

# BMJ Open Global systematic review of Indigenous community-led legal interventions to control alcohol

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## ABSTRACT

**Objectives:** The national and subnational governments of most developed nations have adopted cost-effective regulatory and legislative controls over alcohol supply and consumption with great success. However, there has been a lack of scrutiny of the effectiveness and appropriateness of these laws in shaping the health-related behaviours of Indigenous communities, who disproportionately experience alcohol-related harm. Further, such controls imposed unilaterally without Indigenous consultation have often been discriminatory and harmful in practice.

**Setting, participants and outcome measures:** In this systematic review of quantitative evaluations of Indigenous-led alcohol controls, we aim to investigate how regulatory responses have been developed and implemented by Indigenous communities worldwide, and evaluate their effectiveness in improving health and social outcomes. We included articles from electronic databases MEDLINE, EMBASE, CINAHL, PsycINFO and Web of Science from inception to December 2015.

**Results:** Our search yielded 1489 articles from which 18 met the inclusion criteria. Controls were implemented in rural and remote populations of high-income nations. Communities employed a range of regulatory options including alcohol rationing, prohibition of sale, importation or possession, restrictions on liquor sold, times of sale or mode of sale, Indigenous-controlled liquor licensing, sin tax and traditional forms of control. 11 studies reported interventions that were effective in reducing crime, injury deaths, injury, hospitalisations or lowering per capita consumption. In six studies interventions were found to be ineffective or harmful. The results were inconclusive in one.

**Conclusions:** Indigenous-led policies that are developed or implemented by communities can be effective in improving health and social outcomes.

## INTRODUCTION

Governments in most developed nations have adopted some form of regulatory and legislative control over alcohol supply and consumption through initiatives such as licensing systems, taxation, a minimum age

## Strengths and limitations of this study

- This systematic review is the first to explore the effectiveness of legal responses to alcohol misuse and alcohol-related harm that have been designed and implemented by Indigenous communities.
- Summarising the evidence on effective and ineffective community-led policy models could provide valuable insights into local policy innovation to promote the health of marginalised populations.
- Effective controls could encourage nation-states and subnational governments to facilitate, through a menu of regulatory instruments, powerful and acceptable community-led approaches to Indigenous alcohol policy worldwide.
- This review was limited to published literature and did not include grey literature.

of purchase and penalties for drink drivers. These measures have proven beneficial to the health of populations worldwide, however, Indigenous communities across the world remain disproportionately affected by harmful alcohol use, casting doubt over the effectiveness of these measures in reducing the burden of alcohol-related deaths, chronic disease and disability in Indigenous populations. There have been limited evaluations of the effectiveness of such legal measures and their appropriateness in shaping alcohol-related behaviours in Indigenous communities.

In part, the disproportionate burden of alcohol harm borne by Indigenous communities around the world has resulted from the stressful experiences of discrimination, colonialism, dispossession and economic and social marginalisation of Indigenous peoples in many countries.<sup>1 2</sup> Public health academics hypothesise that legal measures may be ineffective in reducing this burden in Indigenous populations because policy models lack cultural acceptability, due to

inadequate investment in the social determinants of health (eg, education, transport and employment) and that these policies fail to achieve adequate levels of enforcement and accountability in these communities.<sup>3 4</sup> The United Nations (UN) Expert Mechanism on the Rights of Indigenous Peoples has mandated that Indigenous participation in decision-making on the full spectrum of matters that affect their lives forms the fundamental basis for the enjoyment of human rights.<sup>5</sup> Further, the UN has cautioned member states that a failure to ensure these rights can lead to further marginalisation and inequities among Indigenous people.<sup>5</sup> Yet peak Indigenous health bodies such as Australia's National Aboriginal Community Controlled Health Organisation attribute the ongoing crisis in Indigenous health to a lack of cohesive public policy and the lack of power that Indigenous people have had in influencing public policy decisions that affect their social and emotional and well-being.<sup>6</sup> In Australia, public health academics have argued that compulsory alcohol restrictions which have been imposed on Indigenous communities by unilateral state action (in some areas for decades), have constituted "an affront to Indigenous self-determination" and that without community support, these interventions are "an overly simplistic solution to a complex problem" and risk the revival of a protectionist past.<sup>7</sup> In the USA, following a move to nullify local alcohol laws established by Alaska Native tribal councils by the Federal Government, alcohol abuse and alcohol-related mortality escalated for the next two decades until this centralised approach was reversed.<sup>8</sup>

Local Indigenous knowledge and systems of governance, which could provide insights into policy innovation and a sustainable shift in social norms, remain neglected areas of public health research to date. There is potential for community-led legal initiatives to be used as preventative health tools for communities affected by the harmful use of alcohol and disproportionately affected by chronic conditions and their risk factors. While community leadership is the ideal, it is not always clear how this concept is applied, in particular how community involvement in the design and enforcement of these programmes interacts with formal government regulatory input. Such community input could involve the engagement of local leaders in developing local solutions through innovative initiatives that use tools such as community partnerships, local taxes, restrictions or incentives. Lessons regarding the use and effectiveness of such measures have not been synthesised previously in the published literature. In light of emerging interest in building countries' legal infrastructure to promote health, this study aimed to investigate how Indigenous communities use public health law mechanisms to control alcohol and prevent its misuse and to what extent controls are effective in achieving improvements in health and social outcomes.<sup>9</sup>

## METHODS

A systematic review of published literature was undertaken. Databases MEDLINE, EMBASE, CINAHL, PsycINFO and Web of Science, were searched from inception to 18 December 2015 to identify published quantitative evaluations of Indigenous-led alcohol controls. The WHO definition was followed in identifying Indigenous populations.<sup>10</sup> Globally, there is a lack of consensus regarding the terminology used to describe Indigenous populations. In this review, we have mirrored the study authors' use of Indigenous terminology.

