and driving. Greater focus on demand reduction strategies may be necessary to address alcohol misuse.

1. INTRODUCTION

Alcohol is often a catalyst for conflict, criminal behaviour, and serious road crashes that contribute towards high injury and fatality rates globally (1). Generally, various types of alcohol supply restrictions have been implemented to reduce such behaviour, with varying success (2-4) and have been listed as a strategy in internationally recognised framework to address alcohol-related harm (5). Restrictions on alcohol availability are based on the concept that societal alcohol-related harm is closely associated with the degree of alcohol access, referred to as Availability Theory (6). Alcohol misuse has arguably had a greater impact on health outcomes of Indigenous peoples in Australia, Canada, United States of America and New Zealand/Aotearoa compared to their national counterparts (7-9), including overrepresentation in fatal alcohol-related road crashes (10), which are one of the primary causes of injuries for this sub-population. Following calls from Indigenous leaders and community spokespeople for the management of alcohol in remote Indigenous communities, restrictions on alcohol carriage and licensed community venues were implemented to similarly reduce alcohol-related injuries and violence.

Reviews of existing alcohol restrictions in Indigenous communities have been mixed. In the Australian context, a review by d'Abbs and Togni (2000) found that supply reduction was effective in reducing alcohol consumption and alcohol-related harm including drunkenness and interpersonal violence (11). Similarly, Wood and Grunewald (2006) found Alaskan native communities that had localised alcohol prohibition had lower age-adjusted rates for all serious injuries from assaults and motor vehicle collisions (12). However, some commentators describe the policy to reduce alcohol harm through prohibition as largely ineffective and are less conclusive on the improvement towards health outcomes long-term than previously reported (13). For example, increases in binge drinking (14,15), displacement of drinkers to unsafe locations (16) and increases in levels of public drunkenness and violence in regional centres due to the influx of large groups of drinkers from remote communities have been attributed to alcohol restrictions in remote Indigenous communities (17). There is also speculation the change in drinking location has led to an increase in drink driving in remote Indigenous communities (16). However, other than consistent anecdotal evidence, there is limited quantified information on how alcohol restrictions may have changed the rate of, and the participants engaging in drink driving from remote Indigenous communities.

Over a decade ago the Queensland Government commissioned the Cape York Justice Study into alcohol abuse and violence in these communities (18). In response to the study's findings, the 'Meeting Challenges, Making Choices' initiative was established. As part of the initiative, alcohol management plans (AMP) were introduced with local community justice groups (consisting of Indigenous Elders and others), in partnership with government agencies in 2002 and 2003 (19). The AMPs consisted of a three-tiered approach including supply reduction strategies (SRS) in collaboration with demand and harm reduction strategies. However, the SRS were the main component and consisted of alcohol possession and sale limits. These restrictions varied within each community, and were staggered in their implementation.

After several years of operation a government review of the initial SRS found a decline in hospital admissions for assault and, to a lesser extent other injuries (20). However, drink driving was noted to have increased (20). Other studies, such as that by Margolis and colleagues also identified reductions in absolute and proportional rates of serious-injury retrievals using injury retrieval and hospital admission data (21). More recently, a retrospective review of interpersonal violence was found to significantly decrease with the implementation of these initial alcohol restrictions (22). Given the reduction in injury rates, a

second SRS in 2008 consisting of tighter alcohol restrictions followed, including total alcohol prohibition was implemented in some communities. These tighter alcohol restrictions continued to generate some positive changes, with further reductions in injury-related behaviour. Again, Margolis and colleagues identified a significant reduction in serious-injury retrievals following the 2008 alcohol restrictions in four remote communities (23). To date, there is limited quantified information to confirm the effect of tighter alcohol restrictions in Queensland Indigenous communities on drink driving. Recent reviews of alcohol restrictions in other Australian jurisdictions however, whereby total alcohol prohibition also exists, have identified changes in road behaviour including increasing drink driving and the displacement of drinkers from remote communities to the outskirts of town to consume alcohol whereby use of a private vehicle is essential (16).

Road transport crashes, predominantly single vehicle crashes, are one of the leading causes of injuries for Indigenous Australians (9). In addition, high range BAC ($\geq 0.15\text{g}/100\text{ml}$) has been linked with more severe injuries and fatalities on Australian roads (24). Therefore, understanding the impact of the tighter 2008 SRS on Indigenous drink driving in remote areas will have important implications towards understanding the effect of SRS and how it may impact on drink driving given the majority of information presently is largely anecdotal. This study aims to identify changes to i) the number of drink driving convictions, and; ii) the characteristics of the persons convicted from the four remote Indigenous communities following the implementation of the tighter SRS in 2008.

