ORIGINAL PAPER

Drug and Alcohol REVIEW · APSAD · WILEY

Effective alcohol policies and lifetime abstinence: An analysis of the International Alcohol Control policy index

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Abstract

Introduction: Alcohol abstinence remains common among adults globally, although low and middle-income countries are experiencing declines in abstention. The effect of alcohol policies on lifetime abstinence is poorly understood. The International Alcohol Control (IAC) policy index was developed to benchmark and

monitor the uptake of effective alcohol policies and has shown strong associations with alcohol per capita consumption and drinking patterns. Uniquely, the index incorporates both policy 'stringency' and 'impact', reflecting policy implementation and enforcement, across effective policies. Here we assessed the association of the IAC policy index with lifetime abstinence in a diverse sample of jurisdictions.

Methods: We conducted a cross-sectional analysis of the relationship between the IAC policy index score, and its components, and lifetime abstinence among adults (15+ years) in 13 high and middle-income jurisdictions. We examined the correlations for each component of the index and stringency and impact separately.

Results: Overall, the total IAC policy index scores were positively correlated with lifetime abstinence ($r = 0.76$), as were both the stringency ($r = 0.62$) and impact ($r = 0.82$) scores. Marketing restrictions showed higher correlations with lifetime abstinence than other policy domains ($r = 0.80$), including restrictions on physical availability, pricing policies and drink-driving prevention.

Discussion and Conclusion: Our findings suggest that restricting alcohol marketing could be an important policy for the protection of alcohol abstention. The IAC policy index may be a useful tool to benchmark the performance of alcohol policy in supporting alcohol abstention in high and middle-income countries.

KEYWORDS
abstention, abstinence, alcohol, alcohol policy, policy index

1 | INTRODUCTION

Alcohol use remains a leading risk factor globally for death, disability and societal harms [1]. Although the highest levels of alcohol per capita consumption (APC) are observed in high-income countries (HIC), alcohol-attributable burden of disease is highest in countries with lower Human Development Index scores, which reflect lower life expectancy, education and gross national income per capita, underscoring the inequity associated with alcohol harms [1]. The protection of abstention via prevention of alcohol initiation is seldom stated as a goal for public health policy, even though never drinking remains more prevalent than current drinking [2].

Little progress has been achieved since 2013 in implementing the most cost-effective or 'best buy' alcohol policies as recommended by the World Health Organization (WHO), including sales restrictions, increased taxation and and bans on alcohol marketing [3]. In this context, we developed the International Alcohol Control (IAC) policy index [4] to assist decision-makers in assessing the progress of countries over time in relation to these most effective policies, benchmark performance and set policy priorities [5]. The IAC policy index has been found to be strongly associated with recorded APC [4] and drinking patterns [6] in diverse country settings. This is the first analysis of levels of abstention related to an index of alcohol control policies.

1.1 | Alcohol abstention

While much research has evaluated the impact of public health policies on alcohol consumption, few studies have examined levels of abstention. Almost half (45%) of the global adult population report to be never drinkers, exceeding the proportion of current drinkers (43%) [2]. However, this pattern is expected to reverse by 2030, with the prevalence of lifetime abstinence falling to 40% and current drinkers increasing to 50% [7]. The prevalence of lifetime abstinence varies widely across the world, with the highest levels in the Eastern Mediterranean, Africa and South-East Asia regions [2]. In an ecological study of 183 countries, higher lifetime abstinence was associated with a higher proportion of Muslims and lower gross domestic product (GDP) per capita [8]. Decreases in abstention are typically associated with economic growth and commercialisation, however, evidence from middle-income countries suggests that effective alcohol control policies may mitigate against an increase in alcohol-attributable harm [9]. Since drinkers typically show similar distributions of consumption across different jurisdictions, including a proportion of heavy drinkers [10], protecting lifetime abstention can be an important contribution to minimising increases in alcohol harm. Decreasing trends in alcohol consumption, including initiation and current drinking, have also been observed among young people in many high and middle-income countries,

with some research suggesting alcohol policies may have contributed to these declines [11].