### Inclusion criteria

Studies had to meet four criteria for inclusion in this review. First, studies had to examine an Indigenous population. The search strategy (see online supplementary file 1) for this component was adapted from previously published systematic reviews.<sup>11 12</sup> Second, studies had to examine legal interventions (including traditional forms of law) that were community-led. The authors defined community-led in terms of development and/or implementation (either in terms of development and/or implementation). In order to be included on the basis of development, communities needed to have developed (in isolation or in collaboration with other stakeholders such as governments) the nature and scope of the alcohol control. To be included on the basis of implementation, it was necessary that alcohol controls were implemented or governed by the community or community representatives. Studies were included if controls were government-facilitated with supporting regulatory controls. The authors acknowledge that regulatory responses to control alcohol often require the resources and regulatory power of governments and their agencies. Therefore, it is open to conjecture whether these controls can be genuinely community led. Third, studies had to examine interventions designed to reduce the harms of alcohol consumption. Finally, studies had to quantitatively evaluate the effectiveness of legal interventions to control alcohol in improving one or more health or social outcomes. Qualitative articles, as they lacked a quantitative measure of effectiveness, were excluded from this review. Studies were not excluded on the basis of language, the methods of the quantitative studies or their outcome measures.

### Data extraction

Study review and selection were independently undertaken by two authors (JM and BA). Abstracts, titles and keywords of the studies returned from the search were screened for compatibility with the inclusion criteria. Once studies were identified for potential inclusion, full texts were reviewed. Reference lists of included papers were independently reviewed by two authors (JM and BA) for studies that may warrant inclusion. Data were extracted from the studies using a form developed for the review in consultation with the authorship team.

Data extracted included country of origin, Indigenous population and size, category of alcohol control, legal instruments employed, communities' use of research evidence or population data to inform the control, data collected and time horizon of the evaluation (table 1). Any disagreements throughout this process were resolved by arbitration with reviewers MLH and SJ.

## RESULTS

The review found 18 studies spanning 1975 to 2014.

### Populations studied

All studies came from high-income nations, the USA (n=10), Australia (n=6), Canada (n=1) and Greenland (n=1; see table 2). Except for the Greenlandic study which was nationwide, populations studied were rural or remote communities.

### Study designs

All study designs were of before and after, cross-sectional or time-series analyses using primarily secondary data (table 2). Two of the included Australian studies are linked before and after studies evaluating the impact of alcohol controls in four communities following the introduction of two state government-facilitated supply-reduction strategies, one in 2002–2003 and the other in 2008.<sup>13 14</sup>

Eight studies evaluated health or social outcomes before and after alcohol controls were introduced.<sup>13–20</sup> Two of those studies also evaluated health or social outcomes after the controls were repealed in their study populations.<sup>19 20</sup>

Six studies used one or more other populations as a control group to compare 'wet' villages (those without a restrictive alcohol law) with 'damp' villages (those with some restrictions in place but where alcohol could still be bought in specific containers, quantities and venues) or 'dry' villages (those with laws prohibiting the availability of alcohol).<sup>8 17 21–24</sup>

Two studies from the US compared health outcomes between one or more communities with different forms of governance of alcohol control.<sup>25 26</sup> One compared traditional forms of control with communities that had implemented local option laws (government-facilitated opt-in alcohol controls that could be voted in by residents via local referendum).<sup>25</sup> The other compared

outcomes between communities that had alcohol prohibited under federal law, state law and local option laws.<sup>26</sup> One study compared Native and non-Native American populations.<sup>27</sup>

One study evaluated a package of Indigenous-led interventions implemented at different points in time and used a time-series analysis to evaluate health and social outcomes.<sup>28</sup> Three studies employed a comparison of Indigenous communities and state or national averages across health and social outcomes.<sup>17 28 29</sup> In their use of comparators, some studies fell into more than one of the categories discussed above.

### Time horizon of evaluation

The length of follow-up investigations ranged between 1 and 27 years (table 2).

### Categories of alcohol control

A range of regulatory options were designed and implemented by local communities (table 2). The majority of controls involved prohibition of the sale, importation or possession, restrictions on liquor sold, times of sale or mode of sale, Indigenous-controlled liquor licensing and enhanced law enforcement. Other forms of regulatory control included a local excise tax, alcohol rationing and traditional forms of control. Under Greenland's alcohol rationing system, each individual was entitled to a sheet of 72 points of rationing coupons per month. Alcohol was priced according to strength or size of alcohol purchase (eg, one point for one beer and 24 points for three-quarters of a litre of hard liquor).<sup>20</sup> Traditional forms of control were observed in Alaskan communities where the 'Yupi't Nation' sovereignty movement (in opposition to government-facilitated local option laws) had gained popularity. Interventions involved a range of group-oriented responses including ignoring antisocial behaviour, presenting the transgression in a dramatised dance form in the men's house (kashgi), community leaders resolving the dispute through consultation, banishment from the village and finally, killing the offender.<sup>25</sup>

### Indigenous representation in decision-making

Indigenous-led controls reviewed fell into four categories. First, controls that were conceived and implemented by the community included the traditional forms of control discussed previously.<sup>25</sup> Second, government-

**Table 1** Data extracted from evaluations meeting inclusion criteria

Population	Characteristics of evaluation	Mechanism of alcohol control	Effectiveness of control
Indigenous population	Study design	Type of alcohol control mechanism	Outcomes reported
Country of origin	Time horizon of evaluation	Legal instruments employed	Effectiveness of control in achieving prevention
Setting (urban or remote)	Use of control population	Use of research evidence and population data to inform scope and nature of control	outcomes
Size of study population	Study limitations		
	Generalisability of findings		
	Policy implications		