2. METHOD

2.1 Setting

This study considered the impact of the alcohol restrictions on drink driving in four remote communities all located within the Cape York Peninsula. This area of Far North Queensland covers ~128,000 km² and contains twelve statistical regions, with a population of approximately 7,800 Indigenous Australians (25) (see Figure 1). Although there are communities across other parts of Queensland with alcohol restrictions, including Central Queensland and the Torres Strait Islands, a cluster of over 250 Islands, with a population of approximately 5,900 Indigenous Australians (26), these four communities were selected for this study as they have separate Magistrates courts to those operating in the major centres within Cape York Peninsula and there is enough isolation to be confident that the convictions from the four study community courts are of permanent community residences.

Prior to the introduction of the alcohol restrictions in 2002 and 2003 a licensed venue (canteen) was located in each community that was operational and permitted the sale of takeaway alcohol. As part of the broader alcohol management plans implemented, each study community was subject to a stepwise reduction in the legal availability of alcohol. These plans included alcohol carriage limits (on type, strength, and amount of alcohol) in communities, canteen takeaway restrictions and limited canteen opening hours. Details of the alcohol restrictions are presented in Table 1.

In 2008, Queensland Government introduced additional reforms, including banning councils from holding a general liquor licence and prohibiting drinking in public in communities. Specifically for the study communities, at the end of 2008 three communities moved to prohibition of alcohol and licensed premises were closed, while a fourth allowed low-alcohol beer within licensed premises. The distances from each study community to the closest licensed venue to purchase alcohol legally are presented in Table 2. The population data in this table is from the Australian Bureau of Statistics (27).



Figure 1. Map of Cape York Peninsula, Queensland, Australia

| Restriction Type | 2002-2003 SRS | | | | 2008 SRS | | | |
|------------------|---------------|-----|-----|---------|----------|----|----|-----|
| | Community | | | | | | | |
| | A | B | C | D | A | B | C | D |
| Beer ≤4% | Yes | Yes | Yes | Yes | No | No | No | Yes |
| Beer > 4% | No | No | Yes | Yes | No | No | No | No |
| Wine | No | No | No | No | No | No | No | No |
| Spirits ≤5.5% | Yes | No | No | No | No | No | No | No |
| Spirits >5.5% | No | No | No | No | No | No | No | No |
| Open Carriage | No | No | No | Limited | No | No | No | No |
| Canteen | Yes | Yes | Yes | Yes | No | No | No | Yes |
| Takeaway | No | No | No | Limited | No | No | No | No |
| Homebrew | Yes | Yes | Yes | Yes | No | No | No | No |

Table 1. Legal access to alcohol by community: first (2002–2003) and second (2008) supply-reduction strategies

| Community | Indigenous Population 2006 | Indigenous Population 2011 | Distance to closest legal alcohol venue |
|----------------|----------------------------|----------------------------|---|
| A | 1059 (94%) | 1195 (92%) | 185 kms |
| B | 1028 (93%) | 937 (91%) | 362 kms |
| C | 541 (90%) | 432 (84%) | 138 kms |
| D ¹ | 580 (90%) | 600 (90%) | 461 kms |

Table 2. Proportion of Indigenous population in each study community and distance to the closest licensed alcohol venue

2.2. Data

The Department of Justice and Attorney-General, Brisbane, Australia, provided de-identified routinely collected drink driving convictions from courts in the four study communities for the period 1 January 2006 – 31 December 2011. This data was used as it was the only drink driving data with the inclusion of Indigenous status. However, the inclusion of this field in court records commenced in 2006. Therefore, convictions with the inclusion of Indigenous status (self-identified) are not available to allow for analysis to compare drink driving convictions prior and post the initial SRS (2002-2003). The authors believe it is important to conduct the analysis of the data at this time between the first and second SRS because of the critical impact this particular issue has on Indigenous drivers and the communities in which they live, and the limited understanding of how alcohol restrictions impact on drink driving behaviour.

