A composite index of provincial alcohol control policy implementation capacity in Thailand

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Abstract:

Introduction: The use of indices to measure the progress of alcohol control policies is increasing. However, few studies have integrated policy implementation into these assessments, and most existing indices focus primarily on the stringency of policies. This thesis addresses these knowledge gaps by creating a composite index to evaluate the implementation of alcohol control policies at the provincial level in Thailand.

Methods: The study employed a mixed-method approach. Initially, a scoping review was conducted to identify quantitative tools and measurements for assessing the implementation of effective alcohol control policies. A second scoping review focused on identifying barriers and facilitators, with most of the studies identified using qualitative or mixed-method approaches. Subsequently, a narrative review and key informant interviews were conducted to develop a conceptual framework based on the Policy Capacity Framework. The resulting framework was validated through an expert consultative workshop. A tool was then developed for assessing the implementation of effective alcohol control policies and tested in two selected provinces. After revising the tool, a key informant survey was conducted, and secondary data gathered from relevant organisations. The PAPIC (Provincial Alcohol Policy Implementation Capacity) index was then finalised. Lastly, the study examined the association between the PAPIC index and alcohol consumption, consumption patterns, and alcohol-related harms.

Results: The study found variations across different provinces. Higher scores on the index were associated with lower quantities of alcohol consumed per drinker and a lower proportion of regular drinkers. In particular, a higher index score for implementation of alcohol advertising control was associated with lower level of alcohol consumption per drinker and a lower proportion of regular drinkers. The results also showed a statistically significant association between the index for implementation of physical availability policies and the proportion of regular drinkers. However, no association was found between the indices and alcohol-related harms.

Conclusions: The study confirmed that an increase in the implementation of effective alcohol control policies, as measured by the PAPIC index, was associated with lower quantities of alcohol consumption per drinker and patterns of alcohol consumption. To effectively reduce

alcohol consumption, governments require evidence on policy implementation to inform and prioritise actions for effective implementation.

Preface

Personal Statement

I was born into a poor family, and alcohol problems have been a part of my family history; my grandfather struggled with alcohol dependence. This personal connection inspires me to dedicate part of my work to his memory. The challenges he faced motivated me to persevere in my efforts, with the hope that fewer people would suffer from the harms of alcohol, which is no ordinary commodity.

My academic journey began when I joined the International Health Policy Program (IHPP) in Thailand. From 2010 to 2018, I worked as a research assistant, and since 2019, I have been a researcher focusing on alcohol control policies. These experiences have shaped my career and deepened my commitment to this field.

Through my work, I've observed that while Thailand has comprehensive alcohol control laws, their enforcement remains a significant challenge. This became even more evident during my involvement in the *Evaluation and Monitoring of Provincial Strategies to Reduce Harmful Alcohol Use in 25 Provinces* project in 2015-2016. I found that strengthening policy implementation at the provincial level is crucial, as local authorities are closer to the issues and better equipped to address them effectively.

My expertise is in quantitative research. I received a bachelor's degree in European Public Health from Maastricht University, the Netherlands, in 2010 and further developed my skills during my Master's degree in Health and Society: Social Epidemiology at University College London (UCL) in 2017. UCL provided me with advanced training in quantitative research methods, which has been instrumental in my work.

I was fortunate to receive a scholarship from the *Capacity Building on Health Policy and Systems Research* program (HPSR Fellowship), a collaboration between the National Health Security Office (NHSO), the Bank for Agriculture and Agricultural Co-operatives (BAAC), and the International Health Policy Program Foundation (IHPF). This program focuses on developing the capacity of young scholars in health policy and systems research in Thailand. It has significantly influenced my academic work, guiding my thesis toward research that aims to improve population health.

Acknowledgement

I would not have finished the thesis without the support of the following people, as well as many more that I do not mention here.

I will always feel grateful to have had Professor Sally Casswell as my primary supervisor. Her belief and trust in my capacity have propelled me beyond what I believed I could achieve. Professor Sally has consistently demonstrated the importance of seeking opportunities for growth and refinement in our work, and never settling for mediocrity. Her commitment to serving society and striving for continual improvement has broadened my global perspective and instilled in me a passion for using academia as a tool for positive societal change. Dr. Taisia Huckle, my secondary supervisor, has also consistently shown me that high quality work is king. With her keen eye for detail and insistence on excellence, she has set a high standard for me as a researcher. I am grateful for her guidance and dedication to quality. Additionally, I owe a debt of gratitude to Dr. Surasak Chaiyasong, my advisor, who has supported since the early stages of my career. He understands my strengths and weaknesses, helping me to build my capabilities and offering invaluable advice.

I am immensely grateful for the opportunity to pursue my PhD under the auspices of the SHORE and Whariki Research Centre. Throughout my journey, I have received outstanding support from my colleagues. Steve Randerson has been a dependable source of guidance during moments of struggle with my thesis. Karl Parker and Jose Romeo graciously offered their assistance and opened their doors whenever I sought clarification on statistical matters. Thomas Graydon-Guy has provided invaluable support with IT inquiries, ensuring smooth progress in my research endeavours. I extend my heartfelt appreciation to Eriko Kobayashi, Jan Sheeran, Rubee Prattley-Jones, and Kelly Zhao for their support in handling administrative tasks. I would also like to thank Jeffery Adams for his support during my PhD. Additionally, I am thankful to Lisa Morice for her editing assistance, which has significantly contributed to the refinement of my work, and also her kindness and friendship in New Zealand. Thanks to June Leung for allowing me to learn from her work and guidance in research. I would like to thank to Robin van der Sanden who provided me support and guidance on my thesis during my stay in New Zealand.

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I would like to express my gratitude to Dr Thaksaphon Thammarangsi, who mentored me in my early career in alcohol control policy research and is a great example of a good boss: generous and always seeing opportunities to improve society using research.

I would also like to express my gratitude to Dr.Nipon Chinanonwait, Miss Sirikul Vongsirisopak, Miss Chanokthida Siriwat, Miss Nutthiga Srirod and staff working under the Office of Alcoholic Beverage Control Committee for their invaluable support during the data collection process and for their valuable advice throughout the project.

I extend my sincere thanks to all the key informants who generously dedicated their time to fill out questionnaires and participate in the verification of data. Your contributions have been invaluable to the success of this project, and I am deeply grateful for your cooperation and support.

I would like to express my heartfelt gratitude to the anonymous reviewers who generously dedicated their time and expertise to improve my work. Your constructive feedback and valuable insights have been instrumental in enhancing the quality and impact of my research. Thank you for your invaluable contributions to this endeavor.

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I also thank my friends whom I met in New Zealand. Joanna Choi, Jan Singhapan, and Gulsinee Yossoonnern, who are always available when I need help.

I express my deepest gratitude to my parents, Somchai Jankhotkaew and Boonlong Jankhotkaew, for their unconditional love, unwavering support, and invaluable guidance throughout my life's journey. I also would like to thank all my family members, who always support me.

About a doctoral thesis ‘with publications’

This thesis is presented in a "with publications" format, incorporating a series of journal articles at various stages of publication or submission. Each findings chapter in the body of the thesis is structured as a standalone journal article prepared for publication. This approach adheres to the Massey University doctoral thesis with publications guidelines.

This thesis is presented as an integrated compilation of publications, framed by an introduction, discussion, and conclusions. The first chapter provides the background and justification for the thesis. The second is a published article that reviews the tools and measurements used for evaluating alcohol control policy implementation from the international literature. The third chapter, also a published article, reviews the barriers and facilitators affecting the implementation of effective alcohol control policies. The fourth chapter, a submitted paper, introduces a conceptual framework for creating an index to measure provincial alcohol control policy implementation in Thailand. The fifth chapter is a paper on the development of the index assessing provincial alcohol control policy implementation capacity in Thailand, which published recently. The final chapter offers a discussion and conclusion.

The details of the journal articles included in this thesis and their publication stages are listed in the table below. I hold first authorship on all papers, with the co-authors consisting of my supervisory team and, where applicable, other SHORE & Whāriki researchers, as well as researchers from the International Health Policy Program, Ministry of Public Health, Thailand and Social Pharmacy Research Unit, Faculty of Pharmacy, Mahasarakham University who contributed significantly to specific articles. Appendix Figure 1A.1-1A.4 contain a statement of author contributions for each journal article. Each article is presented in accordance with the copyright permissions of the respective publishers.

Chapter	Citations	Publication status
Chapter 2	Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., & Phonsuk, P. (2023). Quantitative tools and measurements for assessing the implementation of regulatory policies in reducing alcohol consumption and alcohol-related harms: A scoping review. *Drug and Alcohol Review*, *42*(1), 157-168. https://doi.org/10.1111/dar.13543	Published
Chapter 3	Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., & Phonsuk, P. (2022). Barriers and facilitators to the implementation of effective alcohol control policies: A scoping review. *Int Journal of Environmenatl Research and Public Health*, *19*(11). https://doi.org/10.3390/ijerph19116742	Published
Chapter 4	Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., & Kalapat, R. (2024). Application of the Policy Capacity Framework to policy implementation of effective alcohol control policies in Thailand.*Drug and Alcohol Review*.	Draft
Chapter 5	Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., Kalapat, R., Waleewong, O., & Parker, K. (2024). A composite index of provincial alcohol control policy implementation capacity in Thailand. *International Journal of Drug Policy*, *130*, 104504. https://doi.org/https://doi.org/10.1016/j.drugpo.2024.104504	Published

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List of Acronyms

COVID-19	Novel Coronavirus
CSO	Civil Society Organization
GPP	Gross Provincial Product
ICD-10	International Statistical Classification of Diseases and Related Health Problems 10th Revision
NCDs	Noncommunicable diseases
OECD	Organisation for Economic Co-operation and Development
PAPIC	Provincial Alcohol Control Policy Implementation Capacity Index
SDGs	Sustainable Development Goals
UN	United Nations
WHO	World Health Organization

Chapter 1: Introduction

This chapter provides an overview of alcohol control policies in the global context, followed by an examination of alcohol policy in Thailand. Emphasis is placed on policy content and the key actors involved. Additionally, alcohol policy implementation at the provincial level is explored, including aspects such as the prevailing alcohol consumption landscape, the stakeholders involved, and implementation processes. This is followed by a review of the existing literature to identify gaps in policy implementation and measurement. Lastly, the chapter addresses the need for generating a composite index to evaluate the implementation of effective alcohol control policies, known as best buys. The chapter highlights existing knowledge gaps uncovered in the course of the doctoral research reported in this thesis.

1.1 Global context of alcohol control policy

Alcohol drinking has a negative impact at both the individual and societal levels, contributing to more than 230 diseases and conditions. At the global level, 3 million deaths are attributable to alcohol consumption annually (World Health Organization, 2018a). The negative impacts of alcohol consumption go beyond health effects for individuals, with family, community, and society also suffering consequences (Laslett et al., 2019). For example, alcohol consumption contributes to domestic violence (Devries et al., 2014). At the national level, a systematic review conducted by Thavorncharoensap et al. reported economic losses of 0.45 to 5.44% in terms of Gross Domestic Product across 12 selected countries (Thavorncharoensap et al., 2009).

The World Health Organization (WHO) and United Nations (UN) have both committed to reducing the harmful use of alcohol. The Global Strategy to Reduce the Harmful Use of Alcohol (the Global Strategy) was adopted by the World Health Assembly in 2010 (World Health Organization, 2010), followed a decade later by the 2022 adoption of the Global Alcohol Action Plan 2022-2030 (the Global Alcohol Action Plan) to strengthen implementation of the Global Strategy. Another key commitment at the global level is target 3.5 of the UN Sustainable Development Goals (SDG), which aims to “Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol” (United Nations, 2018a). Alcohol control policy also interlinks with other health-related agenda, for example the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020. One global target for

noncommunicable diseases (NCDs) is reducing alcohol consumption per capita by 10% by 2025 (World Health Organization, 2013). The Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases was adopted by the UN in 2011 (United Nations, 2011). It has since been followed up twice, mostly recently in 2018 (United Nations, 2018b), with statements reiterating the importance of effective alcohol control policies in preventing NCDs. In addition, WHO launched the SAFER initiative in 2018. SAFER addresses effective interventions, including strengthening restrictions on alcohol availability, advancing and enforcing drink-driving countermeasures, facilitating access to screening, brief interventions and treatment, enforcing bans or comprehensive restrictions on alcohol advertising, sponsorship, and promotion, and raising prices on alcohol through excise taxes and pricing policies. The SAFER initiative is used as a technical tool to support Member States in reducing the harmful use of alcohol by strengthening the ongoing implementation of the Global Strategy (World Health Organization, 2019c).

While global policy documents address the importance of government action to reduce alcohol consumption, the implementation of alcohol control policy has been neglected in many low- and middle-income countries. At the global level, countries face two main barriers to overcoming the challenges of harmful use of alcohol: one is a lack of commitment to adopting effective alcohol control policies, and the other is putting effective policies into action once they have been adopted. As identified by the global consultation on the implementation of the Global Strategy, countries face challenges that include a lack of political will, commitment, implementation and regulatory capacities, as well as inherited social norms and cultural traditions concerning alcohol use, the absence of a legally binding international instrument, globalisation of alcohol production, and the growth of digital marketing (World Health Organization, 2019a). Without national and local commitment to implementing effective alcohol control policies, we will struggle to reduce the harmful use of alcohol at the global scale.

1.2 Thai context on alcohol control policy

1.2.1 Alcohol consumption situation in Thailand

In Thailand, alcohol per capita consumption remains high. Approximately 7-8 litres were consumed annually between 2010 and 2016 (World Health Organization, 2018a), exceeding the global average of 6.4 litres in 2016 (World Health Organization, 2018a). Additionally, the prevalence of alcohol consumption in Thailand has been stable, remaining at around 30-34% (adults aged 15 years and above) over the last decade, except in 2017 and 2021, when there was a slight decrease to 28% in both years (National Statistical Office, 2017; National Statistical Office Thailand, 2021). However, the prevalence among the younger age groups (aged between 15 and 19 years) gradually increased from 11% in 2001 to 19% in 2015, dropping to 14% in 2017 (National Statistical Office, 2017) and 9% in 2021 (Center for Alcohol Studies, 2018; National Statistical Office Thailand, 2021). Also, one-third of Thai drinkers are heavy episodic drinkers (National Statistical Office Thailand, 2021). In addition, alcohol consumption is one of the top three contributing risk factors to disability-adjusted life years among the Thai population (International Health Policy Program, 2023).

1.2.2 Regulation of alcohol control policies in Thailand

Many policy measures to control harmful use of alcohol have been implemented in Thailand, both through legislative and non-legislative measures. The legislative measures are the Alcoholic Beverage Control Act B.E.2551 (2008) (Office of Alcoholic Beverage Control Committee, 2008) and the Excise Act B.E.2560 (2017) (Excise Department, 2017a). The former consists of many regulatory domains, including restriction on the physical availability of alcohol and partial restriction of alcohol marketing and advertising. In addition, various committees have been established with mandates for policy development, implementation, monitoring, and legal sanctions. Several ministerial regulations were promulgated after the endorsement of the Alcoholic Beverage Control Act to cover other policy measures, such as prohibiting the sale of alcohol on trains and on public premises. The other main legislative measure regulates excise tax and the licensing of alcohol sales and production. Apart from these two Acts, alcohol drink-driving countermeasures were enacted as part of the Land Traffic Act, B.E. 2522 (1979). Moreover, alcohol is also regulated through announcements from the National Council for Peace and Order

(NCPO) to prevent and address alcohol issues related to car and motorcycle racing on roads, as well as control alcohol use in service facilities and entertainment venues (National Council for Peace and Order (NCPO), 2015), and through the Ministerial Regulation on National Parks to restrict alcohol sales in national parks (The Department of National Parks, 2010). In addition, non-legislative measures have been put in place, such as the National Alcohol Strategy endorsed by the 2009 National Health Assembly. The Strategy is based on the principle of the "Triangle that Moves the Mountain", where the three points of the triangle are governmental authority, civil society, and academia (Wongwatanakul & Thamarangsi, 2013). The focus of this study is the implementation of effective alcohol policies that are regulated under the three legal measures mentioned above (Table1.1).