**Table 2** Quantitative evaluations of alcohol controls meeting inclusion criteria

Author (year)	Country of origin (Indigenous population)	Population size	Category of alcohol control	Legal instruments	Health and social outcomes reported	Data collected	Time Horizon of evaluation
May (1975) <sup>19</sup>	United States (Native American)	12 000 (Native American)	Prohibition of sale, importation or possession	Tribally imposed prohibition laws	Arrests	Tribal Police data	3 years (June–July 1969, June–July 1970, June–July 1971)
Schechter (1986) <sup>20</sup>	Greenland (Greenlandic Inuit)	50 000 (80% Indigenous)	Alcohol rationing	Rationing ordinance passed by the Greenland Council following public plebiscite	Alcohol sales; crime	Alcohol sales or consumption data	6 years (1978–1984)
Gallaher <i>et al</i> (1992) <sup>27</sup>	USA (Native American)	123 000 (all residents of New Mexico)	Prohibition of sale, importation or possession	Tribally imposed prohibition laws	Unintentional injury	Cause-specific mortality data; Hospital records or medical examiner reports; Traffic accident report files (containing location of Indigenous pedestrian deaths)	10 years (January 1 1980 to December 31 1989)
Lee (1993) <sup>25</sup>	USA (Alaska Native)	8 Indigenous villages (of 57 in the region)	Restrictions on liquor sold, times of sale or mode of sale; traditional forms of control	Local option law	Crime; Intentional injury (self-harm, attempted suicide or suicide)	Crime data for serious or minor offences	5 years (1983–1987)
Chiu <i>et al</i> (1997) <sup>16</sup>	USA (Alaska Native)	4000 (61% Indigenous)	Prohibition of sale, importation or possession	Local option law	Social or health service usage	Alcohol-related outpatient visit records	33 months (November 1993 through July 1996)
Landen <i>et al</i> (1997) <sup>24</sup>	USA (Alaska Native)	<i>Dry</i> villages: 63 419 person-years (93% Indigenous) <i>Wet</i> villages: 38 867 person-years (55% Indigenous)*†	Prohibition of sale, importation or possession	Local option law	Unintentional injury	Cause-specific mortality data	3 years (1990–1993)
Landen (1997) <sup>23</sup>	USA (American Indian)	<i>Wet</i> reservations: (1) <5000; (2) 5000–10 000; (3) <5000 (4) 5000–10 000 (5) 5000–10 000 <i>Dry</i> reservations: (6/7) 10 000–15 000 (8) 5000–10 000	Prohibition of sale, importation or possession	Tribally imposed prohibition laws	Alcohol-related mortality	American Indian mortality data by county	11 years (1979–1990)

Continued

Table 2 Continued

Author (year)	Country of origin (Indigenous population)	Population size	Category of alcohol control	Legal instruments	Health and social outcomes reported	Data collected	Time Horizon of evaluation
Douglas (1998) <sup>17</sup>	Australia (Aboriginal and or Torres Strait Islander—primarily Kija and Djaru language groups)	~1200 with 3000 from surrounding towns (63% Indigenous)	Restrictions on liquor sold, times of sale or mode of sale	Regulation instituted by state or territory liquor licensing authorities	Crime; Social or health service usage	Alcohol sales or consumption data	3 years (1991–1994)
d'Abbs (1998) <sup>29</sup>	Australia (Aboriginal and Torres Strait Islander)	7 Indigenous communities (of total of 8 with licensed clubs)	Indigenous-controlled liquor licensing	Not stated	Alcohol consumption	Alcohol sales or consumption data	1 year (1994–1995)
Berman <i>et al</i> (2000) <sup>22</sup>	USA (Alaska Native)	29 000 (26 000 in control group)	Indigenous-controlled liquor licensing; Prohibition of sale, importation or possession	Local option law	Injury	Legal determinations classifying injury deaths (data not available to determine whether alcohol-related)	13 years (1980–1993)
Gray <i>et al</i> (2000) <sup>15</sup>	Australia (Aboriginal and Torres Strait Islander)	~2700 (all residents of Tennant Creek)	Restrictions on liquor sold, times of sale or mode of sale	Regulation instituted by state or territory liquor licensing authorities	Alcohol consumption; hospital admissions; admissions to local women's refuge and sober up shelter; crime;	Alcohol sales data, health and social service admissions data; local police data	4 years (1994–1998)
Ellis (2003) <sup>28</sup>	USA (American Indian)	McKinley County: 43 000 Indigenous Fremont: 7000 Indigenous	Restrictions on liquor sold, times of sale or mode of sale; local excise tax; enhanced law enforcement	Local option law	Crime; Mortality (motor vehicle accident mortality, homicide, suicide and alcohol-induced causes); Motor vehicle accidents	Alcohol sales or consumption data; adolescent substance use data; Hospital records or medical examiner reports; Traffic accident report files; crime data for serious or minor offences	21 years (1974–1995) for annual mortality rates for selected substance abuse-related causes; 1 year (1989–96) for traffic crash rates.
Wood and Gruenewald (2006) <sup>8</sup>	USA (Alaska Native)	<i>Dry</i> villages: 165 191 person-years (108 906 with and 56 285 without local police presence) <i>Wet</i> villages: 67 906 person-years (45 655 person-years with and 22 251 person-years without local police presence)*†	Prohibition of sale, importation or possession	Local option law	Motor vehicle accidents; Intentional injury (self-harm, attempted suicide or suicide); Intentional injury (self-harm, attempted suicide or suicide)	Serious injury data obtained from state trauma registries; data pertaining to police presence (number of months that a village had a police service used as an indicator of police presence)	10 years (1991–2000)

Continued

Table 2 Continued

Author (year)	Country of origin (Indigenous population)	Population size	Category of alcohol control	Legal instruments	Health and social outcomes reported	Data collected	Time Horizon of evaluation
Hogan <i>et al</i> (2006) <sup>18</sup>	Australia (Aboriginal and Torres Strait Islander)	Not stated	Restrictions on liquor sold, times of sale or mode of sale	Regulations instituted by state or territory liquor licensing authorities	Alcohol sales; crime; Social or health service usage	Alcohol sales or consumption data; Hospital records or medical examiner reports; Admissions to local Sobering Up shelter; Crime data for serious or minor offences	1 year (April 2002—June 2003)
Margolis <i>et al</i> (2008) <sup>13</sup>	Australia (Aboriginal and Torres Strait Islander)	4 Indigenous communities	Restrictions on liquor sold, times of sale or mode of sale	Alcohol Management Plan (AMP)	Injury; Social or health service usage	Royal Flying Doctor Service trauma retrieval data	8 years pre and 2 years post-AMP (1 January 1995–24 November 2005)
Wood (2011) <sup>21</sup>	Canada (First Nation)	23 Indigenous communities	Prohibition of sale, importation or possession	Local option law		Crime data for serious or minor offences	21 years (1986—2006)
Margolis <i>et al</i> (2011) <sup>14</sup>	Australia (Aboriginal and Torres Strait Islander)	Community A 1129 (1059, 94% Indigenous), community B 1101 (1028, 93% Indigenous), community C 599 (541, 90% Indigenous), community D 644 (580, 90% Indigenous).	Prohibition of sale, importation or possession; Restrictions on liquor sold, times of sale or mode of sale	Alcohol Management Plan (AMP)	Injury; Social or health service usage	Royal Flying Doctor Service trauma retrieval data	14.5 years (1 January 1996—31 July 2010)
Berman (2014) <sup>26</sup>	USA (Alaska Native)	178 Indigenous communities	Prohibition of sale, importation or possession	Local option law	Intentional injury (self-harm, attempted suicide or suicide)	Cause-specific mortality data	27 years (1980-2007)