Information available included: court system and type, date of offence and conviction, charge number, court location, offence code, and sentencing description. The dataset also included the following offender details, date of birth, gender, and self-recorded Indigenous status. Using the Indigenous status field, all convictions for drivers who did not self-identify as an Indigenous person (Aboriginal and/or Torres Strait Islander) were removed. In addition, all the charges that were not successfully prosecuted, whereby the offender was not convicted, were also removed for the purpose of analysis.

2.3 Classification of blood alcohol concentration and sentence outcomes for the analysis

In Australia, the legal breath alcohol limit for licensed drivers on probationary licence and professional drivers (i.e. taxi and truck drivers) is 0.00g/100ml and for full licensed drivers, between 0.00g/100ml and 0.49g/100ml (28). There were three categories of BAC under Queensland legislation at the time this data was accessed, namely above the zero limit (<0.05g/100ml); equal to or above the general alcohol limit (0.05-0.149g/100ml); and, equal to or above the high range alcohol limit (≥ 0.15 g/100ml). For the purpose of the study, zero and general range categories were combined, therefore, we compared two BAC categories, 1) 'low range' BAC (<0.15g/100ml) and 2) 'high range' BAC (≥ 0.15 g/100ml).

¹ There is an operating canteen in community D.

The Penalties and Sentencing Act provides judicial discretion at sentencing. Hence, on some occasions an offender received multiple penalties. We therefore defined sentencing in order of increasing severity, specifically 'convicted not further punished', 'other' (such as, victim compensation), 'monetary fine', 'community based order' (including probation, community service and intensive corrections), 'suspended sentence' and 'imprisonment'.

2.4 Data Analysis

The 'date of the offence' and not 'conviction date' was used for data analysis. Associations between gender, age at offence (<25 years; 25-39 years and 40+ years) and BAC category were examined across communities using cross tabulations and chi-squares. Robust Poisson regression analyses (for all four communities) using cross-sectional longitudinal (measured over time) data, to compare drink driving conviction counts for the 3 years before the 2008 SRS restrictions (2006–2008), with the 3 years following their implementation (2009–2011). When divided into monthly data, the counts of convictions were too small for analysis we therefore combined data into 'yearly' divisions pre versus post SRS introduction. As data was de-identified, identification of persons in the data or what conviction this was for each person was not possible. Time series techniques such as smoothers and moving averages were not used, as the data were counts and followed a gamma distribution (Poisson model). Statistical analyses were performed using STATA version 12.0 (Stata Corporation, TX, USA).

2.5 Ethics

Queensland University of Technology Human Research Ethics Committee approved this study (approval no. 1100000636).

3. FINDINGS

3.1 Overall convictions from four study communities

During the period 1 January 2006 – 31 to December 2011 there were 301 drink driving convictions recorded within the four study communities. There was little difference in the number of drink driving convictions prior to and following the 2008 SRS, 149 and 152 respectively. The observed drink driving rates for the four study communities per 1,000 over the six years are shown in Figure 2.

In relation to BAC, prior to the tighter alcohol restrictions there were 98 high range BAC convictions (65% of offences) in total from the four study communities. A reduction in the number of drink drivers apprehended for high range BAC convictions was seen, with 77 high range BAC convictions (50%) between 2009 and 2011. This change in the type of BAC pre and post the second SRS was statistically significant ($\chi^2=6.73$; $p<0.01$).

The primary sentence imposed in all communities was 'monetary' penalties (see Table 3). On average, 69% of convictions received a monetary penalty before the 2008 restrictions, compared with 78% of convictions after 2008. Other prosecution outcomes, including 'community-based order' and 'suspended sentence' remained similar pre and post the 2008 SRS, 12% compared with 11%; and, 2% compared with 3% respectively. Fourteen percent of convictions received 'imprisonment' pre 2008 SRS, and this decreased to 6% after the tighter restrictions.