This thesis focuses on the four best buy policies recommended by the World Health Organization to tackle alcohol consumption and alcohol-related harms: control of physical availability, control of alcohol advertising, drink-driving countermeasures, and alcohol taxation. These policies were selected based on a comprehensive review of cost-effectiveness analyses, which identified them as the most effective measures for addressing alcohol-related deaths and disabilities (World Health Organization, 2017). Other interventions that could be covered but are not the focus of this thesis include community interventions, screening and brief interventions, and alcohol treatment. This thesis, however, concentrates on policies that are regulatory in nature and enforced at the provincial level.

Table 1. 1 Effective alcohol control policies in Thailand

Main policy measures	**Policy measures**
Physical availability Restriction of alcohol sales in certain places	• temples or places where religious rituals are practised • government healthcare facilities, and hospitals • government facilities • dormitories • educational institutions • petrol stations • state enterprises' premises or areas and other state agencies • industrial areas • public parks of state enterprises or other government agencies • areas under the supervision of, or utilised by state enterprises or other government agencies • transportation terminals

Main policy measures	Policy measures
Restriction of alcohol drinking in certain places	• roads and footpaths • train stations or on trains • public ferry terminals or on public ferry service • within the premises or vicinity of educational institutions, or nearby dormitories in the vicinity of educational institutions • national parks • temples or places where religious rituals are practised • government healthcare facilities, and hospitals • government facilities • educational institutions • petrol stations • state enterprises' premises or areas and other state agencies • industrial areas • public parks of state enterprises or other government agencies • areas under the supervision of, or utilised by state enterprises or other government agencies • transportation terminals • roads and footpaths or in cars • train stations or on the trains • public ferry terminals or on public ferry services • within the premises or vicinity of educational institutions, or nearby dormitories in the vicinity of educational institutions • national parks
Restriction of alcohol sales to certain persons	• persons aged below 20 years • intoxicated persons
Restriction of alcohol sales at certain times	Alcohol sales are allowed from 11 am to 2 pm and from 5 pm to midnight.
Restriction of alcohol sales on certain days	Makha Bucha Day, Visakha Bucha Day, Asalha Bucha Day, Beginning of Buddhist Lent, End of Buddhist Lent, Election Day, Day before Election Day
Licensing	Alcohol licensing fees; there are two types of alcohol license by volume of alcohol sold: 1) 10 litres or above on one occasion. and 2) less than 10 litres on one occasion.
Control of alcohol advertising	• Alcohol advertising in direct and indirect ways is prohibited, with exception of providing information or socially constructive knowledge and not displaying products. These restrictions do not apply to advertising that originates from outside Thailand. • Pricing reductions • Promotion (e.g., offering or proposing the right to attend competitions, shows, lottery services, raffles, or any other benefits as compensation to purchasers of alcoholic beverages, or to holders of coupons or any other items related to alcoholic beverages for exchange or purchase)
Alcohol taxation policies	• Tax levy regarding ad-valorem tax and specific tax rates and earmarked tax for local tax, sport, media and the Thai Health Promotion Foundation

Main policy measures	Policy measures
Drink-driving countermeasures	Adults BAC limit at 0.05% BAC limit at 0.02% applied to: • young people • holders of temporary driving licenses • Drivers who hold a driver's license for other types of vehicles that cannot be substituted. • Drivers who do not have a driver's license or whose driver's license has been suspended or revoked. People who refuse an alcohol breath test.

1.2.3 Policy actors and the implementation of alcohol control policies in Thailand

The key policy actors involved in the implementation of alcohol policies within Thailand include government actors, academics, and civil society members (e.g., StopDrink Network). Implementation of policy occurs at both the national and provincial levels (see Figure 1.1).

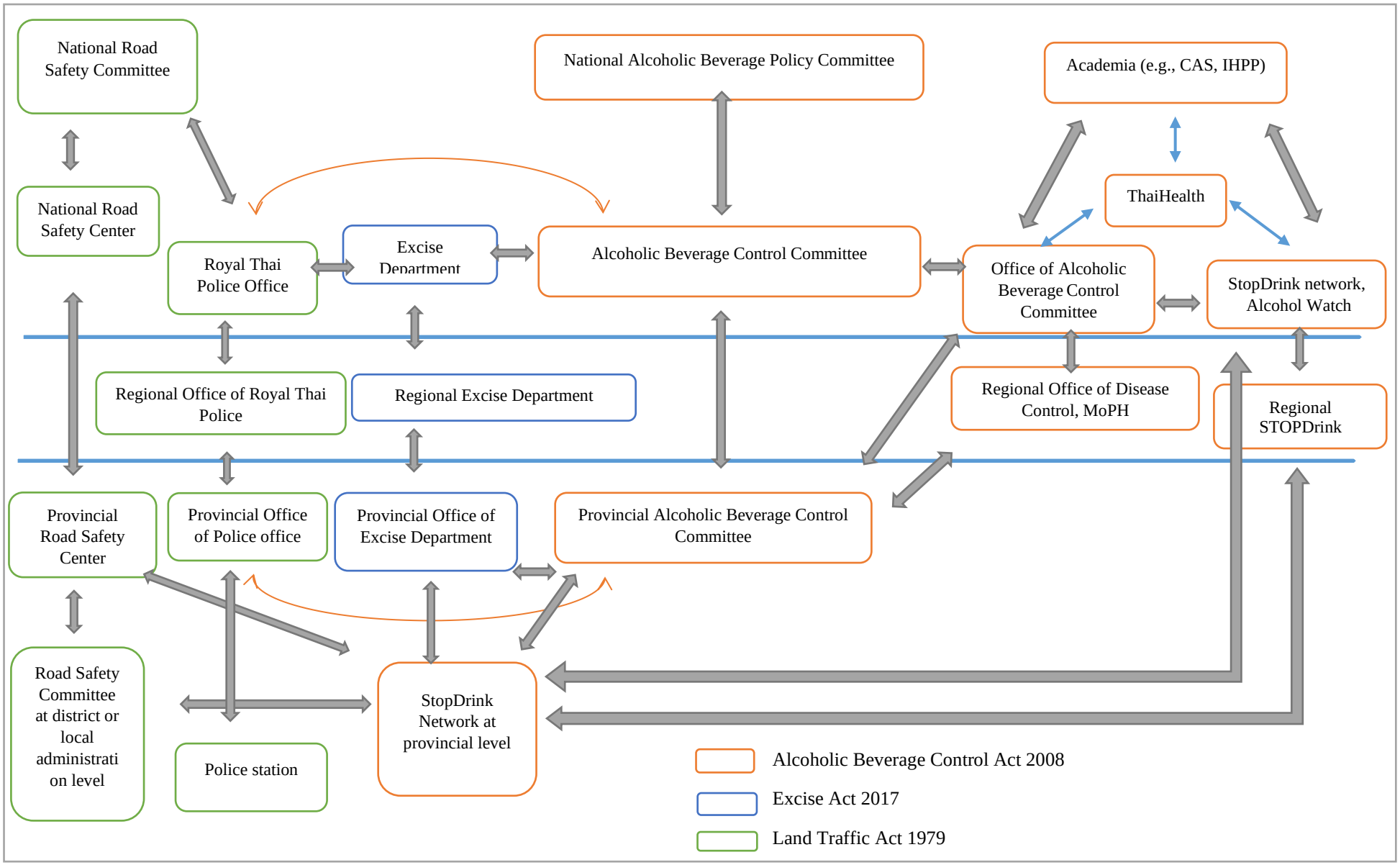
National Road Safety Committee
National Alcoholic Beverage Policy Committee
Academia (e.g., CAS, IHPP)
National Road Safety Center
ThaiHealth
Royal Thai Police Office
Excise Department
Alcoholic Beverage Control Committee
Office of Alcoholic Beverage Control Committee
StopDrink network, Alcohol Watch
Regional Office of Royal Thai Police
Regional Excise Department
Regional Office of Disease Control, MoPH
Regional STOPDrink
Provincial Road Safety Center
Provincial Office of Police office
Provincial Office of Excise Department
Provincial Alcoholic Beverage Control Committee
Road Safety Committee at district or local administrati on level
Police station
StopDrink Network at provincial level
Alcoholic Beverage Control Act 2008
Excise Act 2017
Land Traffic Act 1979

Figure 1. 1 Implementing agencies of effective alcohol control policies in Thailand

Government actors: Critical role in the implementation of the Alcoholic Beverage Control Act B.E. 2551 (2008), the Excise Act B.E.2560 (2017), and the Land Traffic Act, B.E. 2522 (1979)

Under the Alcoholic Beverage Control Act 2008, three committees have legally mandated roles in the implementation of alcohol policy in Thailand. These are the National Alcoholic Beverage Policy Committee, the Alcoholic Beverage Control Committee, and the Provincial Alcoholic Beverage Control Committee. The Office of Alcoholic Beverage Control Committee acts as the secretariat of the three committees. These committees function across the various levels of policy, from national to provincial in the following ways. First, the prime minister chairs the National Alcoholic Beverage Policy Committee, which consists of nine ex-officio Ministers from different ministries, as mandated by article five of the Act (Office of Alcoholic Beverage Control Committee, 2008). This Committee is responsible for establishing national policies, strategies, and plans on alcohol control, alcohol treatment and rehabilitation, and monitoring, and evaluating the progress of national policies.

Second, the Alcoholic Beverage Control Committee is chaired by the Minister of Public Health, and members are ex-officio Permanent Secretaries from various ministries, the Chief of the Thai Health Promotion Foundation, and three representatives from Civil Society Organisation (CSO). The main function of the Alcoholic Beverage Control Committee is to propose alcohol control policies to the National Alcohol Control Committee and the Minister of Public Health.

Third, the Office of the Alcoholic Beverage Control Committee, which is part of the Department of Disease Control of the Ministry of Public Health, acts as secretariat to the National Alcoholic Beverage Policy Committee and the Alcoholic Beverage Control Committee. Hence, it is the coordinating body that has a direct relationship with the provincial committees. It monitors and evaluates the progress of alcohol control policies and coordinates with the Provincial Alcoholic Beverage Control Committee as well as other relevant agencies to reduce the harmful use of alcohol. Furthermore, it also maintains a clearing house of information on alcohol control policy in the country.

Fourth, implementing agencies at the provincial level are mainly assigned to the Provincial Alcoholic Beverage Control Committees (Provincial Committees). These committees are chaired

by provincial governors and include ex-officio members from various provincial offices. The Provincial Chief Medical Officer of the Ministry of Public Health acts as the secretariat of the Provincial Committee (Office of Alcoholic Beverage Control Committee, 2008). The Provincial Committees have five main functions: 1) providing recommendations in relation to national alcohol measures to the Alcoholic Beverage Control Committee, 2) giving advice and coordinating private- and government- agencies at the provincial level, 3) establishing a protocol for monitoring and preventing alcohol use among youth, 4) establishing protocols or procedures that are consistent with national alcohol policies in order to reduce the harmful use of alcohol, 5) regular monitoring to evaluate law enforcement and report back to the Alcoholic Beverage Alcohol Control Committee. In addition, representatives from the CSO can play a critical role in alcohol control at the provincial level but they are not members of the Provincial Committees. The work of CSOs is mainly funded by the Thai Health Promotion Foundation in order to support the implementation of alcohol control policies at the provincial level.

Apart from the four main key policy actors, the Excise Department is also a key agency responsible for implementing pricing and taxation, and licensing measures under the Excise Act B.E.2560 (2017). As such, the Excise Department has offices at both the regional and provincial levels. The functions of the Provincial Excise Offices are to tax alcohol production, issue licenses for alcohol production and alcohol retail, and monitor illicit alcohol. The Chief of each Provincial Excise Office is also a member of the Provincial Alcoholic Beverage Control Committee for that province.

In addition, the Royal Thai Police is the leading implementing agency responsible for enforcing the Land Traffic Act, B.E. 2522 (1979). Typically, the Royal Thai Police issue an official letter and provide guidelines to the provincial offices to assist them in their implementation of drink-driving measures. These drink-driving measures are also established through the road safety policy platform, consisting of five main actors: the National Road Safety Committee, the National Road Safety Center, the Provincial Road Safety Center, the District Road Safety Center, and the Local Administrative Road Safety Center. These five actors each have different functions. Firstly, the National Road Safety Committee directs policy planning and sets national strategies, as well as proposing national announcements to promote road safety. Secondly, the primary role of the National Road Safety Center is to propose road safety policies to the National Road Safety Committee and monitor the progress of implementation. Thirdly, the Provincial Road Safety

Center is chaired by provincial governors and mainly function to propose provincial policy on road safety, monitor implementation, set up monitoring systems, and report progress to the National Road Safety Center. Fourthly, the main function of the District Road Safety Center is to propose road safety policies at the district level, implement road safety policies, monitor progress and report to the Provincial Road Safety Center. Lastly, the Local Administrative Road Safety Center works on a voluntary basis within areas that consistently face road safety problems (Road Safety Center Thailand, 2020).

Academia: Critical role in generating evidence

The Center for Alcohol Studies is the main agency responsible for generating and supporting evidence-informed policy and monitoring and evaluating the progress of implementation at the national level (Wongwatanakul & Thamarangsi, 2013). This program is funded by the Thai Health Promotion Foundation and its partners (Wongwatanakul & Thamarangsi, 2013). In addition, the Alcoholic Beverage Control Committee is also part of the appointed Sub-committee on the Technical Support for Alcohol Control. The Sub-committee is responsible for promoting and supporting the development of academic knowledge, providing opinions and suggestions, monitoring and evaluating alcohol control measures, and proposing measures and guidelines to prevent and control the impact of alcohol consumption to the Alcoholic Beverage Control Committee. The Sub-committee comprises various academics from research institutes and universities. This Sub-committee meets regularly to prepare documents to support decision-making by the Alcoholic Beverage Control Committee and policy implementation (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020). With respect to drink-driving measures, the Thai Road Safety Center is the main academic agency responsible for generating and supporting knowledge and evidence-based policies on road safety, including drink-driving. The Thai Road Safety Center is funded by the Thai Health Promotion Foundation (ThaiHealth) (Thai Road Safety Center, 2018). At the provincial level, academics in some universities provide knowledge and technical support for the implementation of alcohol control policies; however, this is voluntary.

Civil society: Supporting the implementation of alcohol control policies, playing a complementary role to government actors

Various civil society organisations are involved in and contribute to alcohol control. They have roles in various national committees. Three of these are on advisory committee of the National Alcoholic Beverage Policy Committee (representatives from alcohol campaign, child development and consumer protection), with a further three on the Alcoholic Beverage Control Committee (representatives from alcohol campaign group; children, youth and women's group; and consumer protection group). In implementation of alcohol control policies in Thailand at national and provincial levels, there are two main civil society organisations. First, the Alcohol Watch Network, which monitors marketing activities for violations of the Act across all provinces in Thailand. They report to the Office of Alcoholic Beverage Control Committee under the Ministry of Public Health. In addition, the Stopdrink network plays a significant role in implementing alcohol control policies across all provinces in Thailand (StopDrink network, 2019; Wongwatanakul & Thamarangsi, 2013). It is the main CSO partner involved in supporting and implementing the Alcoholic Beverage Control Act 2008, through raising awareness and helping to monitor businesses that violate the Act at the national and local levels.

Multi-sectoral collaboration occurs across these three actor groups: the government, which regulates and implements the Act; academia, which generates evidence for the implementation of policies; and civil society, which supports the implementation of alcohol control policies through three main functions. First, they play a crucial role in promoting information about alcohol laws to educate the public and raise awareness about existing regulations, as well as fostering public support for law enforcement. Second, they are involved in monitoring and reporting violations of laws, as well as following up on progress after violations are reported. Lastly, in relation to drinking-and-driving countermeasures, civil society members assist police officers in enforcing the law.

ThaiHealth, an independent body established by law (Pongutta et al., 2019), plays a critical coordinating role across the three actor groups (Wongwatanakul & Thamarangsi, 2013). The Thai Health Promotion Foundation's Chief Executive Officer is also an ex-officio member of the Alcoholic Beverage Control Committee. At the provincial level, ThaiHealth supports the

Stopdrink network in its work assisting the implementation of the Alcoholic Beverage Control Act 2008 (see Figure 1.1).