\*Person-years: Some studies used person-years to quantify the populations of wet and dry villages where communities changed alcohol status one or more times during the period of the study. For example, in Landen's study, multiple *wet* and *dry* villages changed alcohol status. Thus, each month a village was dry, its population contributed one-twelfth of a person-year to the dry total. A similar method was used for wet villages.

†.

facilitated community-led controls included prohibition and restriction controls that were facilitated by local option laws that allowed communities to vote on their desired form of alcohol control (eg, that alcohol could be bought and sold, imported, sold and imported or that possession was to be prohibited) through legally held referendums.<sup>22</sup> A third model involved 'community coalitions' backed by government intervention. In an Australian study in the Kimberley region, this involved the Alcohol Action Advisory Committee consisting of police, health, Aboriginal Legal Services and faith-based organisations as well as individual members of the community who together lobbied the state Director of Liquor Licensing to impose alcohol restrictions.<sup>17</sup> A fourth model of governance involved government initiated community partnerships such as Queensland Australia's Meeting Challenges, Making Choices Committee. The Committee involved community justice groups and Indigenous Elders tasked with developing alcohol management plans for their communities in partnership with government agencies.<sup>13 14</sup>

### Use of evidence in informing controls

The extent to which research evidence or population data was used by communities to inform the development and implementation of controls is unclear as most studies (n=17) did not report this. One study reported that research evidence pertaining to the severity of local burden and conditions was available to tribal leaders and the public.<sup>28</sup> In that study, research evidence and population health data, in combination with the local knowledge of tribal leaders, helped to inform decision makers about the various dimensions of the substance abuse problem, provide indicators for the ongoing monitoring of progress and safeguard against unintended impacts on vulnerable sectors of the community through the development of programmes (eg, an alcohol crisis centre, alcohol server training and *KICK-IT*, an adolescent programme targeting at-risk youth).

### Enforcement of alcohol controls

One study investigated the impact of the brief legalisation of alcohol in a large American Indian tribe on the Great Plains where the possession and use of alcohol had never been legal. That study estimated that arrests for intoxication declined immediately after legalisation.<sup>19</sup> The findings suggested that the enforcement of prohibition controls did not necessarily reduce incidences of harmful alcohol use. For example, authors hypothesised that drinkers were less likely to rapidly consume alcohol in attempts to circumvent prohibition controls when alcohol was legal. Another study from the US, reported that despite prohibition on the sale and importation of alcohol, 117 convictions for bootlegging were enforced by the Alaska Alcoholic Beverage Control Board over the 3-year evaluation.<sup>24</sup>

Sixteen studies did not report quantitative data regarding the legal enforcement of the alcohol controls.

However, the authors noted several challenges, many specific to particular categories of control.

### Alcohol rationing

With regards to alcohol rationing, alcohol coupons were legally non-transferable but the proper legal use of the coupons was seldom enforced. Identification was not requested and the point sheets were not printed with a marker of personal identification.<sup>20</sup>

### Prohibition and restriction controls

With regards to the prohibition category, 'dry' communities that bordered 'wet' communities often found a persisting problem in the movement of heavy drinkers in 'dry' communities to other towns where alcohol was legally available.<sup>19 27</sup> In New Mexico, this resulted in limited options for intoxicated persons to travel home safely and deaths due to hypothermia or pedestrian accidents resulting from travelling the large distances between towns.<sup>27</sup>

In studies that evaluated interventions in the prohibition or restriction categories, providing adequate police services in rural areas was problematic.<sup>8</sup> Challenges included difficulties imposed by extreme weather and an absence of roads connecting communities to major towns. In one study, this precluded the deployment of trained state-certified police officers to the most isolated Alaska Native villages. Only a few communities had their own local departments that employed fully certified police officers. Other villages were served by non-certified para-professional Village Public Safety Officers. However, many villages went months without the presence of an officer due to extremely high rates of attrition of officers. Some villages had no local police presence and were instead served by state troopers on an as-needed basis by air or river.<sup>8</sup>

The presence of illegal smuggling of alcohol into communities, and then unlicensed sales to drinkers presented a challenge to enforcement for other communities. In one study, authors cited anecdotal reports and unpublished consultation data pointing to rising rates of sly grogging in some communities in Cape York, Queensland.<sup>14</sup> However, one study reported that stronger enforcement measures had brought about increased efficiency. Code enforcement had become increasingly diligent and in combination with the enforcement of other liquor laws, had the effect of reducing the frequency of inappropriate alcohol sales. The measures also led to increased community cohesion and engagement with alcohol sellers. When hours for drive-up alcohol sales were restricted, some alcohol sellers voluntarily closed their drive-up windows.<sup>28</sup>

### Traditional forms of control

With regard to traditional forms of control, a significant issue was that the village social structure did not support a village member assuming a formal, external, authoritarian role. Having to interfere with personal

relationships or arrest one's friends and relatives was not compatible with village life.<sup>25</sup>

### Effectiveness of interventions

In 11 of the 18 studies reviewed, the Indigenous-led alcohol controls employed were effective in achieving improvements in one or more health outcomes (eg, reductions in disease, injury or crime) (table 3).<sup>8 13–17 20–22 24 28</sup> Interventions were classified as effective if the controls were associated with improvements within the same population or in comparison with other populations, except where authors deemed the results inconclusive due to methodological or reporting biases.