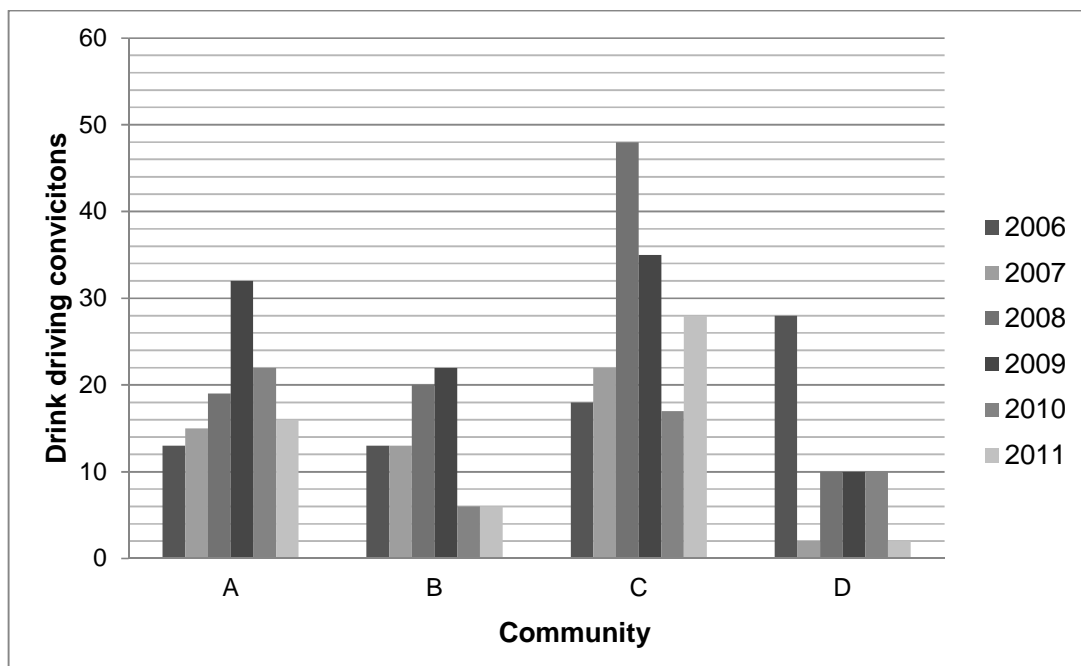


Figure 2. Observed drink driving rates (rounded to the nearest integer) per 1000 Indigenous community members per year

3.2 Overall demographic findings

Demographics for all the convictions included in the analysis are shown in Table 3. Drink driving convictions by male persons accounted for nine in ten convictions (90%). The mean age for men was 36.1 years (range: 18-64 years), with women 4 years younger, at 32.1 years (range: 18-51 years).

We compared the three age brackets (<25 years; 25-39 years and 40+ years) pre and post the 2008 SRS for convictions of male and female persons. There was no statistically significant change in age for men after the introduction of the tighter 2008 alcohol restrictions ($\chi^2=1.61$; $p=0.44$). A similar trend was evident with convictions female persons, with no statistically significant change in age after the introduction of the tighter 2008 alcohol restrictions ($\chi^2=0.83$; $p=0.65$).

| Variable | 2006-2008 | 2009-2011 | 2006-2008 | 2009-2011 | 2006-2008 | 2009-2011 | 2006-2008 | 2009-2011 |
|----------------------------|-------------|-----------|-------------|-----------|------------------|------------------|------------------|------------------|
| | Community A | | Community B | | Community C | | Community D | |
| Gender | | | | | | | | |
| Male | 46 (87%) | 72 (91%) | 24 (96%) | 18 (100%) | 48 (100%) | 29 (69%)* | 23 (100%) | 10 (77%)* |
| Age | | | | | | | | |
| <25 years | 9 (17%) | 7 (9%) | 2 (8%) | 3 (17%) | 8 (16%) | 13 (31%) | 8 (35%) | 2 (17%) |
| 25-39 years | 24 (45%) | 41 (52%) | 14 (56%) | 5 (28%) | 24 (50%) | 13 (31%) | 8 (35%) | 6 (50%) |
| <40 years | 20 (38%) | 31 (39%) | 9 (36%) | 10 (55%) | 16 (34%) | 16 (38%) | 7 (30%) | 4 (33%) |
| BAC | | | | | | | | |
| ≥ 0.15g/100ml | 30 (56%) | 39 (50%) | 16 (64%) | 12 (67%) | 33 (69%) | 19 (45%)* | 19 (82%) | 7 (9%) |
| Sentencing Severity | | | | | | | | |
| Monetary Penalty | 40 (76%) | 66 (84%) | 20 (80%) | 15 (83%) | 31 (65%) | 27 (66%) | 13 (56%) | 11 (85%) |
| Community-Based Order | 7 (14%) | 7 (9%) | 3 (12%) | 3 (17%) | 3 (6%) | 5 (12%) | 6 (26%) | 2 (15%) |
| Suspended Sentence | 0 (0%) | 1 (1%) | 1 (4%) | 0 (0%) | 1 (2%) | 4 (10%) | 2 (9%) | 0 (0%) |
| Imprisonment | 5 (10%) | 5 (6%) | 1 (4%) | 0 (0%) | 13 (27%) | 5(12%) | 2 (9%) | 0 (0%) |