1.3 Public administration at the provincial level and provincial alcohol control policy context

1.3.1 Public administration at the provincial level

Thailand consists of 77 provinces. There are three levels of public administration under the National Administrative Organization Act 1991: central, provincial, and local.

First, central administration refers to ministries and their subordinate departments and agencies headquartered in Bangkok.

Second, at the provincial level, there are 77 provincial administrative offices and 878 districts. The provincial administration is based on the concept of decentralisation, wherein central ministries delegate certain powers to peripheral offices in the provinces and districts, with ultimate control and direction retained centrally at the ministerial headquarters in Bangkok (Lowatcharin & Crumpton, 2019). The provincial governors are appointed by the Ministry of the Interior. They are responsible for ensuring the implementation of national policies at the provincial level.

Third, local administration consists of three levels: provincial local administration, municipalities, and local administration at the sub-district level (Lowatcharin & Crumpton, 2019; Royal Thai Government, 1991). The chief of each provincial local administration is elected by residents of their area. The local administration is also based on the decentralisation concept, whereby they can create their own policies and have their own decision-making bodies for financial management and allocation, resource planning and public service delivery.

This thesis focuses on the second level, where provincial governors serve as the heads of the provinces responsible for ensuring the implementation of national policies, in particular, effective alcohol control policies, at the provincial level. The provincial governors serve as the chairs of both the Provincial Alcoholic Beverage Committee and the Provincial Road Safety Center Committee. Further details regarding the functions and roles of these committees are provided below.

1.3.2 Alcohol consumption situation at the provincial level

The current prevalence of alcohol drinking varies across provinces in Thailand. The highest prevalence of alcohol consumption is found among provinces located in the northern- and northeastern- regions, whereas the lowest prevalence is in provinces situated in the southern region of Thailand, a region heavily populated with Muslims (Assanangkornchai, 2019a). A study by Chaiyasong and Thamarangsi generated a provincial alcohol index (PAI) using 2007 national survey data (Chaiyasong & Thamarangsi, 2016). The PAI consists of five main components: the prevalence of adult drinkers, the prevalence of underage drinkers, the proportion of regular drinkers, the proportion of binge drinkers, and the proportion of drink drivers. The PAI scores ranged from 0 to 100, where a higher score indicates a higher risk of drinking problems (Chaiyasong & Thamarangsi, 2016). There was wide variability in PAI scores across Thailand. Scores were highest in the provinces located in the northern region, and lowest in the southern region. Furthermore, PAI scores varied widely across provinces located in the northern and central regions. The study found while the provincial alcohol index is related to alcohol-related harms across provinces, there were low goodness-of-fit values for the association between the PAI scores and alcohol-related harm. This thesis extends Chaiyasong and Thamarangsi's work (Chaiyasong & Thamarangsi, 2016) by measuring policy implementation aspects at the provincial level.

1.3.3 Key actors involved in the implementation of effective alcohol control policies at the provincial level

The primary stakeholders involved in implementing effective alcohol control policies consist of various groups, often intersecting in certain circumstances. This section delineates their roles within the Act.

a) Alcoholic Beverage Control Act 2008

Provinces are the setting where alcohol control regulations are implemented. Chaired by the provincial governors, the Provincial Alcoholic Beverage Control Committees are the implementation arm of the Alcoholic Beverage Control Act. Therefore, leadership and commitment from provincial governors are key to effective implementation of the Alcoholic Beverage Control Act 2008 at the provincial level.

The Alcoholic Beverage Alcoholic Control Act 2008 was enacted at the provincial level by the Announcement of the Prime Minister on Officers for enforcement of the Alcoholic Beverage Control Act (Office of Alcoholic Beverage Control Committee, 2008). Various actors were assigned in the Announcement, including the Provincial Alcoholic Beverage Control Committees, and provincial officers under the Ministry of Public Health, Ministry of Interior, Ministry of Finance (including officers of the Excise Department and officers of the Customs Department), Ministry of Industry, Ministry of Culture, Ministry of Social Development and Human Security, Ministry of Interior, and the Royal Thai Police (Office of Alcoholic Beverage Control Committee, 2008). Apart from these key government officers, civil society organisations also play a crucial role in reporting suspected cases that potentially violate the Alcoholic Beverage Control Act 2008 and the Excise Act 2017.

b) The Land Traffic Act 1979

The Chief of the Provincial Police Office in each province issues official letters and approves plans for conducting local sobriety checkpoints. The Provincial Road Safety Center is another implementation arm for enforcing drink-driving measures and other road safety measures. The Provincial Road Safety Center also monitors progress with implementation of drink-driving measures. All members of the Provincial Road Safety Center are also on the Provincial Alcoholic Beverage Control Committee

a) The Excise Act 2017

The Provincial Office of the Excise Department and its branches are the main implementing agencies of the Excise Act 2017.

1.3.4 Processes of policy implementation of effective alcohol control policies at the provincial level

a) Alcoholic Beverage Control Act 2008 – regulation for control of physical availability and alcohol advertising

The authorities who enforce the Alcoholic Beverage Control Act are described above. Law enforcement is implemented differently depending on the mechanisms used by different provinces. In some provinces, officers under the Ministry of Public Health act as coordinators to set up the

plan for law enforcement. In other provinces, law enforcement teams for the Alcoholic Beverage Control Act 2008 join with other teams working to enforce other laws, such as existing laws on peace and social order. Some provinces have plans at the district level, which officers working under the Ministry of Public Health support and coordinate. The Provincial Committee in each province acts as the decision-making body that follows up on the progress of implementation. The frequency of meetings varies depending on the provincial context and key actors.

There are existing mechanisms to support the enforcement of the Act. The Office of the Alcoholic Beverage Committee established the Tobacco and Alcohol Surveillance System (TAS) as a platform for reporting law violations. Upon receiving complaints, the Committee forwards them to the Provincial Office of the Ministry of Public Health, which then follows up and addresses cases of law violation. Additionally, civil society members utilise informal channels such as digital chat rooms, with leading groups like the Alcohol Watch Network screening cases for referral to the Office of the Alcoholic Beverage Committee.

b) Drink-driving

Police officers establish plans to enforce drink-driving measures, which they then submit to the Provincial Chief Officers of the Royal Thai Police for implementation (Royal Thai Government, 2021). During periods of regular road activity, police officers typically serve as law enforcers. However, during peak periods for road traffic injuries, such as New Year and Thai New Year, additional support is provided by officers from the Provincial Office of the Department of Disaster Prevention and Mitigation, Ministry of Interior, and volunteers. Progress with addressing road traffic injuries is monitored through the Provincial Road Safety Center.

c) Alcohol taxation policies

At the provincial level, officers under the Excise Department are responsible for enforcing alcohol taxation policies. There are two processes for implementing these policies. Firstly, owners must purchase tax stamps for alcohol products produced in the provinces, indicating that the required tax has been paid. This requirement applies to all alcoholic products except beer, which instead carries a label stating "tax paid" on the product. According to the law, officers under the Provincial Office of the Excise Department are mandated to conduct monthly inspections of alcohol factories

to monitor the presence of illicit alcohol (Department, 2017). Secondly, the detection of illicit alcohol occurs through two methods: inspections at alcohol factories and inspections during alcohol sales at retail outlets. The first task is solely conducted by the Provincial Office of the Excise Department, while the second task is carried out by both the Provincial Office of the Excise Department and its branches.

Despite the dedicated implementation roles specified in the Alcoholic Beverage Control Act 2008, the Excise Act 2017, and the Land Traffic Act, B.E. 2522 (1979), failure to effectively implement regulations is one major challenge contributing to the gap between policy intention and outcomes. A Joint Assessment Mission was established by the WHO Country Cooperation Strategy (CCS-NCD) in 2020 to review alcohol control policy and strategy in Thailand between 2008 and 2019. Various concerns and challenges were identified, including inadequate policy infrastructure for law enforcement at the provincial level (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020). This included a lack of political commitment in response to local contexts, instability of institutional capacity as measured by workforce competency and staff turnover rate, insufficient budgets, lack of monitoring, and lack of evidence for policy and other supporting mechanisms (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020). The weak policy infrastructure is complicated by external challenges, notably industry interference in alcohol control policy and aggressive marketing and promotion of alcohol. As a result, law enforcement remains weak. For example, in one study, 99% of people below the legal purchasing age requirement who attempted purchase successfully bought alcohol by themselves (Puangsuwan et al., 2012). In addition, a study conducted in 2019 by Srithanaviboonchai and colleagues reported that one-third of the Thai population (33%) had admitted to seeing alcohol being sold to people below the legal purchasing age (Srithanaviboonchai et al., 2019). Moreover, previous technical reports address the challenge of implementing drink-driving countermeasures due to the lack of funding to support alcohol blood tests (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020) and insufficient alcohol breathalysers (Khampang, 2022).

1.4 Implementation research of alcohol control policy

Policy implementation research gained prominence following Pressman and Wildavsky's examination of a failed economic project in Oakland, California in 1973 (Pressman & Wildavsky, 1984). Despite the project's sound design and widespread public support, it failed to reduce unemployment rates. This incident marked the emergence of policy implementation research, which seeks to elucidate the factors influencing policy goals and outcomes. Essentially, it aims to bridge the gap between policy expectations and actual outputs and outcomes. While policy implementation has traditionally been seen as a domain of public administration and political science, there has been limited development of theories and frameworks in this area. This could be attributed to a reluctance by policy implementation researchers to integrate theories from other fields, reflecting a conservative approach to theory adaptation (Nilsen et al., 2013).

Studies aimed at generating a conceptual framework for the implementation of alcohol control policies are notably scarce. Most existing research focuses on illustrating the pathways and interactions between alcohol consumption levels, consumption patterns, and alcohol-related harm (Babor et al., 2022; Room et al., 2016). Only one US study focuses on the conceptualisation of policy implementation in the context of city level restrictions on malt liquor availability (Jones-Webb et al., 2014).

Conceptualising and generating theories to frame issues is crucial for designing effective policy, planning its implementation, and evaluating its outcomes. To achieve this, it is imperative to gather a collective body of evidence, drawn from different country contexts, to confirm the validity of conceptual frameworks or theories. This approach will assist policymakers and researchers to develop comprehensive and adaptable strategies that address the complexities of alcohol control policies.

1.5 Measuring implementation of alcohol control policies and a composite index of implementation of alcohol control policies

The composite index is increasingly recognised as a tool for use by policymakers to compare, rank, monitor, and benchmark a country’s performance. The composite index helps to capture and

illustrate the complexity of multiple dimensions of policy implementation and compile these dimensions into a single tool. This approach is widely used to initiate discussion and stimulate public interest (OECD, 2008).

The following subsections discuss previous research and its limitations regarding the components needed to create a composite index, and in particular methods and data sources for creating a composite index of alcohol control policy implementation at the provincial level.

1.5.1 Components for creating a composite index to assess the implementation of alcohol control policies

Brand et al. (2007) conducted a pioneering study to develop an index for evaluating alcohol control policies across 30 OECD countries (Brand et al., 2007). Their research garnered significant attention, and subsequent studies have expanded upon their findings. The index developed by Brand et al. (2007) is based on five policies encompassing physical availability, drinking context (community mobilisation programs and mandatory training of alcohol servers), alcohol prices, alcohol advertising, and operation of motor vehicles. The primary focus was assessing the presence or absence of alcohol control policies and their stringency (Brand et al., 2007). Subsequent studies have maintained this focus on policy stringency across countries, while also broadening the scope to include a larger number of countries (Ferreira-Borges et al., 2015; Joana & Sandro, 2018). The study conducted by Madureira-Lima and Galea (Joana & Sandro, 2018) encompasses the largest number of countries to date, using data from 167 countries. Moreover, their study also covers a wider range of policy areas by incorporating the 10 areas outlined in WHO's Global Strategy to Reduce the Harmful Use of Alcohol. Nevertheless, only a handful of studies have expanded their focus beyond the stringency of policies to other critical elements, such as implementation or enforcement aspects. While this shift in focus poses greater challenges in terms of methodology and sourcing data, it is crucial to supporting the transition from policy to tangible impact. A benchmarking study by Casswell et al. is among the few attempts to measure policy impact, however, it does not assess implementation directly (Casswell et al., 2022). In summary, few studies have created a composite index that includes policy implementation aspects. These aspects are important to the process transferring policy into impact on the ground.

Only four countries, the US, Canada, England, and Sweden, have produced studies into the level of implementation of alcohol control policies at the sub-national level (de Vocht et al., 2016; Naimi

et al., 2014; Nilsson et al., 2015; Vallance et al., 2021). Studies from the US and Canada have focused on the existence of policies in different cities, states, or provinces (Naimi et al., 2014; Vallance et al., 2021). One US study also attempted to classify enforcement activities across different cities (Erickson, Rutledge, et al., 2015). A study in Sweden by Nilsson et al. integrated elements of policy implementation into an index with five main elements: staff and budget, municipal alcohol policies, supervision and licensed premises, cooperation with local actors, and prevention activities and prevention programmes (Nilsson et al., 2015). In England, researchers attempted to created index scores based on two indicators: whether areas made use of cumulative impact based on licensing data and whether applications for new alcohol premises were successfully challenged by local authorities in the area (de Vocht et al., 2016). The cumulative impact zone policy, implemented in England and Wales, aims to limit the density of outlets by assessing new alcohol license applications based on the potential adverse effects they might have on the area (Her Majesty's Stationery Office, 2003).

1.5.2 Methods and data sources for creating a composite index of alcohol control policies

Previous composite indexes of alcohol control policies have employed data from two main sources – secondary data and interviews with key informants. Some studies combine both methods. Brand et al. (2007) , one of the first studies to create an index for measuring alcohol control policies, used data from available sources, including technical reports and data from WHO (Brand et al., 2007). This approach has also been used to develop subsequent alcohol control policy indexes, including studies by the World Health Organization Regional Office of Europe (World Health Organization Regional Office for Europe, 2017), Pan American Health Organization (Pan American Health Organization, 2018), and Madureira-Lima and Galea (Joana & Sandro, 2018) to measure implementation of the Global Strategy. These studies were based on WHO global alcohol and substance use surveys, which gather data from national experts via self-administered questionnaires. The WHO data is collected at the country level, mainly from experts from the Ministry of Health of each Member States. Therefore, data quality may vary. Moreover, the WHO data only indicates whether a policy exists, without further providing detail about the specific policies. The International Alcohol Control (IAC) study uses a different approach. Researchers within collaborating countries collect data using a wide range of methods and sources. Sources

include legislative documents, liquor licensing lists (for hours), and government websites (for information such as excise tax rates and blood alcohol concentration levels). The studies that assessed alcohol control policies at sub-national levels relied on the existing data from the website of relevant agencies and also questionnaire data from local authorities (Naimi et al., 2014; Nilsson et al., 2015).

The existing composite indices for measuring alcohol control policies are validated in similar ways, including by assessing the association between index and alcohol consumption per capita. Some indices are validated against drinking patterns, or rates of abstention. The indexes normally have scores (ranging from 0 to 100) for levels of implementation across 10 action areas for WHO Member States. The majority of studies identify an association between their respective indexes of alcohol control policies and alcohol consumption per capita. For example, Brand et al. (2007) found that scores determined the strength of a country's alcohol control policies, identifying a strong negative correlation (r = -0.57) between alcohol policy scores and per capita consumption (Brand et al., 2007). A similar study conducted across nine countries in the Western Pacific Region assessed levels of stringency and enforcement in five domains using 16 intervention items. This study found a strong negative correlation between rating scores and alcohol consumption (r = -0.86) (Carragher et al., 2014). As mentioned, other studies have investigated the association between index scores and alcohol consumption patterns (e.g., drinking frequency (Casswell et al., 2023), and binge drinking and rates of abstention (Leung et al., 2023)). For example, Leung et al. found a strong association between the index applied and lifetime abstention (r=-0.76) (Leung et al., 2023). Another study conducted in the USA found that the alcohol policy scores correlated with binge drinking prevalence (r=0.50) (Naimi et al., 2014).