Seven of these studies involved the evaluation of one category of alcohol control.<sup>8 13 16 17 20 21 24</sup> The remaining four studies involved evaluations of multiple categories of alcohol control.<sup>14 15 22 28</sup> Prohibition of alcohol possession, sale or importation was the most frequently implemented form of alcohol control among those that were effective (n=6).<sup>8 14 16 21 22 24</sup>

Five studies reported less crime in the communities studied (either in comparison to before the controls were implemented, or in comparison to other populations without similar controls).<sup>8 17 20 21 28</sup> Three studies reported fewer injury deaths.<sup>22 24 28</sup> Four studies reported fewer injuries in the communities studied.<sup>8 13 14 17</sup> One reported that annual per capita consumption of pure alcohol declined, as well as hospital admissions for acute alcohol-related conditions.<sup>15</sup>

Some alcohol controls were effective in achieving only some of the health outcome measures included in the evaluations.<sup>17 22</sup> In a US study of communities that went 'dry', by prohibiting the sale, importation and possession of alcohol, they achieved reductions in homicides but there was no effect on rates of suicide. Communities that became 'damp' achieved reductions in suicides, but there was no effect on homicides.<sup>22</sup> In an Australian study, a package of interventions implemented in a single community including reduced trading hours for take-away outlets and restrictions on the type of alcohol sold at specific times of the day, achieved reductions in criminal charges imposed by the Halls Creek Police Station. Reductions were also achieved in aeromedical retrieval evacuations resulting from serious injury requiring hospital treatment and as such, could not be managed within the study communities. However, despite fluctuations in the data for domestic violence presentations to Halls Creek District Hospital, there was no discernible or statistically significant evidence of an increasing or decreasing trend in hospitalisations over a 2-year evaluation period.<sup>17</sup> Controls also had unintended consequences. In Tennant Creek in Australia, despite overall reductions in per capita consumption, restrictions were circumvented with a shift to fortified wine purchases which remained accessible when sold in containers less than or equal to 1125 mL. In addition,

unlawful entries to dwellings significantly increased following the imposition of alcohol restrictions.<sup>15</sup>

In six studies, alcohol controls were ineffective (table 3).<sup>18 19 23 26 27 29</sup> In one study in New Mexico, US, there had been an increase in hypothermia and pedestrian deaths in response to restrictions that deemed alcohol possession and sale to be illegal.<sup>27</sup> In another US study involving 178 Alaska Native communities, the prohibition on importation was shown to be ineffective in preventing suicide, the primary outcome of the study. This finding raised questions about whether alcohol was the causal factor in risk of suicide or a comorbid response to depression or other mental health problems.<sup>26</sup> One US study found no significant differences in alcohol-related mortality between reservations where alcohol possession and use was prohibited and those where it was legal.<sup>23</sup> In another US study, the short-lived (2-month) legalisation of alcohol possession and consumption saw a decline in arrests for driving while intoxicated.<sup>19</sup> Arrests significantly increased following a return to prohibition.<sup>19</sup>

In the Northern Territory in Australia, Aboriginal-controlled licensed clubs failed to lower persistently high consumption levels. Aboriginal-controlled licensed clubs, a term often used interchangeably with Aboriginal Social Clubs and wet canteens are specific community venues that encourage responsible drinking patterns (eg, through day caps, restrictions on hours of sale or bans on problem-drinkers) and reinforce community standards. In communities with these clubs, per capita consumption remained 183% higher than the territory average in males and 76% higher in females.<sup>29</sup> Another Australian study within the same territory found that implementation of a suite of measures including restrictions on time of sale in take-away outlets, the removal of liquor in containers >2 L and the provision of only light beer in bars before noon was not associated with a significant reduction in quarterly wholesale sales of pure alcohol over the 12-month trial period. Rather, drinkers shifted from one product to another product of equal price and purchased the same amount of pure alcohol. There was a shift in consumption from cask wine to 2 L cask port which was priced at 28 cents (AUD) per 10 mL, the same price as alcohol in the 4 and 5 L casks that became unavailable under the trial restrictions.<sup>18</sup>

In a study of Alaska Natives, the results were inconclusive.<sup>25</sup> The data showed that villages that had maintained traditional forms of social control had less crime (including felonies and misdemeanours, with the exception of liquor violations as well as drunk in public and protective custody incidents). However, the authors reasoned that this may be linked to reporting mechanisms—the abolition of VPSO positions, avoiding contact with state troopers, relying on traditional mechanisms with no formal records of crime or choosing to ignore certain behaviours. Another possibility that was highlighted is that such communities are more culturally cohesive as they have retained traditional (Yup'ik) values