*<0.05

Table 3. Drink driving risk factors, pre versus post 2008 supply reduction strategy, by community

3.3 Drink driving after the 2008 alcohol restrictions by community

Chi-squares were conducted for each variable by community pre and post the 2008 SRS. In relation to changes in BAC following tighter alcohol restrictions, community C ($\chi^2=5.58$; $p<0.01$) was the only study community that had a significant decline in BAC after the second SRS. The other study communities, A, B and D, did not show the same trend, with no statistically significant change in the BAC of drink driving convictions after the 2008 SRS.

There were no significant differences identified in types of outcomes received by community.

A comparison of the demographics of those apprehended for drink driving from the four study communities identified the number of drink driving convictions of women increased significantly compared to men in communities C ($\chi^2=17.36$; $p<0.01$) and D ($\chi^2=5.79$; $p=0.04$). A further examination of women in communities C and D were apprehended and convicted after the 2008 SRS was conducted. Of the 15 women, 6 (40%) women were convicted of a high range BAC conviction.

Further analysis of three age brackets (<25 years; 25-39 years and 40+ years) by community found that there was no statistically significant change in the age of persons after 2008 within any community.

| Community | IRR | p value | 95% CI |
|-----------|------|---------|-------------|
| A | 1.26 | <0.01 | 1.24 - 1.28 |
| B | 0.72 | <0.01 | 0.70 - 0.74 |
| C | 0.49 | <0.01 | 0.48 - 0.50 |
| D | 0.66 | <0.01 | 0.64 - 0.68 |

Table 4. Drink driving convictions before versus after alcohol restrictions, Poisson regression models by community

Using Robust Poisson regression models, we identified statistically significant reductions in the number drink driving convictions in three of the four study communities after the 2008 SRS, specifically communities B, C and D, as presented in Table 4. Community A was the only study community to record an increase in the number of drink driving convictions after alcohol was prohibited in the community (IRR: 1.26; 95% CI: 1.23-1.28, $p < 0.01$).

4. DISCUSSION

These preliminary findings provide a platform to begin contributing quantified information to the existing anecdotal reports regarding drink driving and the impact of alcohol restrictions on driving practices in remote Indigenous communities in Australia, and internationally. The results from this study must be interpreted in light of the limitations. Firstly, the number of drink driving convictions is mainly reflective of the enforcement of drink driving laws and the resources available at the time and may not be a true account of drink driving behaviour in the four study communities. However, the patterns and relationships between enforcement and drink driving behaviour are by no means clear, as it is also possible that in more isolated areas and remote communities, where people are known to each other, enforcement can target known drink drivers or utilise local knowledge in enforcement activities. It is not possible here to say which, if either, of these situations is the most likely or what the size of any effect has been.

Road use and specifically drink driving behaviour is influenced by seasonal changes across Cape York Peninsula, Queensland. All four communities are cut off by road during the wet season which lasts approximately between November-April. However, this may vary for each study community and for each year, thus impacting on residents' opportunity to travel on road to access alcohol outside the community or the ability for 'sly-grog' to enter the communities. The specific BAC reading at time of offence was also not available within the dataset. Thus, further comprehensive analysis of the BAC readings of convictions, particularly pertaining to smaller changes within each BAC range, could not be completed other than those charges under Queensland legislation. Recording specific offence details would improve the analysis of the data and therefore the understanding of alcohol management on drink driving, especially as analysis is already limited to certain datasets because of non-recording of Indigenous status in other databases.

4.1 Study Implications

The findings presented here suggest the tightening of alcohol access for local residents in 2008 may have contributed towards a statistically significant decline in the number of drink driving offences identified in three of the four study communities. These results are generally consistent with previous findings including those of Margolis and colleagues (2011) that support the second SRS in reducing alcohol-related injuries and associated behaviours. Indeed, the reduction in drink driving offences is encouraging for policy makers to achieve the objectives of the alcohol management plans. Specifically, the reduction in the number of high range BAC convictions in one study community supports the notion alcohol restrictions may play a role in reducing the road-related fatality and injury rates that Indigenous Australians in remote areas experience (9), as the BAC of a driver in particular has been consistently shown to correlate with the risk of being involved in, and the severity of, a road accident (29).