A limited number of studies have investigated the association between composite indexes of alcohol control policies and alcohol-related harms. Research conducted in the US has linked the stringency of alcohol control policies with alcoholic liver cirrhosis and alcohol-related road traffic injuries. One index combines two aspects: stringency and enforcement (frequency of enforcing existing law, resources available to enforcement officers). Greater stringency of drink-driving regulations by including random breath testing was found to be associated with a reduction in alcohol-related traffic fatalities (Cohen et al., 2002). Another US study reported an association between stringency of alcohol control policies and alcoholic liver cirrhosis among females, but not

males (Hadland et al., 2015). These previous studies have mainly investigated the stringency of policy at the local level and paid less attention to the supporting infrastructure for policy implementation. Moreover, the US context differs from Thailand, where alcohol control policies are based on national laws.

1.6 Summary of knowledge gaps

In Thailand, despite the establishment of effective policy implementation measures (control of alcohol advertising, control of physical availability, drink-driving countermeasures, and alcohol taxation), the country still faces challenges in executing those policies and attaining their intended goals. This thesis aims to address three knowledge gaps in global alcohol control policy research. Simultaneously, it specifically endeavours to contribute to enhancing the effectiveness of policy implementation in Thailand.

The first knowledge gap concerns the lack of a standardised conceptual framework for the implementation of effective alcohol control policies globally. While an existing framework from the US attempts to address this knowledge gap, it has a narrow focus on controlling physical availability to restrict the sale of high malt liquors (Jones-Webb et al., 2014). There is a need for a robust framework that can be tested in diverse social contexts. Thailand, a country that has already adopted four effective policies, is well-suited to the initial development of such a conceptual framework. The research can then pave the way for other low- and middle-income countries facing similar challenges in alcohol control policy implementation.

Secondly, the majority of studies assessing the implementation of effective alcohol control policies tend to focus on a single policy rather than considering the broader spectrum. This gap is exacerbated by the lack of standardised tools and indicators for measuring the implementation of alcohol control policies. Furthermore, no systematic review has been conducted to gather these tools and indicators together to comprehensively address policy implementation. Systematically collating available tools and indicators would greatly benefit both researchers and practitioners involved in planning, implementing, and evaluating the progress of policy implementation efforts.

Thirdly, no single study has endeavoured to establish an index reflecting the implementation of effective alcohol control policies in low- and middle-income countries. These nations face

particular challenges, including limited resources and competing health priorities such as infectious diseases and non-communicable diseases. Such an index would serve as a valuable tool for monitoring the progress of policy implementation and capturing for attention of both the public and policymakers. While a few studies have developed indices for local alcohol policy implementation, such as in Sweden, these studies have limitations in terms of their applicability to other countries. For instance, the strictness of alcohol control policies in Sweden, where there is a government monopoly on alcohol sales, differs from other contexts, particularly low- and middle-income countries. Furthermore, the association between the index and alcohol consumption at the local level was minimal (Nilsson et al., 2020). This doctoral research seeks to extend earlier studies by developing broader indicators tailored to the specific capacities of governments or implementation agencies in Thailand, such as the provision of technical support for law enforcement and staff training, while also accounting for potential confounders that could affect the association, such as regional variations in drinking culture.

1.7 Objectives

To develop a composite index of provincial alcohol control policy implementation capacity in Thailand.

Specific objectives

1. To identify tools and measurements used to assess the implementation of alcohol control policy from the research literature.
2. To develop a conceptual framework to assess the implementation of provincial alcohol control.
3. To generate a composite index of provincial alcohol control policy implementation capacity in Thailand based on the conceptual framework
4. To examine the associations between a composite index of provincial alcohol control policy implementation capacity in Thailand and relevant available outcomes in all provinces

1.8 Thesis structure

The thesis comprises four primary publications. The first publication was a scoping study which reported tools, methods, and indicators to assess policy implementation quantitatively. The second publication focused on identifying indicators, termed facilitators and barriers, affecting the effective implementation of alcohol control policies. Both publications aimed to compile tools and indicators towards developing a composite index for evaluating the effectiveness of alcohol control policies. The third publication conceptualised policy implementation for effective alcohol control policies at the provincial level in Thailand, primarily focusing on creating concepts and components for constructing the composite index. Lastly, the main publication constructed an index of policy implementation at the provincial level in Thailand. The final section of the thesis discusses key findings, and the research contributions, implications, and limitations.

Chapter 2: Quantitative tools and measurements for assessing the implementation of regulatory policies in reducing alcohol consumption and alcohol-related harms: A scoping review

Policy implementation refers to transferring policies into practice. The main focus is the processes of implementation (carrying out, accomplishing, fulfilling, producing and completing policy goals). Implementation of effective alcohol control policy is a global priority as alcohol contributes to negative individual health and wider societal impacts. However, comprehensive reviews of the tools and measurements for assessing the implementation of alcohol control policy are lacking in the published literature. Chapter 2 reports a scoping review of quantitative tools and methods for assessing the implementation of effective alcohol control policies. The aim of the review was to identify tools and measurements for assessing alcohol policy implementation to inform the development of the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand (Chapter 5).

Abstract

Issues. Implementation of alcohol control policy is a global priority as alcohol contributes to negative individual health and societal impacts. However, there are no available reviews that comprehensively provide tools and measurements for assessing the implementation of alcohol control policy. This study reviews tools and measurements for assessing alcohol policy implementation. Policies considered include alcohol pricing and taxation, alcohol marketing control, physical availability control, and drink-driving policy. **Approach.** We conducted a scoping review from Scopus, Web of Science, and World Health Organization's website. We included studies on policy implementation for the four most effective prevention policies published worldwide between 2000 and 2021. **Key findings.** The search yielded 11,654 articles, and these were narrowed down to 39 included studies. Of these 39 studies**,** almost half assessed the implementation of a drink-driving policy (n=19), followed by multiple policies (n=12), and physical availability control (n=8). There is no single study assessing policy implementation of pricing and taxation or alcohol marketing control. The majority of the studies were conducted in high-income countries (n=31). Globally, there is no standardised tool or guidelines for measuring the policy implementation of these four policies. The tools for measuring policy implementation mostly focused on a single policy, and few covered multiple policies. **Implications.** We recommend developing standardised tools and measurements to monitor policy implementation across multiple policies at country levels. **Conclusion.** This review highlighted a lack of comprehensive and standardised tools to assess policy implementation and the limited number of studies on alcohol policy implementation in low- and middle-income countries.

Keywords: tool, quantitative measurement, policy implementation, alcohol policy, scoping review

Introduction

Alcohol consumption has negative impacts on individual health and on society. Alcohol consumption contributes to more than 230 diseases and injuries such as liver cancer, tuberculosis, fetal alcohol spectrum disorders, alcohol dependence, and suicide. Globally, there are six deaths every minute from alcohol-related diseases and injuries (World Health Organization, 2018b). Not only this, but alcohol has serious negative impacts on society as a whole, such as contributing to domestic violence and crime. In addition, alcohol consumption has resulted in productivity and economic losses, ranging from 0.45-5.44% of Gross Domestic Product (Thavorncharoensap et al., 2009).

Policy implementation refers to transferring policies into practice. It is mainly focused on the processes of implementation (carrying out, accomplishing, fulfilling, producing, and completing policy goals) (Pressman & Wildavsky, 1984). Various domains are considered important, including the content of policies or characteristics of interventions, factors within implementing agencies (e.g., resources, skills, and the acceptability of the policy to the implementing agencies), contextual factors (political, social, and cultural factors) (Breimaier et al., 2015; Damschroder et al., 2009). Implementation processes include training, coordinating, raising public awareness, and law enforcement (Jones-Webb et al., 2014). Also, immediate results and short-term outcomes (e.g., knowledge about policies or law among implementers and general population, and the perception of law enforcement among general population), are useful as they help to identify steps and progress in the policy implementation process.

Despite increasing evidence of the effectiveness of alcohol control policies, particularly the so-called “best-buy policies”(World Health Organization, 2017), there has been less attention on translating those policies into practice in various settings, particularly in low- and middle-income countries. In addition, alcohol policy implementation is challenging, as efforts and commitments are beyond the health sector and include the context of powerful commercial interests (World Health Organization, 2019a). The complexity of policy implementation requires sound measurements and standardised tools for measuring alcohol policy implementation to track progress and prioritise policy actions.

Measuring policy implementation is an essential step for identifying the progress of policy implementation at national and global levels. Quantitative measures and tools can help to measure the progress of policy implementation and identify potential facilitators or barriers that affect policy implementation outcomes and can be designed to be comparative across countries. To allow countries to monitor their progress requires tools to enable comprehensive measurements of policy content, implementation processes, and policy implementation context (Hogwood & Gunn, 1984) and to monitor policy implementation in different policy areas. This can help countries identify implementation gaps and effectively prioritise their actions and efforts to invest limited resources efficiently. As a result, it can help countries leverage and accelerate alcohol policy implementation for achieving the Sustainable Development Goal 3.5.2, reducing alcohol consumption per capita.

Globally, few tools have been developed to measure the progress of policy implementation at the national level (Carragher et al., 2014; Casswell et al., 2018; Nilsson et al., 2015). Most of the available studies focused on the comprehensiveness and restrictiveness of policies (Brand et al., 2007; Erickson, Lenk, Toomey, et al., 2014; Joana & Sandro, 2018; Naimi et al., 2014). Few of them included measurements of policy implementation. One example which included implementation is the Alcohol Prevention Magnitude Measure, which was developed to measure policy implementation in Sweden (Nilsson et al., 2015); however, this tool has not been tested elsewhere. As most available tools focus on the comprehensiveness and restrictiveness of policies, they might not be able to capture the complexity of the factors that influence the implementation outcomes in different settings regarding social, economic, political, and cultural aspects. In this regard, the outcome of implementation may depend on more than just an effective intervention. Other aspects include cultural aspects and social norms, political commitment, and the capacity and motivation of the implementing agency itself. Hence, conducting a scoping review of tools for assessing the implementation of effective policies can help generate tools that capture the overall complexity of the implementation process.

At present, no systematic review or scoping review has been conducted to identify tools and measurements for assessing the implementation of alcohol control policy. Hence, this review is intended to fill this gap by focusing on the three “best buy policies”: alcohol pricing and taxation, control of alcohol marketing, control of physical availability, and one effective intervention, on

drink-driving (World Health Organization, 2017). This review aims to identify tools and measurements for assessing alcohol policy implementation.

Methods

We conducted a scoping review following the approach of the Joanna Briggs Institute (Peters et al., 2020) and registered the protocol through the Open Science Framework. The JBI's guideline has been widely used and cited worldwide (Khalil et al., 2020). A scoping review was deemed an appropriate choice for this review to explore the breadth and depth of literature, map existing knowledge, and identify gaps of knowledge (Tricco et al., 2016). A scoping review does require quality assessment or a critical appraisal of the included studies and its' purpose is not to critically review tools, their content or application.

To ensure the accuracy of the scoping review, we followed the six steps to conduct a scoping review provided by JBI (Peters et al., 2020).

Stage 1: identifying the research questions and scope of the study

The scoping review aimed to explore the evidence on tools and measurements available to assess the implementation of effective alcohol control policies. We developed a research question regarding the gap in evidence on the implementation of alcohol control policy. "What tools and measurements have been used to assess the implementation of regulatory policies to reduce alcohol consumption and alcohol-related harm?" We decided to focus on four regulatory measures with the strongest evidence base for effectiveness: alcohol taxation and pricing, control of marketing, control of physical availability, and drink-driving measures (World Health Organization, 2017). The operational definitions of the terms used in this review are as follows. Alcohol policy included any regulatory measures implemented at the national level or sub-national levels. The interested alcohol policies included the four most effective policies as mentioned earlier. Physical availability included regulating retail outlets, densities of retail outlets, restricting hours and days of trade, ban of public drinking, minimum purchasing age, licensing, control of social supply, and online sales (Babor et al., 2010). Alcohol marketing covers any regulatory measures that control any forms of alcohol marketing (i.e., alcohol advertisement, promotion, pricing promotion, alcohol sponsorship, products, and placement) (Babor et al., 2010).

Policy implementation means carrying out, accomplishing, fulfilling, producing, and completing policy goals (Pressman & Wildavsky, 1984). We focused on the following key areas: first, factors inside implementing agencies included available resources (e.g., financial, materials, and human resources) (Breimaier et al., 2015; Damschroder et al., 2009). Second, policy implementation process including activities to be carried out to implement alcohol control policies (e.g., coordinating between implementing agencies, education, raising public awareness, training, and law enforcement) (Jones-Webb et al., 2014). Third, short-term outcomes of policy implementation made by governments (e.g., knowledge about law content among implementers and general population, perception towards law enforcement among general population). This review does not focus on measurement of the intermediate-term outcomes (e.g., alcohol consumption patterns) and impacts (i.e., alcohol-related harm) which has been covered by a guideline from WHO 2000 (World Health Organization, 2000). Fourth, the context of policy implementation was also a focus (e.g., social, cultural, economic and political contexts). Last, characteristics of interventions or policy content, which focused on investigating the restrictiveness and stringency of policies and implementation were included (i.e. we excluded studies that focused only on policy content).

A quantitative tool refers to any tools used to collect data for measuring policy implementation and outcomes of policy implementation. Measurement is the process of an operationalised abstract construct (i.e., policy implementation) into concrete variables (Hagan, 2014; Thomas, 1998) in order to determine policy implementation and outcomes.

Stage 2: developing and conducting a search strategy

We developed a search strategy in Scopus and Web of Science. We selected Scopus as it is the largest search engine of scientific literature (Schotten, 2017), including 100% of MEDLINE health science topics. We selected Web of Science, which covered some of the articles not covered in Scopus. We also included grey literature from WHO's website. A search strategy was developed for Scopus and revised appropriately for Web of Science and WHO's website. The key search strategy can be found in the supporting information (see appendix Table 2A.1). The last date that we conducted the search was 18th May 2021.

Inclusion criteria

Inclusion criteria consisted of three aspects regarding context, concept, and population. All included studies needed to meet the three criteria. Firstly, the context, we included any literature from any setting. Secondly, the concepts: we included relevant studies that addressed quantitative tools or measures for assessing the implementation of one of the four policies: alcohol taxation and pricing, control of marketing, control of physical availability, and drink-driving policy. The studies included in this review focused on policy implementation regarding the scope mentioned earlier. Thirdly, the populations, we included any population group.

This review included publications published between 2000 and 2021 to ensure up-to-date evidence. We included published and grey literature. The grey literature included government reports and technical reports. Quantitative and mixed-methods were included to ensure that we included studies that used tools and quantitative measurements for assessing the implementation of alcohol control policies. We included primary and secondary research that quantified policy implementation.

Exclusion criteria

We excluded various types of studies. First, studies of policy implementation that did not investigate the four policies listed above. Second, we excluded any studies that did not provide tools or measurements. Third, we excluded any literature that was not written in English. Last, we excluded any studies that only applied qualitative methods.

Stage 3: evidence screening and selection

Two reviewers (JJ and PP) independently screened titles and abstracts following the review protocol. The full texts of studies selected for inclusion were then screened. In the case of a small number of disagreements, they were discussed, and a consensus was achieved.

Stage 4: data extraction

Based on the previous template suggested by JBI, (Aromataris & Munn, 2020) a data extraction form was developed and adapted during the protocol setting stage and piloted and adjusted during the review stage. The data extraction form was designed according to the research questions and objectives. It included authors, study country, objectives of the study, policy levels, settings, policy

areas, design and methods, tools, and key components of measurements assessing policy implementation. Prior to the use of the data extraction form, two reviewers independently tested the data extraction form and discussed improvements to the comprehensiveness and clarity of the form. The agreements were based on consensus between the two reviewers. The full data extraction process was done by one independent reviewer (JJ), and one reviewer (PP) verified the data for accuracy for every included study. If there were inconsistencies, the decisions were based on the consensus between the two reviewers.