**Table 3** Effect of legal interventions to control alcohol on health and social outcomes

Author (year)	Main results
May (1975) <sup>19</sup>	<ul style="list-style-type: none"> <li>▶ Arrests declined for the 2-month period of alcohol legalisation by 30% (182 in June-July of 1969 to 126 in June-July of 1970).</li> <li>▶ Following the repeal, arrests rose by over 30% to 189 in June-July of 1971.</li> <li>▶ Data pertaining to individual arrests was unavailable. However, at an aggregate level in 1969 and 1970, 88.7% of Native American arrests within and bordering the reservations were for alcohol intoxication and driving while intoxicated.</li> </ul>
Schechter (1986) <sup>20</sup>	<ul style="list-style-type: none"> <li>▶ Overall importation and consumption declined significantly.</li> <li>▶ Number of drinks imported fell from 47 million in 1978 to 35.2 million in 1979, 30.5 million in 1980 and 36 million in 1981.</li> <li>▶ Litres of pure alcohol consumed dropped from 513 627 in 1978 to 406 856 in 1979, 346 384 in 1980 and 436 066 in 1981.</li> <li>▶ National crime rate dropped markedly particularly violent crimes (murder, attempted murder and assault).</li> <li>▶ After the repeal of alcohol rationing, consumption and importation rose by 60% and incidences of crime increased significantly.</li> </ul>
Gallaher <i>et al</i> (1992) <sup>27</sup>	<ul style="list-style-type: none"> <li>▶ Over 50% excess mortality from all unintentional injuries among Native Americans resulted from hypothermia and pedestrian-motor vehicle crashes.</li> <li>▶ New Mexico Native Americans nearly eight times more likely to die of hypothermia compared with other New Mexico residents.</li> <li>▶ At death, 90% of those Native Americans tested were highly intoxicated (median blood alcohol concentrations of 0.24 and 0.18 mg/dL for pedestrian and hypothermia deaths, respectively).</li> <li>▶ Most deaths occurred at off-reservation sites in border towns and on roads leading back to the reservation.</li> </ul>
Lee (1993) <sup>25</sup>	<ul style="list-style-type: none"> <li>▶ Of 9882 reported incidents of crime overall, Nation villages (employing traditional forms of control) reported 34.5% of the total, non-Nation villages (employing local option controls) reported 65.5% of the total.</li> <li>▶ Rates for felonies and misdemeanors were lower in Nation villages, with the exception of liquor violations and drunk in public and protective custody incidents.</li> <li>▶ In non-Nation villages, incidence of strongarm rape were 6.9 times higher, non-aggravated assault were 3.8 times higher, burglary 2.9 times higher and sexual assault 5 times higher.</li> <li>▶ Nation villages reported more protective custody and drunk-in-public incidents than non-Nation villages, yet serious reported crime were lower.</li> </ul>
Chiu <i>et al</i> (1997) <sup>16</sup>	<ul style="list-style-type: none"> <li>▶ Substantial decrease in the number of alcohol-related outpatient visits when the ban on possession and importation was imposed compared with baseline.</li> <li>▶ When the ban was lifted, outpatient visits increased; when the ban was reimposed, the number of outpatient visits again decreased.</li> <li>▶ Interrupted time-series analysis confirmed that the alcohol ban, its lifting and its reimposition had a statistically significant and negative effect on the number of alcohol-related outpatient visits (<math>p &lt; 0.05</math>).</li> <li>▶ A significantly higher number of visits were made during the two non-ban periods (November 1993-October 1994) and November 1995-February 1996) compared with the two ban periods (<math>p &lt; 0.05</math>).</li> </ul>
Landen <i>et al</i> (1997) <sup>24</sup>	<ul style="list-style-type: none"> <li>▶ Of 302 injury deaths, blood alcohol concentrations (BACs) were available for 200 deaths (66.2%). Of these, 130 (65.0%) had a BAC greater than or equal to 17 mmol/L (greater than or equal to 80 mg/dL) and were therefore considered alcohol-related.</li> <li>▶ Total injury mortality rate was greater among Alaska Natives from wet villages (rate ratio (RR), 1.6; 95% CI 1.3 to 1.2). This difference was not present for non-natives (RR, 1.1; 95% CI 0.3 to 3.8).</li> <li>▶ For Alaska Natives, the alcohol-related injury mortality was greater among residents of wet villages (RR, 2.7; 95% CI 1.9 to 3.8) than among residents of dry villages. The strength of this association was greatest for deaths due to motor vehicle injury, homicide and hypothermia.</li> </ul>
Landen (1997) <sup>23</sup>	<ul style="list-style-type: none"> <li>▶ No significant differences across reservations with prohibition controls and those where alcohol was legal. The average age-adjusted mortality rate found that the mortality rate was higher (<math>n=158</math>) than prohibition (<math>n=138</math>) reservations.</li> </ul>
Douglas (1998) <sup>17</sup>	<ul style="list-style-type: none"> <li>▶ Decrease in alcohol consumption observed for each of the 2 years following the intervention.</li> <li>▶ Overall, incidence of crime declined.</li> <li>▶ Alcohol-related presentations to the hospital and presentations resulting from domestic violence decreased relative to the equivalent quarterly period prior to the intervention. Short-term fluctuations were observed, particularly with domestic violence, where presentations (of lesser severity) became more request during several quarters.</li> <li>▶ Emergency evacuations as a result of injury showed a marked decrease.</li> </ul>