Persistent high range BAC readings in the other study communities were evident, while one community had an increase in the number of drink driving offences. Therefore, there is an indication the alcohol restrictions do not have a clear linkage to reduce drink driving behaviour in all communities. In fact, the restrictions may have led to some individuals from these communities to start, or continue to, engage in unsafe driving practices in order to consume alcohol. Although speculative, one interpretation of this result is that there has been a shift in the location where alcohol is being purchased and then consumed by local residents. Since alcohol was prohibited, drinkers may be driving to regional centres to legally buy alcohol. The rapid consumption of alcohol outside the community or in the vehicle upon returning to the community on roads whereby alcohol restriction laws do not apply may then be taking place in order to avoid detection by authorities. As private vehicle

use is typically the only mode of transport for residents in remote communities, drinkers may then return to the community by vehicle while still under the influence of alcohol. This may help to explain the increase in drink driving convictions in Community A, which was one of the closest communities to a licensed venue. Reviews of similar alcohol restrictions in remote Indigenous communities in other Australian jurisdictions support this explanation and have described the unsafe drinking practices observed since the implementation of alcohol prohibition including the creation of drinking camps on the outskirts of communities, binge drinking, sly-grogging and the breakdown of conventions that had existed to promote responsible drinking (16).² Drink driving and the displacement of drinkers to neighbouring regional centres that are a few hours by vehicle whereby alcohol is legally accessible have also been reported as secondary effects of alcohol restrictions (16).

This study found that the characteristics of people being apprehended for drink driving changed after 2008, with what was once primarily an offence committed by men, significantly changed in two study communities to include more drink driving offences by women. A possible explanation may be that heavy drinkers, most likely men, have relocated to regional centres with alcohol access after the tighter restrictions as outlined above. Latest population data suggests that the male population has reduced between 2006 and 2010 in one study community that showed an increase in women being apprehended (27). Furthermore, population figures indicate changes in the proportion of 25-34 year old persons in some study communities (27). But again, this is not consistent for all study communities. This could contribute to the decline in the number of men drink driving and has been mentioned in the discourse of alcohol restrictions in Western Australia and other studies investigating the impact of these Queensland SRS (21). Another explanation is that in some cases women may have consumed the least amount of alcohol compared to others, and therefore deemed the 'safest' to drive or pressured by other drinkers in the group to drive, particularly as the distance to drive to purchase alcohol has increased from driving in the community to now driving hundreds of kilometres. Related types of driving behaviour have been reported, where there was often a 'group mentality' among Indigenous drinkers. This results in a tendency to nominate the least intoxicated person or the person with the least number of prior convictions to drive in order to avoid further fines or imprisonment (30). Nevertheless, the tighter restrictions have created a new cohort of drink drivers.

These early findings provide important information in the context of driving and alcohol management. The continued behaviour of drink driving in remote communities that have alcohol restrictions and the ongoing high range BAC convictions, which has been linked with chronic alcohol misuse (31), suggest concerted attention must now turn to the remaining tiers of the alcohol management plans, particularly demand reduction strategies to address underlying factors of substance misuse that SRS cannot achieve alone. Alcohol use has been described as a communal activity for sub-sections of remote Indigenous communities (32) with kinship value of sharing closely associated. The culture of drink driving in remote communities may be an extension of this. Research conducted among rural Indigenous populations in Canada found drink driving to be a norm held by pockets of Indigenous residents and identified family pressure as one of the reasons for Indigenous youth to engage in dangerous driving practices (33). The authors of this study viewed this pressure as difficult to avoid and leading to physical or verbal consequences if family demands were not adhered to (34). Therefore, changing the broader culture of drink driving in Indigenous communities requires the development of countermeasures and strategies that are community inclusive, and address these cultural and social factors for sustained changes long-term rather than short term policy.

² Sly-grogging is defined as alcohol that purchased from licensed takeaway outlets in towns where alcohol can be obtained legally and then sold illegally at inflated prices in areas that have alcohol prohibition.