Stage 5: data analysis

The purpose of this scoping review is to map and aggregate findings on the tools that existing studies have used for assessing the implementation of government policies. The data extracted from the studies were analysed descriptively using Stata 16. We adapted a logic model, including inputs, processes, outputs, short-term outcomes and long-term outcomes (Funnell & Rogers, 2011). This model was integrated with key concepts of policy implementation including policy content, policy implementation processes (e.g., education, cooperation, enforcement and publicising enforcement activities), and policy context (Hogwood & Gunn, 1984; Jones-Webb et al., 2014) We categorised components and measurements in alignment with adapted domains from a logic model and policy implementation domains, namely policy content, inputs (e.g., resources and workforce), processes of policy implementation (e.g., cooperation, enforcement and publicising enforcement activities), and short-term outcomes (e.g., compliance with laws, perception towards law enforcement, knowledge about law content), and context of policy implementation (Funnell & Rogers, 2011; Hogwood & Gunn, 1984; Jones-Webb et al., 2014). The logic model and concepts of policy implementation were applied to map indicators used in the included studies. This review was also investigated aspects of comprehensiveness in terms of tools in two dimensions: policy areas (alcohol pricing and taxation, control of alcohol marketing, control of physical availability, and drink-driving policy) and policy domains (law content, inputs, process, short-term implementation outcomes, and context). If there is a tool mentioned in the study, we also investigated whether its reliability and validity have been assessed (see definitions in Table 2.1)

Table 2.1 Validity and reliability domains and definition

Domain	Definition
Validity	The instrument measured what it intends to measure.
• Content validity	Experts in the discipline scrutinize the instrument very carefully and make value judgments regarding construct.
• Criterion-related validity	Comparing scores obtained from the instrument with an external instrument (i.e., gold standard) by investigating the correlation coefficient between results of the instruments.
• Construct validity	Determining one construct is correlated with another relevant construct that is being measured, but not the gold standard.
• Known-group technique	Instruments can differentiate outcomes that vary across different population.
Reliability	Internal consistency of instruments.

Source: Thomas, 1998 (Thomas, 1998)

Stage 6: presentation of the results

We followed the Preferred Reporting Items for Systematic Review and Meta-Analysis extension for Scoping Review (PRISMA-ScR) checklist (see appendix Table 2A.2).

Results

Search results

A total of 11,654 papers were identified from the databases and an additional search from WHO's website. After removing duplication, we screened 8,192 titles and abstracts. After excluding papers that were not in the scope of this review, we had 46 to assess for eligibility. We excluded seven articles for the following reasons: five papers were not in the scope of policy implementation, and mainly focused on the restrictiveness of policies, and two papers did not provide sufficient details on tools or measurements (Figure 2.1).

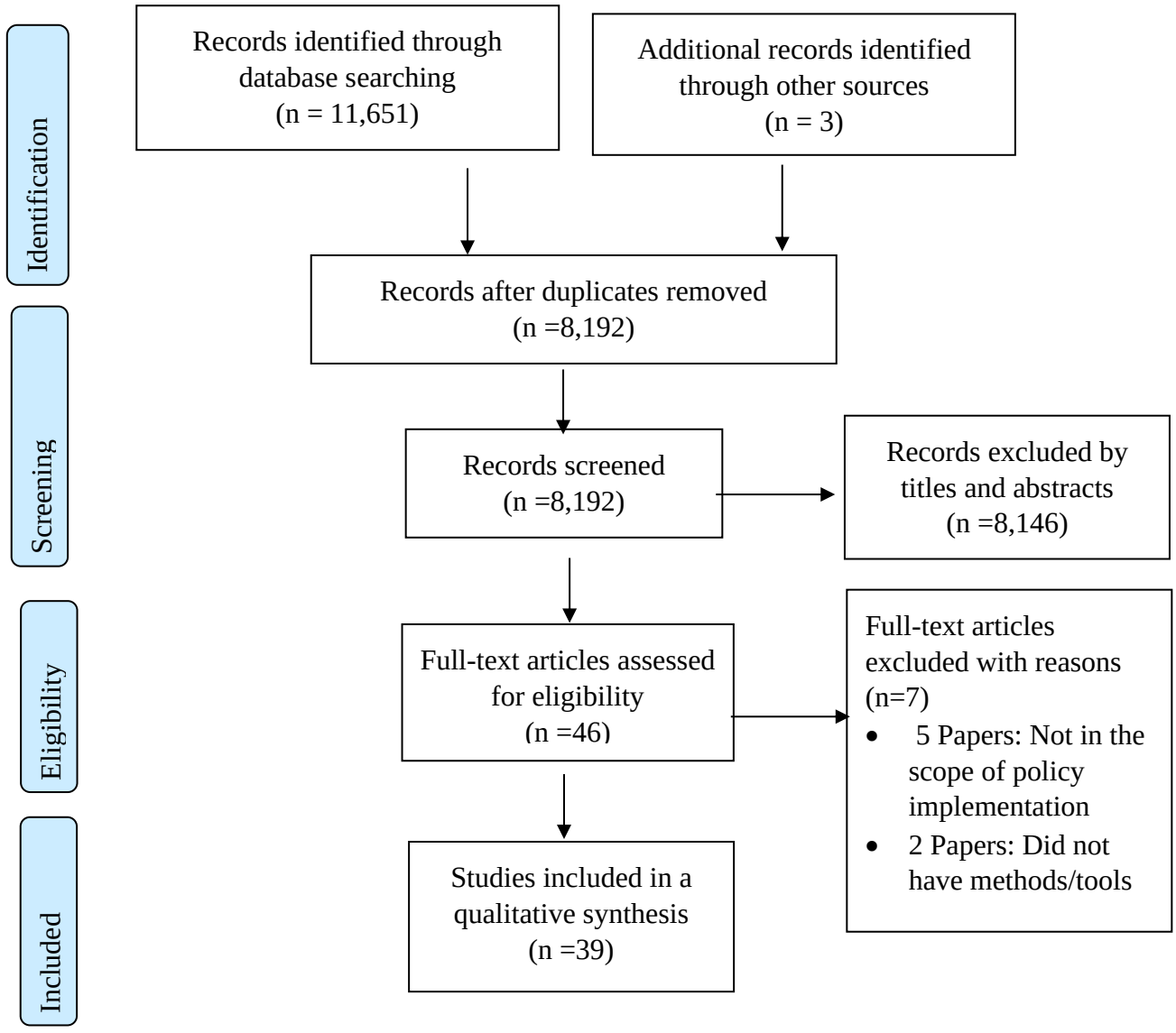

Figure 2. 1 Article screening process

Characteristics of the selected studies

Thirty-one studies were conducted in high-income countries, three were conducted in low- and middle-income countries, and five were multi-country. Regarding study design, the majority used cross-sectional surveys (n=18), multisource data (n=14) and mixed methods (n=7). For policy areas, almost half of the studies were primarily focused on drink-driving policy (n=19) and physical availability control (n=8). Twelve studies investigated the implementation of alcohol policies across different policy areas. No study examined tools that captured the implementation of pricing and taxation policy and alcohol marketing control. Under physical availability control, most of the articles were on minimum purchasing age (n=6) (Table 2.2).

Table 2.2 Characteristics of the selected studies

Characteristics of the selected studies	**Total number of studies n=39 (%)**
Country	
High-income countries	**31 (79)**
• USA	23 (59)
• New Zealand	2 (5)
• Sweden	2 (5)
• Australia (1), Chile (1), Spain (1), and UK (1)	4 (10)
Low- and middle-income countries	**3 (8)**
• China	2 (5)
• Cambodia	1 (3)
Multiple countries	**5 (13)**
Study design	
• Cross-sectional study	18 (46)
• Multisource data	14 (36)
• Mixed method	7 (18)
Level of study	
• National level	21 (54)
• Sub-national level	13 (33)
• Multi-countries	5 (13)
Policy areas	
• **Physical availability control policy** (minimum purchasing age (6), licensing (1), social supply to underage (1))	**8 (20)**
• **Drink-driving policy**	**19 (49)**
• **Combining at least two policy areas**	**12 (31)**

Tools for assessing policy implementation

We found that there is no standardised tool available for assessing alcohol policy implementation among the four policies. Among the studies that applied tools, most of them used questionnaires (n=32). However, only four studies assessed the validity of the questionnaires. One study assessed content validity, and another study applied content validity and criterion-related validity. The study that assessed criterion-related validity was conducted in nine countries in the Western Pacific Region by investigating the association between alcohol policy score and alcohol consumption per capita (Carragher et al., 2014). Furthermore, two studies applied the known-group technique. Those two studies were conducted in Sweden and generated the Alcohol Prevention Magnitude Measure (APMM), which measured the progress of policy implementation. The studies found that the APMM varied across communities with interventions and without interventions (Nilsson et al., 2015; Nilsson et al., 2020). In total, only five studies assessed the reliability of the tool.

In addition, the majority of studies applied a tool assessing a single policy, and we found that only two studies provided a tool for assessing implementation across the four-policy areas. These two studies included the International Alcohol Control Study, which included a component on the assessment of alcohol policy implementation using stringency and impact via surveys of e.g., price and marketing (Casswell et al., 2018; Huckle et al., 2018). Another study was the Toolkit for Evaluating Alcohol Policy Stringency and Enforcement-16 (TEASE-16), which measured policy enforcement by reviewing policy enforcement from available data and government reports (Carragher et al., 2014). In addition, the APMM was generated and tested in Sweden, quantified the implementation of the three main policies: physical availability, brief intervention, and drink-driving measures. The APMM was tested for reliability, and the components of APMM were mainly focused on resources, network and communications as well as activities that carry out to implement policies (Nilsson et al., 2015).

Components of measurements for assessing policy implementation among the four policies

Overall, regarding components of measurements for assessing the policy implementation, the majority of the studies assessed the context of policy implementation (n=29) and processes of

policy implementation (n=29), followed by short-term outcomes of policy implementation (n=16), inputs (n=14) and law content (n=5) (Table 2.3).

Regarding the context of policy implementation, most of the studies assessed community characteristics (n=19) (e.g., outlet density, poverty rates, per cent of ethnicity, unemployment rates) and individual characteristics (n=15) (e.g., age, gender, race, household income). Community characteristics and individual characteristics were mainly included in the studies on drink-driving policy, physical availability control and multi-policy. Beside this, eleven studies investigated social norms such as perception toward alcohol use, alcohol availability, and alcohol-related harm (Table 2.3).

Regarding the process of policy implementation, the majority of the studies investigated the presence/absence and intensity of law enforcement (n=27). Most of these studies investigated drink-driving policy (n=14) and multiple policies (n=8). Five studies investigated the presence/absence of publicity of enforcement and media advocacy for raising awareness (Table 2.3).

Regarding the short-term outcome components, the majority of the studies investigated short-term outcomes, including the deterrent effect of law enforcement (n=11). The majority of studies investigating the deterrent effect of law primarily focused on drink-driving (n=4) and multiple policies (n=4) (Table 2.3).

Regarding inputs of policy implementation, most of the studies investigated the existence of implementers and implementing agencies (n=11). In addition, six studies investigated resources allocated for policy implementation. The majority of these studies were found among multiple policies (n=4) and drink-driving policy (n=2) (Table 2.3).

Regarding law content, most of the studies investigated the restrictiveness and effectiveness of alcohol regulation, and among those were multi-policy studies (n=4) (Table 2.3).

Table 2.3 Components of measures for quantifying policy implementation and short-term outcomes of implementation outcomes of four policies

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
Policy content			5 (13)	
Stringency and effectiveness of alcohol legislation/regulation	**Stringency and effectiveness of alcohol legislation/regulation** using policy scores, constructed from a level of stringency, and effectiveness rating	Availability (1), and multi-policies (4)	5 (13)	(Carragher et al., 2014; Casswell et al., 2018; Erickson et al., 2016; Paschall et al., 2012; Paschall et al., 2014)
Input			14 (36)	
Available resources	**Presence/absence of implementers or implementing agencies** • Numbers of full-time officers per capita • Numbers of officers responsible for law enforcement per capita • Having specific unit assigned for law enforcement related to alcohol [yes/no]	Availability (2), drink-driving (5), and multi-policies (4)	11 (28)	(Calvert et al., 2020; Eger Iii, 2006; Erickson, Farbakhsh, et al., 2015; Erickson, Lenk, Sanem, et al., 2014; Erickson, Rutledge, et al., 2015; Fell et al., 2014; Fell et al., 2015; Jones-Webb et al.,

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
				2015; Nazif-Munoz et al., 2015; Nilsson et al., 2015; Nilsson et al., 2020)
	Resources available for implementation • Fund of enforcement activities per capita • Percentage of total annual resources in agencies devoted to enforce drink-driving laws	Drink-driving (2), and multi-policies (4)	6 (15)	(Erickson, Farbakhsh, et al., 2015; Nilsson et al., 2015; Nilsson et al., 2020; Paschall et al., 2012; Paschall et al., 2014; Yao et al., 2016)
Implementation Process			29 (74)	
Executing	**Cooperation with key stakeholders** • Organizing cooperation with relevant authorities [yes/no]	Multi-policies (2)	2 (5)	(Nilsson et al., 2015; Nilsson et al., 2020)
	Efforts on law enforcement, including presence/absence and intensity of law enforcement	Availability (5), and drink-driving (14), and multi-policies (8)	27 (69)	(Calvert et al., 2020; Carragher et al., 2014; Casswell et al., 2018; de Vocht

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
	• Conducting enforcement activities [yes/no] • Frequency of enforcement • Level of enforcement [Likert scales] • Number of DUI arrests (proxy of enforcement) • Number of sobriety checkpoints/ annual number of traffic stops per capita/ frequency of sobriety checkpoints (weekly, monthly, less than monthly, never) • Proportion of inspected grocery shops selling alcohol			et al., 2016; Dula et al., 2007; Eichelberger & McCartt, 2016; Erickson, Farbakhsh, et al., 2015; Erickson, Lenk, Sanem, et al., 2014; Erickson et al., 2016; Erickson, Rutledge, et al., 2015; Fell et al., 2003; Fell et al., 2014; Fell et al., 2015; Findlay et al., 2002; Jia, King, et al., 2016; Jones-Webb et al., 2015; Lenk et al., 2016; Maclennan et al., 2016; Meesmann et al., 2015; Nazif-Munoz et al., 2015; Nilsson et al., 2015; Nilsson et al., 2020;

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
				Randerson et al., 2018; Sanem et al., 2015; Stringer, 2019; Yao et al., 2016)
	Publicity of law enforcement and raising awareness of alcohol • Publicity of findings of law enforcement [yes/no] • Active work with media advocacy to increase awareness about alcohol [yes/no]	Drink-driving (3), and multi-policies (2)	5 (13)	(Eichelberger & McCartt, 2016; Fell et al., 2003; Nilsson et al., 2015; Nilsson et al., 2020; Sanem et al., 2015)
Implementation outcomes: Short-term outcomes			16 (41)	
Knowledge about laws among implementers, and the general population	**Knowledge about laws among implementers and general population** • Knowledge on laws [true/false and Likert scale] • Police's perception toward their skill and competence [Likert scale]	Availability (1), and drink-driving (3)	4 (10)	(Beck et al., 2009; Findlay et al., 2002; Jia, Fleiter, et al., 2016; Jia, King, et al., 2016)
Deterrent effect	**Deterrent effect and perceptions toward law enforcement**	Availability (3), drink-driving (4), multi-policies (4)	11 (28)	(Alonso et al., 2015; Bachani et al., 2017; Beck et al., 2009;

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
	• Perceived law enforcement [Likert scales] • Perceived likelihood of being caught [Likert scales] • Perceived likelihood of being arrested if the police stopped. [Likert scales] • Perceptions toward punishment [Likert scales]			Casswell et al., 2012; Dent et al., 2005; Huckle et al., 2018; Lipperman-Kreda et al., 2010; Lipperman-Kreda et al., 2009; Meesmann et al., 2015; Paschall et al., 2012; Paschall et al., 2014)
Compliance to law	**Compliance with alcohol law** • Percentage of respondents who violate alcohol control law • Level of compliance [Likert scale]	Availability (1), and multi-policies (2)	3 (8)	(Casswell et al., 2018; Findlay et al., 2002; Randerson et al., 2018)
Contextual factors			29 (74)	
Characteristics of implementers who involved in the policy implementation	**Characteristics of implementers** Gender, age, position or rank in service, number of years were in service	Drink-driving (1)	1(3)	(Findlay et al., 2002)