1.2 | Alcohol policy indices

Alcohol policy indices may facilitate communication with policy makers and the public by summarising complex and multi-dimensional policies [5]. Higher alcohol policy index scores, denoting stronger policies, have been associated with lower APC across many countries [12–16]. Other studies have also found inverse relationships of policy index scores with youth alcohol consumption [17, 18], binge drinking [19] and alcohol harms [20–22]. A common limitation of existing alcohol policy indices is their inability to distinguish between policy-as-stated and policy-as-implemented [23]. While these policy indices have usually accounted for policy effectiveness or stringency, few have included an assessment of policy implementation [19] or enforcement [14].

1.3 | IAC policy index

The IAC study is a multi-country collaborative project designed to evaluate the impact of alcohol control policies across HICs and low and middle-income countries [24]. The IAC policy index was developed based on four policy domains that are the most cost-effective for alcohol control in a range of settings [25], namely availability restrictions, pricing policies, marketing restrictions and drink-driving prevention, as detailed below. The IAC policy index differs in this regard from other indices which include other less cost-effective approaches [14, 16, 19]. A strength of the IAC policy index is the incorporation of policy 'impact', reflecting both policy implementation and enforcement. 'Impact' refers to how policies have affected the environment on the ground in which alcohol is sold and consumed. As the effect of alcohol policies on abstention has not been well characterised, here we aimed to assess the association of the IAC policy index with lifetime abstinence in a diverse sample of jurisdictions.

2 | METHODS

2.1 | Design

This was a cross-sectional analysis of IAC policy index scores with lifetime abstinence in 13 high and middle-income jurisdictions, with data collected between 2012 and 2020.

2.2 | Participants

We included data from 13 jurisdictions, namely Australia, Chile, England, Hong Kong Special Administrative Region (SAR), Netherlands, New Zealand, Mongolia, Scotland, South Africa, St Kitts and Nevis, Thailand, Turkey and Vietnam. This was a small but heterogenous group of jurisdictions, based on researchers who obtained funding and were willing to participate in the IAC study. Data were collected for 1 year for each site.

2.3 | Policy domains

The IAC policy index was based on four policy domains defined by WHO as the most effective to reduce alcohol harms, including three 'best buys' (restrictions on physical availability, pricing policies and restrictions on marketing) and one 'good buy' (drink-driving prevention) [26]. Restrictions on physical availability included policies restricting hours or days of sale and outlet density. Pricing policies included tax rates on alcohol calculated as a percentage of price. Restrictions on marketing included legally binding restrictions on traditional advertising, digital advertising, sponsorship of sports or youth events, sales promotions and product placement. Drink-driving prevention included blood alcohol concentration limits and their enforcement. We did not include brief interventions for hazardous drinkers (the other WHO 'good buy') as our investigation focused on preventive public health measures. We also excluded policies specifically targeted at young people (e.g., minimum purchase age and social supply) as our focus was on interventions most applicable to the general population.

2.4 | IAC policy index

2.4.1 | Data sources

The Alcohol Environment Protocol (AEP) is a research tool for the IAC study that allows countries to document and compare the environment in which alcohol is sold and consumed [27]. Using the AEP, researchers in the 13 jurisdictions collected data on whether policies were in place, their stringency and their impact, as we have described elsewhere [4]. Data on policies and their stringency were obtained from legislative documents and government websites locally. Data on policy impact were derived from researchers' surveys of alcohol outlets (for trading hours and affordability), government data (for random breath testing) and desk research and researchers' estimates (for marketing and random breath testing) [4].

'Stringency' represented the level of policy restriction as legislated or regulated. Policies restricting hours or days of sale were scored on the number of legal trading hours per day and whether outlets were legally allowed to open every day. Policies restricting outlet density were scored on restrictions on number, specified geographic area and distance from certain locations. Pricing policies were scored on tax rates as a percentage of price. Marketing restrictions were scored on no regulation/industry self-regulation, partial ban and total ban. Drink-driving prevention was scored on levels of permitted blood alcohol concentrations and enforcement by sobriety checkpoints, random breath testing and zero tolerance for professional drivers.