Continued

Table 3 Continued

Author (year)	Main results
D'Abbs (1998) <sup>29</sup>	<ul style="list-style-type: none"> <li>▶ Mean consumption levels in standard drink terms, the corresponding equivalents were 5.8 standard drinks per day for female drinkers and 9.3 for male drinkers.</li> <li>▶ Among both male and female drinkers, the overall mean consumption levels were ~50% above the level designated as harmful.</li> <li>▶ In one community, mean consumption lay in the responsible range and the other in the hazardous range. In all others, male and females were above the harmful level.</li> <li>▶ Total beer sales in the seven clubs (1994-1995) amounted to 882 259 L. Assuming a retail price of \$3.50 per 375 mL can of full-strength beer and \$3.00 per can of light beer, the total retail turnover would amount to ~\$8.1 million.</li> </ul>
Berman <i>et al</i> (2000) <sup>22</sup>	<ul style="list-style-type: none"> <li>▶ Injury deaths generally lower during periods when alcohol sales, importation or possession were restricted than when no restrictions were in place (wet).</li> <li>▶ More restrictive controls (dry) significantly reduced homicides but had no effect on suicide rates; less restrictive control options (damp) reduced suicides but had no effect on homicide rates.</li> <li>▶ Accident and homicide death rates fell, on average, by 74 and 66 per 100 000, respectively, for the 89 communities that banned sale and importation or possession. Sixty-one small communities that did not change control status under the law showed no significant changes over time in accident or homicide death rates.</li> <li>▶ The decline in overall injury death rates was much greater in communities with less restrictive options (127 compared to 48 per 100 000). However, death rates were higher in these communities while they were wet, with the discrepancy statistically significant for suicides.</li> </ul>
Gray <i>et al</i> (2000) <sup>15</sup>	<ul style="list-style-type: none"> <li>▶ Annual per capita consumption declined by 19.4% in the 2 years following the introduction of alcohol restrictions.</li> <li>▶ Hospital admissions for acute alcohol-related conditions declined.</li> <li>▶ Restrictions were circumvented by a shift to fortified wine purchases. Fortified wine purchases increased by 570% (573 L) offsetting 14% of the mean quarterly decline of 4173 L of cask wine immediately following the restrictions.</li> <li>▶ Purchases at Aboriginal-controlled licensed clubs (also not covered by the restrictions) increased by 55.7% from 2801 L to 1799 L of pure alcohol and offsetting 20% of the mean quarterly decline of 3002 L.</li> </ul>
Ellis (2003) <sup>28</sup>	<ul style="list-style-type: none"> <li>▶ Following the introduction of restrictions on liquor sold, times of sale or mode of sale, a local excise tax and enhanced law enforcement measures, from 1974 to 1995, McKinley County's (MC) motor vehicle accident mortality rate declined by 60% and was matched by similar declines in mortality from homicide (58%), suicide (59%), alcohol-induced causes (30%) and drug-induced causes (50%).</li> <li>▶ From 1989 to 1995, alcohol-related arrests declined 42% in Gallup, and protective custody detentions were cut in half. Between 1982 and 1995, traffic crashes had declined 32% in MC. All declines experienced in MC exceeded similar trends for New Mexico and the nation.</li> </ul>
Wood (2006) <sup>8</sup>	<ul style="list-style-type: none"> <li>▶ Villages prohibiting alcohol had lower age-adjusted rates of serious injury resulting from assault, motor vehicle collisions. Dry villages with a local police presence had a lower age-adjusted rate of serious injury caused by assault.</li> <li>▶ Local prohibition was associated with lower rates of assault injuries.</li> <li>▶ Local police presence was associated with lower rates of assault injuries. Contrary to expectations, there was no difference in the age-adjusted rate of injury attributed to self-harm for wet vs dry isolated Alaska Native villages. Rates of serious injury caused by assault were 36% higher in villages during periods of police absence than when police were present.</li> </ul>
Hogan <i>et al</i> (2006) <sup>18</sup>	<ul style="list-style-type: none"> <li>▶ Over 12 months the reduction in trading hours was accompanied by decreased levels of alcohol-related harm. However, the regulation of container size was undermined by a shift to cheap cask port with sales of this product increasing by 1000%.</li> <li>▶ A one-third reduction was observed in instances of drunkenness and breaches of the 2 km law, as were Protective Custodies.</li> <li>▶ Ambulance services received 25% less alcohol-related call-outs and selected presentation to the emergency department of Alice Springs were reduced by 19%.</li> <li>▶ Alcohol-related assaults were 13% lower. There was a nearly 20% increase in alcohol-related offences, especially criminal damage and disturbances and indications of more acute conditions being admitted to Alice Springs Hospital. However, the author's reanalysis of these findings found that the evaluators did not provide sufficient data to ascertain whether these were significant reductions of chance phenomena.</li> </ul>
Margolis <i>et al</i> (2008) <sup>13</sup>	<ul style="list-style-type: none"> <li>▶ Overall reduction (2 years vs 2 years before the AMP was implemented) was on average 51.9% (Community (A) 44.8% (B) 54.6% (C) 66% (D) 42.2%).</li> </ul>

Continued

Table 3 Continued

Author (year)	Main results
Wood (2011) <sup>21</sup>	<ul style="list-style-type: none"> <li>▶ Retrieval rates for all other causes did not reveal any statistically significant change. Serious injury resulted in 798 retrievals during the observation period. There was a significant (<math>p=0.021</math>) decrease in injury after the introduction of AMP.</li> <li>▶ Wet communities in Nunavut recorded rates of violent crime that were higher than dry communities.</li> <li>▶ Relative to dry communities, wet communities' overall sexual assault rate was 1.48 (95% CI 1.38 to 1.60) times higher, the serious assault rate was 2.10 (95% CI 1.88 to 2.35) times higher and the homicide rate was 2.88 (95% CI 1.18 to 8.84) times higher.</li> <li>▶ Dry communities were safer than wet communities but still reported rates of violence that were higher than national rates, including a serious assault rate that was double the national rate (3.25 per 1000 vs 1.44 per 1000) and a sexual assault rate that was at least seven times as high as the national rate (7.58 per 1000 vs 0.88 per 1000).</li> <li>▶ Homicide, the rarest violent offence, was relatively more frequent in wet communities than in dry communities (RR=2.88; 95% CI 1.18 to 8.84).</li> </ul>
Margolis <i>et al</i> (2011) <sup>14</sup>	<ul style="list-style-type: none"> <li>▶ After alcohol restrictions were introduced in 2002-2003, retrievals for serious injury dropped initially, then increased in the 2 years before further restrictions in 2008 (average increase, 2.34 per 1000 per year). This trend reversed in the 2 years after the 2008 restrictions (average decrease 7.97 per 1000 per year).</li> <li>▶ There was a statistically significant decreasing time trend in serious-injury retrieval rates in each of the four communities for the period 2 years before the 2002-2003 restrictions, 2 years before the 2008 restrictions and the final 2 years of observations (2009-2010) (<math>p &lt; 0.001</math> for all four communities combined).</li> <li>▶ Overall, serious injury retrieval rates dropped from 30 per 1000 in 2008 to 14 per 1000 in 2010, and the proportions of serious-injury retrievals decreased significantly for all four communities.</li> </ul>
Berman (2014) <sup>26</sup>	<ul style="list-style-type: none"> <li>▶ Suicide rates were higher in communities prohibiting alcohol importation under state law, but the effect was not significant after controlling for other community characteristics.</li> <li>▶ More remote communities, those with fewer non-Natives and those with evidence of cultural divides had higher suicide risks.</li> <li>▶ Communities with higher incomes, more married couples and traditional elders had lower risks. There was a strong association of community characteristics with the choice of alcohol status, consistent with the hypothesis that it is endogenous.</li> <li>▶ Communities choosing alcohol control by referendum were generally larger, with a higher percentage of Alaska Native residents and more remote.</li> <li>▶ Communities with lower median incomes were more likely to choose prohibition.</li> <li>▶ Young men's suicide risks were significantly higher (<math>p &lt; 0.01</math>) when alcohol was prohibited under the state local option law.</li> <li>▶ The association between adoption of any local alcohol control option and suicide was even stronger (<math>p=0.01</math>). However, communities using federal Indian law to ban alcohol had significantly lower suicide risks (<math>p &lt; 0.5</math>).</li> </ul>

to a greater extent than communities with 'Western mechanisms' of social control developed by state and federal governments and operationalised by authorities (eg, 'judges, magistrates, district courts and marshals') external to Indigenous social and cultural systems.<sup>28</sup>

## DISCUSSION

This review found 18 quantitative evaluations of Indigenous-led alcohol controls. The controls were implemented in rural and remote populations in high-income countries. Prohibition on the sale, importation or possession of alcohol was the predominant category of control. Eleven of the 18 studies found one or more alcohol controls (predominantly prohibition) to be effective in improving a broad range of health and social outcomes including reduced rates of hospitalisations, injury and crime.