The misuse of alcohol has consistently been found to be linked with Indigenous offending and unemployment (35). The association of employment in reducing both substance misuse and criminal behaviour has been recognised by Indigenous leaders, who have been calling for greater employment opportunities (36). This is particularly important for remote areas, where treatment options for alcohol misuse are limited. At present there is a low rate of Indigenous residents in remote areas that hold current driver licences. Supporting residents to apply and maintain a valid driver licence, and gain meaningful employment may assist with reducing these broader issues including alcohol misuse and drink driving behaviour. Additional initiatives to complete drink driving treatment options in association with licence disqualification reductions may also be an option to encourage offenders to avoid dangerous road behaviour.

Finally, it is indicated from these findings that there may have been movement in the local drinkers from the community to a regional centre (i.e. decrease in the number of male drink drivers) and the possibility of local residents driving to regional centres to access alcohol and may have been apprehended and convicted at another court location. A broader exploration of drink driving convictions is required to understand the effect alcohol management has on drink driving behaviour in remote Indigenous communities. It is intended that a review of drink drinking on a broader scale will be conducted, examining the behaviour across all remote Indigenous communities with alcohol management plans and the neighbouring regional centres that may have received an influx of drinkers from these satellite communities.

4.3 Conclusion

This study provides evidence that the tighter 2008 alcohol restrictions have been effective in reducing drink driving convictions and high range BAC readings in some communities. Together, these changes are vital in reducing the high alcohol-related injury rates that Indigenous Australians in remote areas experience. However, the increase in women offending and limited offence changes in other communities support the earlier anecdotal reports that drink driving is a secondary effect of alcohol management and indicates drink driving is a complex issue with a number of social factors that underpin the behaviour. Further attention is required in developing appropriate demand strategies to reduce this dangerous road behaviour in remote Indigenous communities.

5. ACKNOWLEDGEMENTS

The authors wish to thank the Queensland Department of Justice and Attorney-General for the use of their data. Opinions or points of view expressed in this document are those of the authors and do not in any way reflect the official position of, or a position that is endorsed by, the Queensland Department of Justice and Attorney-General.

6. REFERENCES

1. WORLD HEALTH ORGANISATION. Global Status Report on Injury Prevention. Geneva: World Health Organisation. 2013.
2. SCRIBER, R.A., MACKINNON, D.P., DWYER, J.H. Alcohol outlet density and motor vehicle crashes in Los Angeles County Cities. *Journal of Studies on Alcohol*. 55 (4), 447-453. 1994.
3. SCHRIBNER, R., COHEN, D., KAPLAN, S., ALLEN, S.H. Alcohol availability and homicide in New Orleans: Conceptual considerations for small area analysis of the effect of outlet density. *Journal of Studies on Alcohol*, 60(3), 310-316. (1999).
4. GRUENEWALD, P.J., JOHNSON, F.W., TRENO, A.J. Outlets, drinking and driving: A multilevel analysis of availability. *Journal of Studies on Alcohol*. 63 (4), 460-468. 2002.
5. WORLD HEALTH ORGANISATION. Global strategy to reduce the harmful use of alcohol. Geneva: World Health Organisation. 2010.
6. SINGLE, E. The availability theory of alcohol-related problems. In C.D Chaudron and D.A. Wilkinson (Eds.). *Theories on Alcoholism*. Toronto: Addiction Research Foundation. 1998.
7. KUNITZ, S.L., LEVY, J.E. Drinking, conduct disorder and social change: Navajo experiences. New York: Oxford University Press. 2000.
8. DURIE, M. Mauri Ora: The dynamics of Maori health. Auckland: Oxford University Press. 2001.
9. VOS, T., BARKER B., STANLEY, L. The burden of disease and injury in Aboriginal and Torres Strait Islander peoples. Summary report. Brisbane: School of Population Health, University of Queensland. 2007.
10. HEALTH CANADA. Aboriginal Traffic Safety Submit Report. Edmonton: Health Canada. 2003.
11. D'ABBS, P., TOGNI, S. Liquor licensing and community action in regional and more Australia: a review of recent initiatives. *Australian and New Zealand Journal of Public Health*. 24 (1), 45-53. 2000.
12. WOOD, D.S., GRUENEWALD, P.J. Local alcohol prohibition, police presence and serious injury in isolated Alaska native villages. *Addiction*. 101 (3), 393-403. 2006.
13. GRAY, D. Indigenous Australians and liquor licensing restrictions. *Addiction*. 95 (10), 1469-1472. 2000.
14. MAY, P.A., SMITH, M.B. Some Navajo opinions about alcohol abuse and prohibition: A survey and recommendations for policy. *Journal of Studies on Alcohol*. 49 (4), 324-334. 1998.
15. BEAUVAIS, F. American Indians and alcohol. *Alcohol Health Research World*. 22 (4), 253-259. 1998.
16. DEPARTMENT OF FAMILIES, HOUSING, COMMUNITY SERVICES AND INDIGENOUS AFFAIRS. Northern Territory Emergency Response, Evaluation Report. Canberra: Commonwealth of Australia. 2011.
17. HUDSON, S. Alcohol Restrictions in Indigenous Communities and Frontier Towns. New South Wales: The Centre for Independent Studies. 2011.
18. FITZGERALD, T. Cape York Justice Study. Brisbane: Queensland Government. 2001.
19. QUEENSLAND DEPARTMENT OF THE PREMIER AND CABINET. Meeting challenges, making choices: the Queensland Government's response to the Cape York Justice Study. Brisbane: Queensland Government. 2002.
20. QUEENSLAND GOVERNMENT. Meeting Challenges, Making Choices. Evaluation Report. Brisbane: Queensland Government. 2005.
21. MARGOLIS, S.A., YPINAZAR, V.A., MULLER, R. The impact of supply reduction through alcohol management plans on serious injury in remote indigenous