'Impact' on the ground referred to the actual trading hours of alcohol outlets, the affordability of alcohol (as reflected by the jurisdiction's typical mid-price of alcoholic beverages divided by GDP per capita), the actual number of marketing modes present and the proportion of motor vehicles stopped for random breath tests. Alcohol outlet density was not included as a measure of impact as the data was missing for most jurisdictions.

Data collected for each policy domain were converted into a score between 0 and 1, with a higher score representing more stringent policy and more restrictive on-the-ground impact. The different policy domains were then weighted from 1 to 5 according to the effectiveness of interventions based on available scientific evidence [28] and their correlations with recorded APC, with 1 being least effective and 5 being most effective. Finally, the policy domains were summed to generate the total IAC policy index score for each jurisdiction, which had a potential range of 0 to 25 points. Further details of our methods have been reported elsewhere [4].

2.5 | Outcome

Lifetime abstinence was defined as the proportion of adults (15+ years) in a jurisdiction who have not consumed any alcohol during their lifetime, assessed at a given point in time [29]. As we were interested in the primary prevention of alcohol initiation, we did not consider past 12-month abstinence, which includes both lifetime abstainers and former drinkers [2].

We obtained data on lifetime abstinence from WHO's Global Information System on Alcohol and Health. As WHO did not report data for Hong Kong SAR, this data was obtained from the Department of Health's Population Health Survey, which was representative of the population aged 15+ years in Hong Kong SAR [30]. Data on GDP per capita for each jurisdiction was obtained from the World Bank [31].

2.6 | Analysis

We assessed the Pearson correlations of total IAC policy index scores with lifetime abstinence. We also examined the correlations for each policy, stringency and impact separately. As lifetime abstinence was particularly high in Turkey, a Muslim-majority country, we tested the

TABLE 1 Overview of international alcohol control policy index score, lifetime abstinence and GDP per capita by jurisdiction

Jurisdiction	IAC policy index total score[a]	Lifetime abstinence, %	GDP per capita, USD	GDP per capita, PPP
Turkey	13.91	89.1%	$10667.14	$26712.92
Vietnam	11.83	38.6%	$2030.26	$5745.20
Thailand	10.33	34.5%	$5860.58	$14870.98
Mongolia	9.65	37.3%	$4366.08	$10549.89
St Kitts and Nevis	8.04	22.8%	$18029.33	$23921.52
Chile	7.62	6.6%	$15037.35	$24470.70
South Africa	6.70	53.5%	$6433.19	$12521.13
Scotland	6.51	11.0%	$43444.57	$39931.23
Australia	5.76	8.5%	$68150.11	$45902.05
England	5.08	11.0%	$43444.57	$39931.23
New Zealand	5.05	10.6%	$38426.55	$32701.38
Netherlands	5.05	12.1%	$53024.06	$59675.18
Hong Kong SAR	3.59	21.8%	$48675.62	$59237.67

Abbreviations: GDP, gross domestic product; IAC, International Alcohol Control; PPP, purchasing power parity; SAR, Special Administrative Region.
[a]Ranked by descending order.

robustness of our results by excluding Turkey from the analyses. As additional sensitivity analyses, we examined partial correlations adjusted for GDP per capita purchasing power parity as this is negatively associated with lifetime abstinence [8]. We also analysed Spearman rank correlations in men and women separately, because rates of lifetime abstinence differ by sex [32]. All analyses were conducted in *R* and figures were produced using the package *ggplot2* [33, 34].

3 | RESULTS

According to the World Bank's classification of countries by income [35], eight jurisdictions in our sample were high-income economies (Australia, Chile, England, Hong Kong SAR, Netherlands, New Zealand, Scotland, and St Kitts and Nevis) and five were middle-income economies (Mongolia, South Africa, Thailand, Turkey and Vietnam). As shown in Table 1, the total IAC policy index scores ranged from 3.59 (Hong Kong SAR) to 13.91 (Turkey) out of a maximum of 25, with higher scores indicating more restrictive policy. The prevalence of lifetime abstinence ranged from 6.6% (Chile) to 89.1% (Turkey), with higher levels in the middle-income than high-income jurisdictions. Table 2 shows the IAC policy index scores by policy and jurisdiction.