The findings of this review add to qualitative research that has explored the widespread and under-recognised agency of Indigenous communities to engage in effective health governance.<sup>30 31</sup> The studies reveal a widespread preference for strong, legal responses to public health problems such as harmful alcohol use which confirm findings of qualitative work exploring community views regarding Indigenous-led alcohol controls.<sup>15 32</sup> In addition, they suggest that many such policy models characterised by community representation and leadership in the development and implementation of alcohol controls are effective in improving health outcomes and deserve serious consideration by governments who can facilitate opportunities for Indigenous populations globally to actively participate in the advocacy, design and implementation of public health law.

Nevertheless, the results reveal the complexity involved in implementing Indigenous-led alcohol controls such



that populations benefit (in terms of health and social outcomes and other social goods including community engagement and capacity building) and vulnerable members of the community are not further disadvantaged. Many of the studies reviewed reported unintended impacts on vulnerable members of communities including those experiencing substance addiction, unemployment, poverty, women and children and other at-risk populations. This was particularly significant for communities that were not geographically isolated from communities where alcohol was legally available. The availability of alcohol in other regions carried the potential to undermine controls in neighbouring 'dry' or 'damp' communities by facilitating heavy drinking in neighbouring areas without alcohol restrictions or the illegal importation of alcohol into 'dry' areas. For example, the introduction of prohibition, the strongest form of alcohol control carried health risks to individuals experiencing substance abuse and travelling long distances to neighbouring areas to obtain alcohol. Health risks included hypothermia due to excessively cold weather conditions, hunger and thirst and pedestrian deaths due to being struck by a vehicle driven by an intoxicated driver or exposure to risk as an intoxicated pedestrian.<sup>27</sup> This information problem is pervasive in under-resourced and marginalised communities.<sup>33</sup> However, the experience of McKinley County in the US, where sizable declines (60%) in the rate of motor vehicle accident mortality and (40%) in alcohol-related arrests were achieved, may suggest that communities could benefit from being able to access and use research evidence and public health surveillance systems to inform local alcohol policy.<sup>28</sup>

Another significant challenge faced by communities was maintaining the sustainability of the controls, which in many cases were repealed and reinstated on multiple occasions. This occurred due to demographic change (eg, a higher proportion of non-Indigenous voters, who were less likely to support alcohol restrictions), local business and economic interests, unpopularity of the control and inadequate resourcing to combat unlicensed alcohol supply (bootlegging), unsafe home brewing and crime (eg, theft) committed with the intent of obtaining possession of alcohol.<sup>17 20 22 24 27</sup> Prohibition controls that were implemented through local elections in the US and Canada could be repealed easily by local referendum and as such, many communities changed their alcohol status from year to year, highlighting the challenges of sustainability.<sup>16 21</sup> An additional challenge to the sustainability of controls is their enforcement. Few studies reported data (eg, arrests, imposition of penalties) on the extent to which controls were enforced. Such measures often do not reveal the true extent of compliance. However, to the extent that it is accessible, the reporting of these data could work to better inform and prepare communities as alcohol control models evolve and adapt to community need.

The responsibility of governments to protect the health of populations, particularly that of marginalised

populations is almost universally recognised.<sup>34 35</sup> Further, national and subnational governments are considerably better resourced than Indigenous communities to meet this aim and as such, hold a unique position to contribute in the key areas highlighted in this review.<sup>34 35</sup> The findings suggest that a first step could be taken in remedying the information problem by providing access to public health evidence and population data at the outset of the consultation and design process. This could enable a more targeted, informed and effective approach, help to identify potential unintended impacts on vulnerable individuals who may be disproportionately affected and identify measurable indicators for the monitoring and evaluation of the control. In addition, governments could provide support to ensure local decision makers have access to a context-specific menu of available legal avenues that communities can consider for potential effectiveness, acceptability and equity. Specifically, this could involve legal information pertaining to the availability of alcohol within the communities and in surrounding populations, legal status of the control, enforcement measures, the scope of the control, models for immediate and stepwise implementation and consideration of time horizons (eg, trial periods or sunset provisions). In addition, this could include the provision of case studies and evaluations of controls in other communities.

A key strength of this study is its comprehensiveness. No limitations were placed on the basis of language, study type, type of health or social outcome, measure of effectiveness or Indigenous population. Further, we included traditional forms of control that did not involve government intervention. One limitation is that we focused exclusively on the peer reviewed literature as it there are no comprehensive global holdings of the grey literature in this area.

## CONCLUSIONS

Public health law can be a powerful prevention tool capable of alleviating the devastating effects of alcohol and alcohol-related harms, particularly where strengthened by community based and culturally sensitive enforcement mechanisms. Advocates and Indigenous health scholars have underscored the importance of Indigenous peoples retaining a place at the forefront of decision-making in a manner that is reflective of Indigenous rights including, but not exclusive to those enshrined in the UN Declaration on the Rights of Indigenous Peoples and distinct from the almost universal history of paternalistic alcohol control.<sup>5 36</sup> The findings of this review indicate that community-led alcohol controls characterised by their development and/or implementation by Indigenous communities globally have been shown to be effective in improving health and social outcomes.

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inclusion or exclusion of empirical studies resolved in discussion with SJ and MLH. All authors contributed to the conceptualisation and design of the paper. All authors contributed to the refinement of the manuscript.

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# Global systematic review of Indigenous community-led legal interventions to control alcohol

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