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
Social, cultural, and economic context	**Characteristics of general population** (age, gender, race, household income, marital status, ethnicity, and education level)	Availability (3), drink-driving (8), and multi-policies (4)	15 (38)	(Alonso et al., 2015; Bachani et al., 2017; Beck et al., 2009; Casswell et al., 2012; Erickson et al., 2016; Fell et al., 2015; Huckle et al., 2018; Jia, King, et al., 2016; Lenk et al., 2016; Lipperman-Kreda et al., 2010; Lipperman-Kreda et al., 2009; Meesmann et al., 2015; Paschall et al., 2012; Paschall et al., 2014; Sanem et al., 2015)
	Social norms on alcohol drinking, alcohol-related harm, and perception toward alcohol availability	Availability (3), drink-driving (3), and multi-policies (5)	11 (28)	(Alonso et al., 2015; Bachani et al., 2017; Casswell et al.,

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
	• Perception toward alcohol use [Likert scales] • Perceived alcohol harm [Likert scales] • Perceived acceptability of alcohol use [Likert scales] • Perception toward drink-driving behaviours [Likert scales] • Perceived ease of alcohol availability [Likert scales]			2012; Erickson, Farbakhsh, et al., 2015; Erickson, Rutledge, et al., 2015; Huckle et al., 2018; Jones-Webb et al., 2015; Lipperman-Kreda et al., 2010; Lipperman-Kreda et al., 2009; Paschall et al., 2012; Paschall et al., 2014)
	Measures on contexts of community or state context include two aspects: alcohol-related context, and demographic/social/economic context	Availability (5), drink-driving (9), multi-policies (5)	19 (49)	(Calvert et al., 2020; de Vocht et al., 2016; Dula et al., 2007)
	Alcohol-related context **Drinking norm** • (Wet, moderate, and dry)			(Eger Iii, 2006; Erickson, Farbakhsh, et al., 2015; Erickson, Lenk, Sanem, et al., 2014; Erickson et al.,

Sets of key components	A brief description and example of relevant measurement	Policies (n)	Total n (%)	Included studies [references]
	Outlet density or outlets per roadway mile in each city **Demographic/social/economic characteristics** • Poverty rate • Per cent of ethnicity • Population • Unemployment rates, • Religiosity • Deprivation index			2016; Erickson, Rutledge, et al., 2015; Fell et al., 2014; Findlay et al., 2002; Jones-Webb et al., 2015; Lenk et al., 2016; Meesmann et al., 2015; Nazif-Munoz et al., 2015; Nilsson et al., 2020; Paschall et al., 2012; Paschall et al., 2014; Stringer, 2019; Yao et al., 2016)

We found that none of the included studies investigated the implementation of a policy in all aspects, including content, input, process, short-term outcomes, and context. Eight studies covered four components of implementation. Among these studies, three of them investigated policy implementation across policy areas. See more details of the findings of the included studies in supporting information (see appendix Table 2A.3).

Discussion

This review is the first study that comprehensively reviewed tools and measurements for assessing alcohol policy implementation. This review contributes to the research community by mapping the published tools or measurements available worldwide. This study found no standardised tools or guidelines for measuring policy implementation among the four policy areas (alcohol pricing and taxation, control of alcohol marketing, control of physical availability, and drink-driving countermeasures). In addition, there were few studies that assessed the validity and reliability of the tools. However, the measurement components for assessing implementation in this review reflect a wide array of policy implementation aspects, including law content, implementation inputs, implementation processes, and short-term implementation outcomes, and implementation context. Overall, the literature is dominated by studies on the process of law enforcement effort, including the presence and absence and intensity of law enforcement.

Most studies assessed the implementation of a single policy, even though more than one type of alcohol policy is usually implemented in a country. Also, studies tend to focus on just some aspects of implementation. To assess how well policy is implemented, we recommend that a more comprehensive approach be taken where multiple effective policies are measured along with a range of key implementation measures. Using a more comprehensive approach and tools will allow for both wider-assessment of how well policy is implemented at a country-level and for how well a country is doing for each type of policy, both of which can help countries prioritise their actions effectively.

When considering the comprehensiveness of studies that found in this review, few studies investigated a range of policy domains. As policy implementation is an interactive process (Walt,

1994), comprehensive studies (i.e., studies that investigate all aspects of policy domains and across multiple policies) are required to help countries prioritise their actions effectively.

We did not find a study using tools or measurements to assess policy implementation of alcohol marketing and pricing policy. The findings may reflect the nature and policy situation globally. First, there are few countries that have implemented regulatory measures to control alcohol marketing (Jernigan, 2017). Second, most of the studies on pricing and taxation policy focused on effectiveness, particularly impact on alcohol consumption (i.e., price elasticity) (Nelson, 2013), which we did not include in this review. The International Alcohol Control Policy Index which included a measure of the impact of policies, intended to reflect implementation, found measures of both price and marketing were associated with per capita consumption across several countries (Casswell et al., 2022)

Implications

It is important to quantify policy implementation to evaluate its progress. Quantifying policy implementation (i.e., policy content, policy implementation process, outputs and short-term implementation outcomes, context) helps to identify potential factors that influence outcomes of policy implementation as well as assess the progress of policy implementation. Later, it contributes to evidence-based decision making to accelerate policy implementation. Our review collates tools and measurements available worldwide and reports the validity and reliability of the tools, where available. This comprehensive review of the tools can provide tools and measurements for countries to apply in their context to measure their policy implementation progress. Monitoring and measuring policy implementation can help countries track their progress and accelerate actions to achieve the Sustainable Development Goals: indicator 3.5.2 reducing alcohol consumption per capita and the global NCD target of reducing harmful use of alcohol by 20% by 2030 (World Health Organization, 2022).

Limitations

A few limitations need to be addressed in this review. First, we did not include non-English studies. Second, we assessed the validity and reliability of the tools based on the information provided by the included studies. However, authors may assess the validity and reliability of the study but not

mention it in the published studies. To comprehensively assess the quality of tools, one could contact authors to ensure the accuracy of the information; however, this is not required in a scoping review. Third, this review only focused on four policy areas and regulatory policy. Therefore, it may not cover alcohol policy implementation overall but concentrate on those known to be most effective. Last, our review focused on specific alcohol policies and policy implementation in general, but did not apply the concept or definition of policy implementation from the political science nor implementation science more specifically in the search strategy.

Conclusion

This review highlighted that there is no standardised tool for measuring alcohol policy implementation. Among available tools, there are few studies that assessed the validity and reliability of the tools. When considering measurement aspects, there is a lack of studies investigating the whole range of alcohol policy domains, from policy content, policy inputs, policy implementation processes, short-term outcomes of policy implementation, and policy context, and few studies assessed multiple policies simultaneously. Moreover, research on tools and measurements for assessing policy implementation is lacking in low- and middle-income country contexts; therefore, more research is needed to enhance policy implementation in these contexts.

Chapter 3: Barriers and facilitators to the implementation of effective alcohol control policies: A scoping review

Based on the evidence presented in the preceding chapter, there is a lack of comprehensive and standardised tools to assess policy implementation internationally. There is also a limited number of studies on alcohol policy implementation in low- and middle-income countries. The evidence presented in this chapter extends on these findings by examining the barriers and facilitators for implementing effective alcohol control policies. It was critical to review the literature on barriers and facilitators as these were not covered by the studies reviewed in Chapter 2 but may be important indicators in the measurement of policy implementation of effective alcohol control policies. This chapter also complements the quantitative focus in Chapter 2 by reviewing studies applying qualitative and mix method approaches. Identifying barriers and facilitators to effective alcohol policy implementation also informed the development of the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand (Chapter 5).

Abstract

Implementation of effective alcohol control policies is a global priority. However, at the global and national levels, implementing effective policies is still challenging, as it requires commitment from multiple stakeholders. This review provides a synthesis of barriers and facilitators to implementing effective alcohol control policies. We conducted a scoping review from two main databases: Scopus and Web of Science, and the grey literature from the World Health Organization's website. We included any studies investigating barriers and facilitators to implementing four effective policies: alcohol pricing and taxation, control of physical availability, alcohol marketing control, and drink-driving policy. Articles published between 2000 and 2021 were included. The search yielded 11,651 articles, which were reduced to 21 after the assessment of eligibility criteria. We found five main barriers: resource constraint; legal loopholes; lack of evidence to support policy implementation, particularly local evidence; low priority of policy implementation among responsible agencies; and insufficient skills of implementers. Facilitators, which were scarce, included establishing monitoring systems and local evidence to support policy implementation and early engagement of implementing agencies and communities. We recommend that national governments pay more attention to potential barriers and facilitators while designing alcohol control regulations and implementing effective policies.

Keywords: policy implementation; effective alcohol policies; barriers; facilitators

1. Introduction

Implementation of an alcohol control policy is a global priority. Alcohol contributes to more than 230 health conditions and has a negative impact on both individuals and society(World Health Organization, 2018b). Reducing alcohol consumption is a global commitment; for example, reducing alcohol consumption is one of the Sustainable Development Goals of the United Nations, and the World Health Organization (WHO) adopted the Global Strategy to Reduce Harmful Use of alcohol (Global Strategy) in 2010. However, the implementation of effective policies is still a global and national challenge. WHO's report reviewed the progress of the Global Strategy and addressed the challenges regarding the implementation of the Global Strategy at global and national levels over the past decade. The report reiterates the challenges related to policy

implementation of effective policies, including lack of political commitment, limited technical capacity, human resources and funding (World Health Organization, 2019a).

Implementation of an alcohol control policy is complex, as it often requires efforts from various stakeholders beyond health sectors, protection from various vested interests and is influenced by social and cultural factors within organisations and society in general (World Health Organization, 2019a). Implementing an effective policy requires individuals, organisations, and systems with enough capacity to enable policy implementation. Individuals and organizations require technical, administration, and political skills to effectively implement alcohol control policies. The systems' capacities are the environments that help to accelerate implementation, for example, political commitment and social climate promote policy implementation (Wu et al., 2018). Barriers and facilitators are embedded in those policy capacities. Removing barriers and promoting facilitators requires a systematic synthesis that can map and analyse how best to help governments design an effective policy and develop systems that can foster implementation. In addition, there are potential factors to consider for implementing general health-related policies, including characteristics of interventions or policies, factors inside implementing agencies, factors outside the control of implementing agencies, and individuals involved in policy implementation (Damschroder et al., 2009).

The main contribution of this study to the existing literature is to undertake a scoping review of barriers and facilitators to the implementation of the effective alcohol control policies (i.e., alcohol pricing and taxation, control of physical availability, control of alcohol advertisement, drink-driving policy). There is no existing systematic scoping review (or systematic review) on barriers and facilitators to implementing the effective alcohol control policies. Only one systematic review has previously provided a synthesis of barriers and facilitators of alcohol control policy implementation but focused only on the screening and brief intervention of alcohol use(Johnson et al., 2011). The implementation of screening and brief interventions has occurred in health care settings, while other effective policies such as taxation and pricing policy, alcohol marketing control, control of physical availability, and drink-driving policy are implemented in different settings and involve more stakeholders. Therefore, barriers and facilitators to policy implementation may vary depending on the context and settings of the policy. To systematically

scope barriers and facilitators to policy implementation from various settings can help countries be informed and design effective implementation of the effective alcohol control policies.

This review provides a synthesis of barriers and facilitators to implementing effective alcohol control policies.

2. Materials and Methods

We conducted a scoping review using the Joanna Briggs Institute (JBI) guidelines (Peters et al., 2020) and registered the protocol of the scoping review at the Open Science Framework. The main research question of this review is "what are the barriers and facilitators to implementation of effective alcohol control policies?". Our review focused on effective regulatory policies, including alcohol taxation and pricing, control of marketing (i.e., alcohol advertisement, promotion, pricing promotion, alcohol sponsorship, products, and placement (Babor et al., 2010)), control of physical availability (i.e., regulating retail outlets, the density distribution of retail outlets, restricting hours and days of trade, ban on public drinking, minimum purchasing age, licensing, control of social supply, and online sales (Babor et al., 2010)), and drink-driving measures.

In this review, policy implementation included carrying out, accomplishing, fulfilling, producing, and completing policy goals (Pressman & Wildavsky, 1984).

2.1 Search strategy and selected databases

We developed a search strategy in Scopus and revised it appropriately for the Web of Science and WHO's website. We chose Scopus because it is the largest search engine in the scientific field (Schotten, 2017), including 100% of MEDLINE health science topics, and we selected Web of Science, as some of its articles are not covered in Scopus. We also included grey literature from WHO's website. The key search strategy is provided in the appendix Table 3A.1. We conducted the search on 18 May 2021.

2.2 Inclusion criteria and exclusion criteria

We included studies that addressed barriers and facilitators of the four effective policies from literature published worldwide between 2000 and 2021 (we did not include brief intervention as this has previously been reviewed (Johnson et al., 2011) and is not a population-wide prevention approach). We included studies that investigated factors influencing the alcohol control policy implementation processes and outcomes, even if the studies did not explicitly mention barriers or facilitators to the alcohol control policy implementation. We included both published and grey literature (i.e., technical reports from WHO's website), and studies that applied any study design, including qualitative, quantitative and mixed-methods.

We excluded studies that did not address barriers and facilitators to the implementation of the four effective policies stated above, studies that were not in English, and studies that did not provide details on the methods (e.g., editorials, debates, news) to ensure transparency of studies (e.g., methods, study design and data collection).

2.3 Evidence screening, selection, data charting, and data analysis

Titles and abstracts were independently screened by two reviewers (JJ and PP) following the review protocol. The full texts of studies were later selected and assessed for eligibility criteria. There was no disagreement between the two reviewers for screening titles and abstract and full text screening.

The template of data charting from JBI was adapted (Aromataris & Munn, 2020) during the protocol setting stage and piloted and adjusted during the review stage. We designed data charting according to the research question and objective. The data charting form included authors, country, study design, study population, and barriers and facilitators to policy implementation. Barriers are factors that delay or have negative effects on policy implementation, and facilitators are factors that positively influence or enable policy implementation.

Prior to use, we tested the data charting form and discussed improvements to its comprehensiveness and clarity. One reviewer (JJ) charted the data, and the other (PP) verified its accuracy.

To analyse the data, we categorised information into barriers and facilitators. We applied the Preferred Reporting Items for Systematic Review and Meta-Analysis extension for Scoping Review (PRISMA-ScR) checklist (see Supplementary Table 3A.2).

3. Results

3.1 Search results

We identified 11,651 articles. We did not find any literature from WHO related to barriers and facilitators to policy implementation. After removing duplication, 8189 articles remained. After excluding papers not in the scope of this review, twenty-one were assessed for eligibility, and we included all of these studies in the synthesis (Figure 3.1).