Table 3 shows the correlations of IAC policy index scores (total, stringency and impact) with lifetime abstinence. Overall, total IAC policy index scores were positively correlated with lifetime abstinence ($r = 0.76$), as were both the stringency ($r = 0.62$) and impact ($r = 0.82$) scores. Marketing restrictions showed relatively high

TABLE 2   International alcohol control policy index score by policy domain and jurisdiction

Jurisdiction	Hours and days of sale	Outlet density	Pricing	Marketing	Drink driving	IAC policy index total score[a]
Turkey	1.09	1.00	2.25	7.00	2.57	13.91
Vietnam	0.56	2.00	6.13	1.41	1.73	11.83
Thailand	1.31	1.00	2.19	2.82	3.01	10.33
Mongolia	0.66	1.00	3.21	2.73	2.06	9.65
St Kitts and Nevis	1.53	2.00	1.46	2.19	0.86	8.04
Chile	1.36	0.50	1.87	0.71	3.18	7.62
South Africa	0.96	1.00	1.54	0.91	2.29	6.70
Scotland	1.13	1.50	1.89	1.57	0.43	6.51
Australia	0.64	0.00	1.17	1.36	2.58	5.76
England	0.66	0.00	2.27	1.30	0.86	5.08
New Zealand	0.68	0.50	1.06	1.03	1.78	5.05
Netherlands	0.41	0.00	1.47	1.41	1.76	5.05
Hong Kong SAR	0.00	0.00	1.23	0.82	1.54	3.59

Abbreviations: IAC, International Alcohol Control; SAR, Special Administrative Region.
[a]Ranked by descending order.

TABLE 3   Correlations of international alcohol control policy index scores with lifetime abstinence

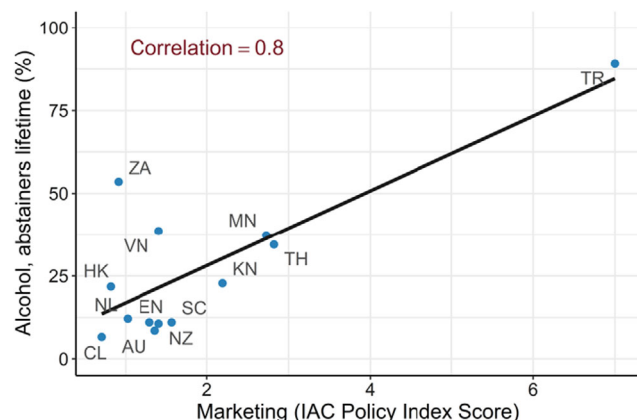| Policy	Total score		Stringency score		Impact score	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
Hours and days of sale	0.16	0.604	0.25	0.410	−0.01	0.973
Outlet density	0.36	0.221	0.36	0.221	NA	NA
Pricing	0.29	0.340	−0.26	0.389	0.49	0.092
Marketing	0.80	0.001	0.58	0.039	0.74	0.004
Drink driving	0.30	0.315	0.39	0.188	−0.23	0.453
Overall	0.76	0.003	0.62	0.024	0.82	0.001

Abbreviation: NA, not available.

FIGURE 1 Relationship of marketing international alcohol control policy index scores with lifetime abstinence (total sample). Abbreviations: AU, Australia; CL, Chile; EN, England; HK, Hong Kong Special Administrative Region; KN, St Kitts and Nevis; MN, Mongolia; NL, Netherlands; NZ, New Zealand; SC, Scotland; TH, Thailand; TR, Turkey; VN, Vietnam; ZA, South Africa
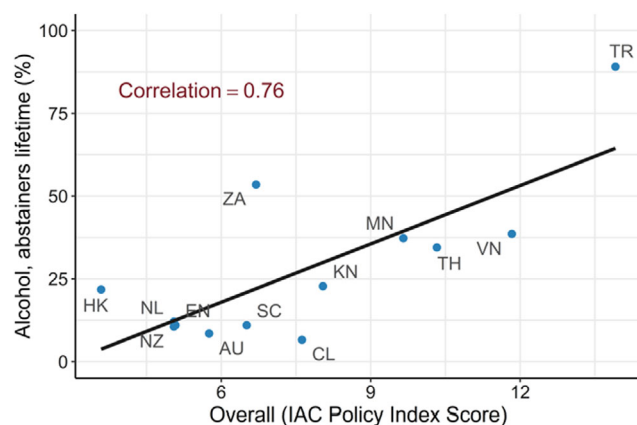