- communities in remote Australia: A ten-year analysis using data from the royal flying doctor service. *Alcohol & Alcoholism*. 43 (1), 104-110. 2008.
22. JENNINGS, S., WHITAKER, R., TURNER, R. Chest trauma in Far North Queensland: alcohol management can make a difference. *Australian and New Zealand Journal of Public Health*. 36 (1), 94-95. 2012.
 23. MARGOLIS, S. A., YPINAZAR, V.A., MULLER, R., CLOUGH, A. Increasing alcohol restrictions and rates of serious injury in four remote Australian Indigenous communities. *Medical journal of Australia*. 194 (10), 503-506. 2011.
 24. SISKIND, V., STEINHARDT, D., SHEEHAN, M., O'CONNOR, T., HANKS, H. Risk factors for fatal crashes in rural Australia. *Accident Anal Prev*. 43 (3), 1082-1088. 2011.
 25. QUEENSLAND TREASURY AND TRADE. Queensland Regional Profile for Cape York Region. Brisbane: Queensland Government. 2012.
 26. QUEENSLAND TREASURY AND TRADE. Queensland Regional Profile for Torres Strait Region. Brisbane: Queensland Government. 2012.
 27. AUSTRALIAN BUREAU OF STATISTICS. (accessed December 2012) <http://www.abs.gov.au/census>
 28. DEPARTMENT OF TRANSPORT AND MAIN ROADS. Annual Report 2010-11. Brisbane: Queensland Government. 2012.
 29. FELL, J, VOAS, R. The effectiveness of reducing illegal blood alcohol concentration (BAC) limits for driving: Evidence for lowering the limit to .05 BAC. *J of Safety Research*. 37 (3), 233-243. 2006.
 30. OFFICE OF ROAD SAFETY. Indigenous Drink Driving and Licensing Strategy: Final Strategy Report. Perth: Office of Road Safety. 2007. [unpublished]
 31. BEIRNESS DJ, MAYHEW, DR, SIMPSON, HM. DWI Repeat Offenders: A Review and Synthesis of the Literature. Canada: Health Canada. 1997.
 32. BRADY, M. Giving away the grog: an ethnography of Aboriginal drinkers who quit without help. *Drug Alcohol Review*. 12, 401-411. 1993.
 33. ROTHE, P., MAKOKIS, P., MOKOKIS, L., STEINHAEUER, S., AGUIAR, W., BRERTTON, G. Drinking and driving in horizon: A holistic description through the lens of a community talking circle. Alberta, Centre for Injury Control and Research: Health Canada. 2005.
 34. ROTHE, P.J. Towards a better understanding of First Nations communities and drinking and driving. *International journal of circumpolar health*. 64 (4), 336-345. 2005.
 35. WEATHERBURN, D., SNOWBALL, L., HUNTER, B. Predictors of Indigenous Arrest: An Exploratory Study. *Australian and New Zealand Journal of Criminology*. 41(2), 307-322.
 36. DEPARTMENT OF COMMUNITIES. Just Futures 2012-2015. Brisbane: Queensland Government. 2011.