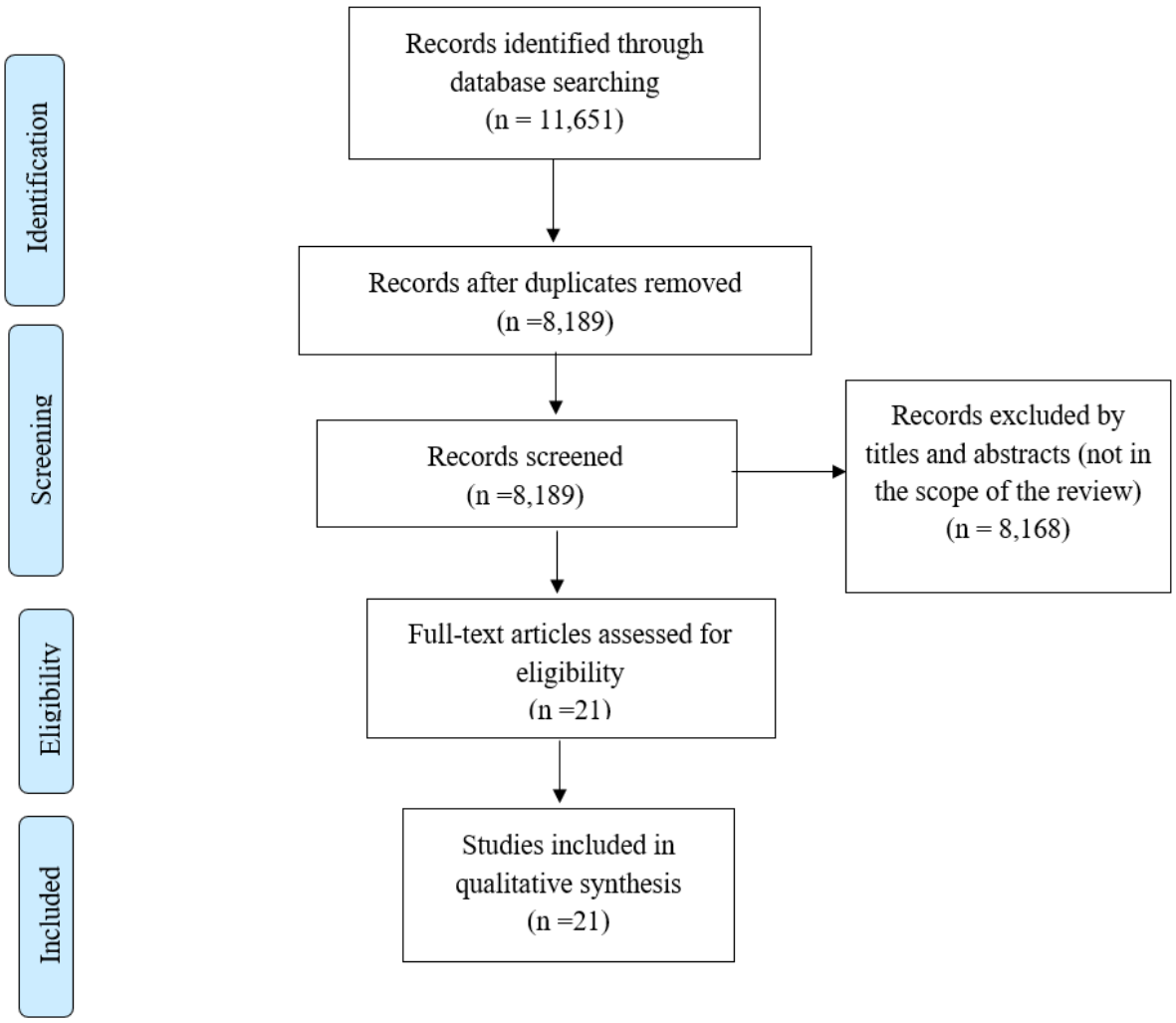

Figure 3. 1 Article screening process

3.2 Characteristics of selected studies

The majority of studies were conducted in high-income countries and applied a qualitative approach. Most studies were conducted among implementing agencies and implementers who were involved in policy implementation. Few studies were conducted among target populations of policies (e.g., alcohol retailers) (Table 3.1).

Table 3.1 Barriers and facilitators to policy implementation among the four policies

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
	Alcohol marketing						
1.	Kaewpramkusol, R., Senior, K., Nanthamongkolchai, S., & Chenhall, R.	2019	A qualitative exploration of the Thai alcohol policy in regulating alcohol industry's marketing strategies and commercial activities	Thailand	Qualitative study Target population: implementers and relevant stakeholders (government officers, academia, and civil society)	Barriers: acceptance of drinking alcohol as a social norm, adaptation of alcohol marketing strategies to take advantage of a legal loophole, legal loopholes in Thai alcohol control law on alcohol marketing, lack of monitoring of digital marketing, high workload, and limited resources for enforcement, alcohol industry's strategy to promote alcohol as an ordinary product and a part of everyday socialising, alcohol sponsorship provides economic and social benefits resulting in acceptance of the alcohol industry sponsorships	(Kaewpramkusol et al., 2019)
	Physical availability						
2.	Egan, M., Brennan, A., Buykx, P., De Vocht, F., Gavens, L., Grace, D., Halliday, E., Hickman,M., Holt, V., Mooney, J.D., Lock, K.	2016	Local policies to tackle a national problem: Comparative qualitative case studies of an English local authority alcohol availability intervention	England	Qualitative study Target population: implementers and relevant stakeholders (i.e., local government authority, licensing leads, public health, police, and other key stakeholders)	Facilitators: using local evidence-informed decision making and skills of licensing leaders in negotiation	(Egan et al., 2016)
3.	Fitzgerald, N., Nicholls, J., Winterbottom, J.,	2017	Implementing a public health objective for	Scotland	Qualitative study Target population: implementers (i.e.,	Barriers: lack of priority among key implementing agencies, and licensing	(Fitzgerald et al., 2017)

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
	& Katikireddi, S. V.		alcohol premises licensing in Scotland: A qualitative study of strategies, values, and perceptions of evidence		public health officers involved in implementing licensing policies and working with the Licensing Board, main implementing agencies)	board (i.e., the decision-making body for issuing alcohol licenses), implementing agencies make little use of evidence Facilitators: important available evidence/data on alcohol-related harms to support decision making	
4.	Gosselt, J. F., Van Hoof, J. J., & De Jong, M. D. T.	2012	Why should I comply? Sellers' accounts for (non-) compliance with legal age limits for alcohol sales	Netherlands	Qualitative study Target population: target groups of policy (i.e., managers or owners of alcohol outlets)	Barriers: lack of knowledge of law among alcohol sellers, inability of staff to manage aggression at alcohol retailers, lack of motivation of alcohol sellers to comply with laws Facilitators: motivation of alcohol retailers, and knowledge of the law among alcohol retailers	(Gosselt Jordy et al., 2012)
5.	Grace, D., Egan, M., & Lock, K.	2016	Examining local processes when applying a cumulative impact policy to address harms of alcohol outlet density	England	Qualitative study Target population: implementers (i.e., licensing officers, councillors, police, and trade)	Barriers: interpretation of regulation differed across local authorities (legal loopholes), and economic benefits outweigh public health consideration among implementers/alcohol retailers Facilitators: evidence-based decision making	(Grace et al., 2016)
6.	Herring, R., Thom, B., Foster, J., Franey, C., & Salazar, C.	2008	Local responses to the Alcohol Licensing Act	England	Qualitative study Target population: implementers (i.e., licensing officers and	Barriers: legal challenges, insufficient robust evidence, inadequate data, lack of training among councillors, lack of	(Herring et al., 2008)

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
			2003: The case of Greater London		chairs of licensing committees)	support from decision-makers, and a balance between economic versus public health benefits Facilitators: engagement of residents	
7.	Miller, P. G., Curtis, A., Graham, K., Kypri, K., Hudson, K., & Chikritzhs, T.	2020	Understanding risk-based licensing schemes for alcohol outlets: A key informant perspective	Multi-country: Canada and Australia	Qualitative study Target population: implementers	Barriers: lack of knowledge of law among police officers and limited resources	(Miller et al., 2020)
8.	Mooney, J. D., Holmes, J., Gavens, L., De Vocht, F., Hickman, M., Lock, K., & Brennan, A	2017	Investigating local policy drivers for alcohol harm prevention: A comparative case study of two local authorities in England	England	Qualitative study Target population: implementers (i.e., police, public health, commissioning, treatment service/clinical, information analyst, and licensing/trading standard)	Barriers: resource constraints, and information sharing was difficult-information technology compatibility issues between implementing agencies (e.g., alcohol-related harm data) Facilitators: pro-active police with strong motivation to tackle the poor police image of the city in relation to drinking and licensing	(Mooney et al., 2017)
9.	Puangsuwan, A., Phakdeesettakun, K., Thamarangsi, T., & Chaiyasong, S	2012	Compliance of off-premise alcohol retailers with the minimum purchase age law	Thailand	Mixed-methods Target population: target of policy (i.e., alcohol retailers)	Barriers: lack of knowledge of the law	(Puangsuwan et al., 2012)
10.	Trifonoff, A., Nicholas, R., Roche, A. M.,	2014	What police want from liquor licensing legislation: the	Australia	Qualitative study Target population: implementers (i.e., police officers)	Barriers: unclear roles of authorities in implementation, influence of alcohol industry in decision-making, inability	(Trifonoff et al., 2014)

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
	Steenson, T., & Andrew, R.		Australian perspective			of police to prove intoxicated persons, and disconnection between decision-makers and implementors Facilitators: involvement of police in legislative and regulatory processes, partnerships (including key stakeholders as a partnership in implementation), and using data for action and decision making	
11.	Wilkinson, C., MacLean, S., & Room, R.	2020	Restricting alcohol outlet density through cumulative impact provisions in planning law: Challenges and opportunities for local governments	Australia	Qualitative study Target population: implementers (i.e., local officers)	Barriers: limited availability of data for decision making, and insufficient guidelines for implementation	(Wilkinson et al., 2020)
12.	Wright, A.	2019	Local alcohol policy implementation in Scotland: Understanding the role of accountability within licensing	Scotland	Qualitative study Target population: implementers (i.e., local authorities who implemented licensing policy at local level, and national alcohol policy actors involved in the process of development or	Barriers: lack of accountability of implementing agencies	(Alex, 2019)

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
					delivery of alcohol control policy)		
	Drink-driving measures						
13.	Eichelberger, A. H., & McCartt, A. T.	2016	Impaired driving enforcement practices among state and local law enforcement agencies in the United States	USA	Quantitative study Target population: implementing agencies (i.e., law enforcement agencies)	Barriers: limited numbers of staff, lack of funding, and excessive paperwork	(Eichelberger & McCartt, 2016)
14.	Fell, J. C., Ferguson, S. A., Williams, A. F., & Fields, M.	2003	Why are sobriety checkpoints not widely adopted as an enforcement strategy in the United States?	USA	Mixed methods Target population: implementing agencies (i.e., law enforcement agencies)	Facilitators: Organisational support, police manpower, funding, and belief in intervention cost-effectiveness, and public support	(Fell et al., 2003)
15.	Fiorentino, D. D., & Martin, B. D.	2018	Survey regarding the 0.05 blood alcohol concentration limit for driving in the United States	USA	Mixed-methods Target population: implementers (i.e., law enforcement officers, prosecutors, defence attorneys, and judges)	Barriers: perceived drink-driving measures as a burden (i.e., perceived economic burden of implementing drink-driving measures with BAC level of 0.05)	(Fiorentino & Martin, 2018)
16.	Grohosky, A. R., Moore, K. A., & Ochshorn, E.	2007	An alcohol policy evaluation of drinking and driving in Hillsborough County, Florida	USA	Qualitative study Target population: implementing agencies (i.e., enforcement agencies, including police, state	Barriers: gaps in existing regulation, heavy workload of key enforcement agencies, and poor communications between enforcement agencies Facilitators:	(Grohosky et al., 2007)

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
					attorney, and treatment providers)	providing education among key stakeholders, raising public awareness and establishing collaboration among stakeholders	
17.	Jia, K., Fleiter, J., King, M., Sheehan, M., Ma, W., Lei, J., & Zhang, J.	2016	Alcohol-related driving in China: Countermeasure implications of research conducted in two cities	China	Mixed-methods Target population: implementers and general drivers	Barriers: insufficient police officers and equipment, insufficient funding, and lack of awareness on the effectiveness of drink driving measures	(Jia, Fleiter, et al., 2016)
	At least two policies						
18.	Abiona, O., Oluwasanu, M., & Oladepo, O.	2019	Analysis of alcohol policy in Nigeria: Multi-sectoral action and the integration of the WHO "best-buy" interventions	Nigeria	Qualitative study Target population: policy actors	Barriers: lack of awareness among policymakers on alcohol-related problems, failure of the government to strengthen systems and structure for alcohol control, lack of funding, poor literacy and deployment of regulatory agencies, no establishment of regulatory agencies, lack of legislation to regulate the alcohol industry, and industry promoted drinking norms	(Abiona et al., 2019)
19.	Casswell, S., Morojele, N., Williams, P. P., Chaiyasong, S., Gordon, R., Gray-Phillip, G., Parry, C. D. H.	2018	The Alcohol Environment Protocol: A new tool for alcohol policy	Multi-country: Scotland, New Zealand, St. Kitts and Nevis,	Mixed-methods Target population: implementers	Barriers: insufficient resources	(Casswell et al., 2018)

	Author	Year	Title	Country	Method and Target Population of Studies	Barriers and Facilitators to Policy Implementation	Refs.
				Thailand, South Africa, Vietnam			
20.	Kaewpramkusol, R., Senior, K., Chenhall, R., Nanthamongkolchai, S., & Chaiyasong, S.	2018	Qualitative exploration of Thai alcohol policy in regulating availability and access	Thailand	Qualitative study Target population: implementers (i.e., government officers, academia, and civil society)	Barriers: weak alcohol regulation, lack of community involvement during implementation, conflict of interest (public health versus economic interest), insufficient allocation of resources, and high numbers of alcohol outlets resulting in high workload for monitoring law compliance	(Kaewpramkusol et al., 2018)
21.	Randerson, S., Casswell, S., & Huckle, T.	2018	Changes in New Zealand's alcohol environment following implementation of the sale and supply of alcohol act (2012)	New Zealand	Mixed-methods Target population: implementers (i.e., police officers, liquor licensing inspectors, and public health officers)	Barriers: difficulty in gathering sufficient evidence to oppose new licensing, compromises between economic and public health goals, difficulties in enforcement around social supply occurring in a private setting, lack of public concern in social supply, lack of resources/ investment in monitoring data, acceptability of intoxicated behaviours among enforcing officers, insufficient staff, low priority among implementers, and difficulties in assessing intoxication	(Randerson et al., 2018)

3.3 Barriers to the implementation of the four policies

Within 19 of the 21 included studies, five main barriers to policy implementation were identified. These included resource constraints, legal loopholes and complications of law, insufficient evidence and lack of monitoring systems to support policy implementation, a low priority among responsible authorities and decision-makers, and limited capacity of implementers and implementing agencies. First, ten out of nineteen studies found resource constraints, such as materials, human resources, and the high workload of police officers, were barriers (Abiona et al., 2019; Casswell et al., 2018; Eichelberger & McCartt, 2016; Grohosky et al., 2007; Jia, Fleiter, et al., 2016; Kaewpramkusol et al., 2018; Kaewpramkusol et al., 2019; Miller et al., 2020; Mooney et al., 2017; Randerson et al., 2018).

Second, six studies reported that legal loopholes and legal complications (e.g., requiring precise law interpretation in practice, unclear roles of responsible authorities in legislation) can be a bottleneck for policy implementation (Abiona et al., 2019; Grace et al., 2016; Grohosky et al., 2007; Kaewpramkusol et al., 2018; Kaewpramkusol et al., 2019; Trifonoff et al., 2014). For example, the study in Thailand addressed legal loopholes in alcohol marketing control; advertisement of alcohol products is prohibited, but not non-alcoholic products. The alcohol industry seized this loophole to promote alcohol brands by using non-alcoholic products (Kaewpramkusol et al., 2019). Another example related to the interpretation of the law from different stakeholders is found in the study conducted in England; the government introduced cumulative impact policies, which provides power to local authorities to grant or not grant alcohol licenses by considering the impact of alcohol licenses to areas. However, the cumulative impact policies' interpretation differed across different involved stakeholders (e.g., local residents, and licensing applicants) (Grace et al., 2016). Another example of legal complications is found in Australia, where the role of implementing agencies (i.e., licensing authorities and police) are not clearly stated in the legislation. This caused the reluctance of responsible agencies (i.e., police) to implement the policy (Trifonoff et al., 2014).

Third, six studies addressed a lack of evidence (Fitzgerald et al., 2017; Herring et al., 2008; Randerson et al., 2018; Wilkinson et al., 2020) and monitoring systems (Kaewpramkusol et al., 2019; Mooney et al., 2017) to support alcohol policies. Most referred to the need for local evidence

for supporting decisions in the licensing application process. For example, studies in England and Scotland found insufficient robust evidence to support a decision on the defence of new licenses (Fitzgerald et al., 2017; Herring et al., 2008).

Fourth, five studies addressed a low priority of policy implementation among responsible authorities and decision-makers (Abiona et al., 2019; Fiorentino & Martin, 2018; Fitzgerald et al., 2017; Jia, Fleiter, et al., 2016; Randerson et al., 2018). Among these studies, the low value placed on alcohol-related problems by agencies responsible for policy implementation was addressed (Abiona et al., 2019; Fitzgerald et al., 2017). The study in Scotland also addressed a low priority of public health interest among implementing agencies, but rather they focused on economic development instead (Fitzgerald et al., 2017). Another aspect is that implementers, police officers, for example, did not believe in the effectiveness of random breath testing (Jia, Fleiter, et al., 2016). Therefore, they tended to place a low priority on implementing the policy.