FIGURE 2 Relationship of total international alcohol control policy index scores with lifetime abstinence (total sample). Abbreviations: AU, Australia; CL, Chile; EN, England; HK, Hong Kong Special Administrative Region; KN, St Kitts and Nevis; MN, Mongolia; NL, Netherlands; NZ, New Zealand; SC, Scotland; TH, Thailand; TR, Turkey; VN, Vietnam; ZA, South Africa

correlations with lifetime abstinence among the policies included ($r = 0.80$) (Figure 1).

In Figure 2, the dispersion of jurisdictions in relation to total IAC policy index scores showed a general pattern of high-income economies with less restrictive policy and lower proportions of lifetime abstention. Turkey was an extreme observation in terms of both IAC policy index scores and lifetime abstinence and South Africa to a lesser extent. Figure 3 and Table S1 show that after excluding Turkey, the IAC policy index score remained correlated with lifetime abstinence ($r = 0.55$). Overall, we found similar results after adjustment for GDP purchasing power
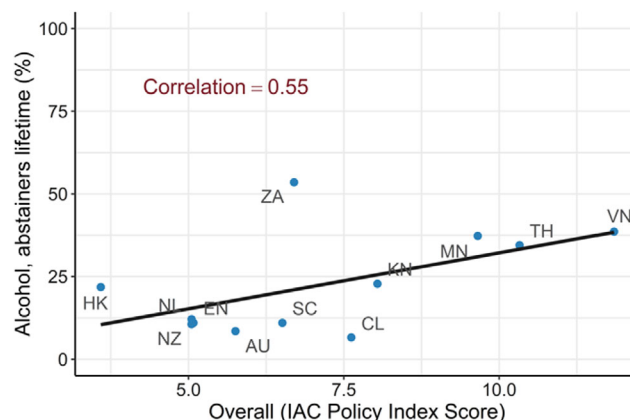

FIGURE 3 Relationship of total international alcohol control policy index scores with lifetime abstinence (excluding Turkey). Abbreviations: AU, Australia; CL, Chile; EN, England; HK, Hong Kong Special Administrative Region; KN, St Kitts and Nevis; MN, Mongolia; NL, Netherlands; NZ, New Zealand; SC, Scotland; TH, Thailand; VN, Vietnam; ZA, South Africa

parity (Table S2 and Figure S1) and in both sexes (Tables S3 to S5 and Figures S2 to S4).

4 | DISCUSSION

In a diverse sample of 13 high and middle-income jurisdictions, the IAC policy index score showed a high positive correlation with lifetime abstinence. The overall IAC policy index scores were low across most of our sample, indicating substantial room for effective alcohol policies to be strengthened. Given our previous studies have also shown associations of IAC policy index scores with alcohol consumption [4, 6], the IAC policy index may be a useful tool to benchmark and monitor progress in alcohol control policy across various drinking contexts.

Marketing restrictions may be an important policy for protecting abstention. Of the four policy domains included in the IAC policy index, marketing restrictions showed relatively high correlations with alcohol abstention, both in terms of stringency and impact on the ground. This is consistent with evidence from systematic reviews of longitudinal studies showing that young people with greater exposure to alcohol marketing may be more likely to start drinking [36, 37]. The IAC policy index considered the impact of 25 different marketing modes across a wide range of media [4]. Our results suggest that comprehensive marketing restrictions may be influential for the protection of alcohol abstention, and that effective implementation and enforcement of such restrictions are crucial. Marketing is used by the transnational alcohol industry to expand their markets through normalising drinking in low and middle-income countries and recruiting new cohorts of

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drinkers in HICs [38]. The rapid rise of marketing in digital media, including in jurisdictions with high levels of abstention, presents unique challenges to effective control [39].

The impact of pricing policies (i.e., alcohol affordability) had a moderate correlation with lifetime abstinence ($r = 0.49$), while stringency (i.e., tax/price ratio) did not ($r = -0.26$). This suggests that the affordability of alcohol, reflecting pricing relative to income, should be considered in the evaluation of pricing policies to prevent drinking initiation. Evidence from Thailand showed that a 10% increase in average alcohol tax rates was associated with 4% lower lifetime drinking [40]. The Thai study did not assess the association of affordability with drinking initiation, although the increases in excise tax rates did appear to raise prices of alcoholic beverages [40].

Restrictions on physical availability and drink-driving prevention had little correlation with lifetime abstinence despite the high correlation for the overall IAC policy index. This may be because these policies are mainly aimed at reducing alcohol consumption and harms among drinkers. Existing evidence on these population-level interventions is focused on outcomes such as alcohol consumption, sales, violence, injuries and medical conditions [41]. There is otherwise a lack of research on alcohol policies with respect to lifetime abstinence, probably because the vast majority of studies are on HICs where drinking is more common than abstention [42].

Our study had the unique strength of incorporating measures of policy impact, which other alcohol policy indices have not. The overall policy impact score was highly correlated with lifetime abstinence, highlighting the importance of evaluating the environment on-the-ground that alcohol policies intend to affect. The AEP aimed to allow systematic data collection across jurisdictions using minimal resources, which can then be repeated in different settings over time [27]. Nonetheless, our study has several limitations. First, this was a cross-sectional analysis which was open to reverse causation, so our findings should not be interpreted as causal. Settings where alcohol use is less common may facilitate the government's development and implementation of more restrictive alcohol policies. Future longitudinal analyses tracking the IAC policy index with alcohol abstention over time may provide more clarity on the direction of relationships. Second, a country's religious and sociocultural context may confound the relationship of alcohol policy restrictiveness with abstention [8]. Cultures such as Turkey where drinking is prohibited by religious traditions have higher levels of abstinence and lower availability of alcohol, whereas societies where alcohol is integrated into daily life and activities tend to have less abstinence and more access to alcohol [43, 44]. In addition, lifetime abstinence is more common among women

than men, which could be related to lower socioeconomic position such as income and education [32]. To account for potential confounding by religion, we excluded Turkey as a sensitivity analysis and found similar results. We also obtained similar results in separate analyses by sex, suggesting robustness of our findings. Third, despite the heterogeneous settings represented in this convenience sample, we had a limited sample size and were unable to include low-income countries, which usually have higher levels of lifetime abstinence [8]. This might have limited the generalisability of our findings to these settings. Fourth, lifetime abstinence may be susceptible to misclassification. Longitudinal studies in high-income countries have shown that some self-identified never drinkers may be former or current drinkers [45–47], although the proportion of never drinkers ever reporting risky consumption was only 5% in an Australian study [47]. Lifetime abstinence may also be over-estimated in countries such as South Africa, where cultural factors could have inhibited women's disclosure of alcohol use [48]. Misclassification of never drinkers may be greater in settings with higher levels of alcohol consumption [46], but it was not possible to assess the degree of measurement error in our study. Nonetheless, lifetime abstinence is relatively simple to measure, and we have used WHO Global Information System on Alcohol and Health data for comparability. Fifth, lifetime abstinence is affected by age of alcohol initiation, which we did not have data on. However, age of alcohol initiation could be on the causal pathway between alcohol policy and lifetime abstinence, and therefore we have not considered it as a potential confounder. We also did not adjust for population age, because while population age may affect lifetime abstinence [8], whether it has a causal role in alcohol policy remains unclear. Finally, we did not have data to assess the impact of outlet density restrictions, which should be considered in the interpretation of our results.

5 | CONCLUSIONS

The findings of this study suggest restricting alcohol marketing may protect alcohol abstention, given its high correlations with lifetime abstinence in our sample of high and middle-income jurisdictions. Alcohol policy's role in protecting alcohol abstention is seldom stated as a goal but is relevant to global health, and the IAC policy index can be used by policymakers to benchmark the performance of alcohol policy in protecting alcohol abstention.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

ETHICS STATEMENT

In line with Massey University guidelines this research was assessed by peer review to be low risk and did not involve human participants. Consequently, it was not reviewed by one of the university's human ethics committees.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.