Finally, four studies reported that it required implementers' skills to implement in practice, but they had insufficient knowledge about law and skills to implement the policy effectively (Herring et al., 2008; Miller et al., 2020; Puangsuwan et al., 2012; Trifonoff et al., 2014). For example, a study in London found that councillors acted as the chair of licensing board who decided to grant alcohol licenses. However, the study reported that they had limited knowledge about licensing matters and law. The study also reported that the training was given insufficient to perform the chair of licensing board's functions. Sometimes, the licensing board had to draw upon a legal team to support the implementation processes (Herring et al., 2008).

Some of the barriers to policy implementation were commonly found across all policies, but others were related more specifically to types of policies. For example, resource constraints, legal loopholes, and low priority of implementing agencies and policymakers were found in all policies. Whereas, lack of local evidence to support policy implementation and insufficient skill of implementers were mainly found in relation to the physical availability control, particularly licensing policy and enforcement of a minimum purchasing age.

Apart from the five main barriers, few studies addressed other factors that hindered policy implementation, including drinking norms, conflicting interests, and the alcohol industry's role in promoting drinking norms. Two studies addressed drinking norms, which are the acceptability of

alcohol drinking in daily life among people in society, and hindered implementation (Abiona et al., 2019; Kaewpramkusol et al., 2019). In addition, the studies in Nigeria and Thailand illustrated that the alcohol industry attempted to promote drinking as a custom and tradition in daily life (Abiona et al., 2019; Kaewpramkusol et al., 2019). This can cause difficulty and reluctance of governments to commit to and implement alcohol control policies. Another four studies illustrated conflicting interests among different sectors (Grace et al., 2016; Herring et al., 2008; Kaewpramkusol et al., 2018; Randerson et al., 2018). For example, alcohol retailers and local authorities viewed alcohol sales particularly as a part of the night-time economy and as a source of income in communities (Herring et al., 2008). The economic sector has its main purpose of generating revenue; therefore, alcohol control and public health interest may not be included in their main agenda (Kaewpramkusol et al., 2018).

3.4 Facilitators to the implementation of the four policies

Nine studies addressed facilitators to policy implementation. Four studies stated that having evidence and a monitoring system to support policy implementation was key to achieving implementation outcomes (Egan et al., 2016; Fitzgerald et al., 2017; Grace et al., 2016; Trifonoff et al., 2014). One study addressed the engagement of key stakeholders at an early stage of legislative processes (Trifonoff et al., 2014), and another study stated the importance of community engagement that helped accelerate the implementation (Herring et al., 2008). One study reported public support as a key facilitator to implementation (Fell et al., 2003). Other key facilitators addressed by included studies are the collaboration between implementing agencies (Grohosky et al., 2007) and motivation of implementing agencies (Mooney et al., 2017).

4. Discussion

We found five common barriers to policy implementation: (1) resource constraints, (2) legal loopholes and legal complications, (3) insufficient evidence and lack of monitoring systems, (4) a low priority of policy implementation among responsible agencies, and (5) limited capacity of implementers and implementing agencies. Apart from these five barriers, some studies addressed external barriers such as the alcohol industry promoting drinking as a norm and conflicting interests among different sectors.

The majority of studies address barriers within the implementing agencies, for example, resource constraints and a lack of monitoring systems. Some of the findings in this review were similar to the systematic review on barriers and facilitators to implementing screening and brief intervention for alcohol misuse (Johnson et al., 2011). Johnson et al. (2011) stated that the main barriers to effective implementation were a lack of resources, training, support from management, and excessive workloads. However, we found additional and important aspects: legal loopholes and legal complications (e.g., requiring precise legal interpretation in practice, unclear roles of responsible authorities in legislation). Legal loopholes created room for the alcohol industry to seize the opportunity to promote its benefits (Kaewpramkusol et al., 2019). Therefore, a comprehensive alcohol control law is required at the design stage (Madureira-Lima & Galea, 2018), and countries need to ensure up-to-date alcohol control law that considers the social and cultural context as well as adaptation of the alcohol industry's strategies (Sudhinaraset et al., 2016). Apart from that, the interpretation of alcohol control laws requires legal support from legal experts (Herring et al., 2008).

Another aspect relevant to regulation was the low priority given to policy implementation among responsible agencies and decision-makers. In the implementation of regulatory measures, governments often apply a "top-down" approach (Hupe & Hill, 2015). Policy formulation and policy implementation in many situations are the responsibility of different actors (Hupe & Hill, 2015). Because of that, implementing agencies and implementers are not involved in policy formulation (Hudson et al., 2019; Hupe & Hill, 2015). Therefore, the implementation of the effective policies may not be a main priority of implementing agencies. Furthermore, policy implementation is not politically attractive, and policy formulation is seen as more important than policy implementation (Hupe & Hill, 2015). Another factor is the drinking norms in everyday life, which might result in the reluctance of implementing agencies to address the problems (Abiona et al., 2019; Kaewpramkusol et al., 2019). These issues may explain why there is a low priority for policy implementation among responsible agencies and decision-makers.

Lack of knowledge about law content and skills for policy implementation was one of the prominent barriers to policy implementation. There are various explanations for insufficient knowledge of law content and policy implementation skills. First, law enforcement requires specific skills and knowledge (e.g., legal content) (Herring et al., 2008). Therefore, legal support

and specific training are needed to effectively implement effective policies. Another factor is the lack of resources for training and the high workload of implementers, and this could result in insufficient knowledge and skills. Improving the knowledge and skills of individuals (in this case, implementers) requires investment from organisations and systems (Wu et al., 2018). If central governments did not allocate a sufficient budget to an organisation, a deficit of skills could occur.

Another barrier to effective policy implementation is conflicting goals of public health and economic interest among different sectors. This barrier occurs because effective alcohol control policy implementation requires cooperation with multiple stakeholders from various interests, including government sectors, alcohol retailers, and the alcohol industry (World Health Organization, 2019a). Various strategies can be applied to handle conflicting goals of public health and economic interest. For example, to ensure policy priority across various sectors, multisectoral collaboration at the policy formulation stage is required (Kanchanachitra et al., 2018); however, the participatory process should be conducted free of conflicts of interest, especially from the alcohol industry. Apart from that, with various interests from different sectors, competent coordinating organisations with legitimacy and strong ownership are required to promote effective coordination across different sectors (Wu et al., 2018). More importantly, based on the findings of this review, the alcohol industry negatively influenced policy implementation by promoting drinking norms and creating resistance to policy implementation (Abiona et al., 2019; Kaewpramkusol et al., 2019). Therefore, a comprehensive regulation to regulate industry strategies and roles in the policy process, including the implementation process, is urgently needed to promote the implementation of effective alcohol control policies.

Limitation

The limitation of this scoping review is concerned with restricting the literature search to articles published in English, resulting in some potentially relevant studies being omitted.

5. Conclusions

This review highlighted five main barriers to policy implementation, including insufficient resources, exploitation of legal loopholes, a lack of monitoring systems and local evidence to support policy implementation, a low priority for implementation by responsible agencies, and a

lack of skills among implementers. Facilitators of policy implementation were sparse; they included monitoring systems and local evidence to support policy implementation and early engagement of implementing agencies and communities. We recommend that governments should allocate more resources (financial, material, and human) to support more effective policy implementation and provide sufficient training for implementers. To design effective policies and ensure better implementation in practice, comprehensive policies and clear guidelines, as well as public communications to promote public acceptance, can help to effectively implement and achieve policy goals.

Chapter 4: Application of the Policy Capacity Framework to policy implementation of effective alcohol control policies in Thailand

Based on the evidence presented in Chapter 3, five main barriers to the implementation of effective alcohol control policies were identified, including resource constraints, legal loopholes and lack of evidence to support policy implementation. Facilitators were less numerous and included establishing monitoring systems and local evidence to support policy implementation and early engagement of implementing agencies and communities. These findings were crucial for developing the conceptual underpinnings of the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand (Chapter 5). The findings from Chapter 3 were used to shape the questions asked during key informant interviews carried out to guide the application of an appropriate conceptual framework. This chapter present a conceptual framework for implementing effective alcohol control policies, later used to develop indicators for the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand (Chapter 5). The framework was developed based on the findings from narrative review and key informant interview and subsequently validated using an expert consultative workshop.

Summary

Background The implementation of effective alcohol control policies is crucial to enabling countries to mitigate the harmful use of alcohol. However, there is no common framework for the implementation of effective alcohol control policies, which could be useful in guiding policy design, planning, implementation, and evaluation. Our study addresses this knowledge gap by examining if and how the Policy Capacity Framework (PCF), which elucidates the core components of policy implementation, is relevant to effective alcohol policy implementation in the Thai context.

Methods Our approach involved reviewing the relevant research literature, regulations, technical reports, and conducting in-depth interviews with key informants at both national and provincial levels. Subsequently, an expert consultative workshop was conducted to validate the components of the resulting conceptual framework. We used thematic analysis to analyse the data based on the components of the PCF to look for synergy and divergence.

Findings The PCF proved well-suited to the Thai alcohol policy context, describing the core components of policy infrastructure necessary for effective implementation. These core components include political capacity (e.g., policy priority, policy champion, and the involvement of civil society members), technical capacity (e.g., technical support, and availability of data) and operational capacity (e.g., human and material resources). However, the Framework had limitations in the Thai alcohol policy context; for example, some elements such as industry interference and economic development factors were not covered.

Interpretation The PCF can be applied in Thailand to assess the core capacities required for policy implementation of effective alcohol control policies.

Introduction

Assessing policy implementation of effective alcohol control policies in complex policy contexts requires a conceptual framework to guide planning, policy implementation, and evaluation. To achieve successful implementation of effective alcohol control policies, countries need to take into account not only their domestic policy infrastructure but also the broader national policy context and the global perspective. At the global level, there is a lack of legally binding regulations to assist countries in implementing effective alcohol control policies. Consequently, it is challenging for governments to fully commit and exert their political influence to safeguard their populations from alcohol-related harm. At the national level, issues of political will and commitment can be both barriers and facilitators for policy implementation (Jankhotkaew et al., 2022). Alcohol industry strategies and tactics to influence the policy process and social norms also play a crucial role in stakeholders' resolution to commit to an effective policy implementation response (Jankhotkaew et al., 2022). This challenge is further exacerbated in low- and middle-income countries, where scarce resources and many competing challenges need to be addressed and overcome. Hence, to enhance the effectiveness of policy implementation, it is crucial to employ a comprehensive conceptual framework that takes into account influential contextual factors.

Policy implementation studies investigate causes and related factors influencing policy outcomes and policy goals (Hill & Hupe, 2002). Policy implementation was first addressed by Pressman and Wildavsky (Pressman & Wildavsky, 1984). in the early 1970s. Theories explaining the policy implementation stage include a focus on the way policy implementers are involved in decision-making processes, either through a bottom-up or top-down process. In bottom-up processes, policy implementers are involved in decision-making around implementation and have the flexibility to adapt and adjust to the nature of organizations and the context. In contrast, top-down processes are more rigid; everything has already been designed by high-ranking governments, and implementers do not have a role in this process (Hill & Hupe, 2002). The content of policy, resources, and external factors are also factors recognized in policy implementation theories (Hogwood & Gunn, 1984). Game Theory focuses on the interactions of actors or parties and analyses their interests or incentives; in this perspective, promoting compliance with regulations requires governments to create incentives to meet the needs of involved parties and people (Howlett, 2018). In addition, one US study generated a model for the implementation of physical availability control of high-

alcohol malt liquor; the main focus was on implementation processes such as building public awareness, educating stakeholders, and enforcing compliance (Jones-Webb et al., 2014).

While some countries have successfully adopted effective policies, challenges often arise when it comes to their implementation due to a lack of government capacity, and Thai key informants believed this to be a key element in the implementation of alcohol policy in Thailand. Therefore, we focused on the Policy Capacity Framework (PCF) and applied it in the Thai context. The PCF identifies the government or implementing agency capacities required to achieve policy goals (Wu et al., 2018). It provides an indication of policy implementation gaps with the intention of strengthening the capacity of government and agencies to effectively implement policies and accelerate the achievement of policy goals.

Policy capacity is the competency and resources to make intelligent choices. It has been used as a framework for all stages of the policy cycle, including the implementation stage and has primarily been applied to health systems (Saddi et al., 2023). PCF consists of nine components: analytical (technical) capacity, political capacity and operational capacity. Each component consists of individual levels, organizational, and systemic levels (Wu et al., 2018; Wu et al., 2015). It is theorized that in the PCF, political capacity is the ability to gain the political and public support needed to ensure that policy implementation is sustained. Analytical capacity focuses on the technical and scientific knowledge and analytical techniques needed to support efficient decision-making. Operational capacity refers to the ability to enact policy effectively, with a focus on managing processes to ensure the successful execution of actions (Wu et al., 2018).

Alcohol policy situation in Thailand

Thailand is an upper middle-income country in Asia that has an advanced alcohol control agenda and implemented the Global Strategy to Reduce Harmful Use of Alcohol. It has clear implementation mechanisms, operated through effective inter-sectoral collaboration across governmental agencies, academia and civil society organizations (CSO) (Wongwatanakul & Thamarangsi, 2013). Effective alcohol control policies in Thailand are governed by three main laws. First, the Alcoholic Beverage Control Act 2008 regulates physical availability and alcohol advertising, as well as establishing national alcohol control bodies and committees. Second, the Excise Act 2017 regulates excise tax and alcohol licensing. Third, the Land Traffic Act 1979

regulates drink-driving countermeasures. The responsible agencies tasked with implementing the three laws overlap, but they use different mechanisms.

The Alcoholic Beverage Control Act 2008 is implemented by three national committees and one secretariat. Specifically, the three main authorities are: the National Alcoholic Beverage Policy Committee, the Alcoholic Beverage Control Committee, and the Provincial Alcoholic Beverage Control Committee in each province (Provincial Committee). The Office of Alcoholic Beverage Control Committee serves as a secretariate of the three Committees. Each Provincial Committee is chaired by a provincial governor and has a number of ex-officio members. The Chief of the Provincial Office of the Ministry of Public Health acts as a secretariat for the Provincial Committees. Although civil society organizations (CSO) can play a critical role in alcohol control, they are not represented on the Provincial Committees. With an extensive network throughout the country, the StopDrink Network, CSO network, plays a significant role in supporting the implementation of the Act in Thailand (Wongwatanakul & Thamarangsi, 2013).

Drink-driving countermeasures are mainly regulated by the Land Traffic Act 1979. The main implementing agency is the police, whose officers enforce the Act. At the provincial level there is another mechanism, the Provincial Road Safety Center. It is a multi-sectoral committee set up to establish the provincial road safety plan and report on progress with road safety measures, including drinking-driving countermeasure, to the National Road Safety Center committees. Provincial governors act as chairs of the Provincial Road Safety Center committees (National Road Safety Center, 2020).

The Excise Act 2017 is implemented by one main agency, the Excise Department. Officers in the provincial offices and branches of the Excise Department are mainly responsible for enforcing laws on the licensing of alcohol sales and production and alcohol taxation (Excise Department, 2017a).

Aims and contribution of the study

This study is the first to apply the PCF to alcohol policy to explore its potential and limitations for the implementation of alcohol control policies. We utilize data to analyse the implementation of effective alcohol control policies in Thailand and examine the relevance and comprehensiveness of the PCF to the Thai alcohol policy context. We focus on the provincial level because the key

agencies implementing effective alcohol control policies (i.e., control of physical availability, control of alcohol advertising, drink-driving countermeasures, and alcohol taxation) operate at this level, with support from national agencies.

Methods

Study design, data sources, and data collection

This study comprised three main stages – a narrative review, in-depth interviews with key informants, and validation of the framework using an expert consultative workshop.

First, we conducted a narrative review across various types of documents: research reports, existing regulations, technical reports, and the websites of governmental and academic organizations to gather information on the content of the relevant laws, policy processes, key actors and barriers and facilitators for policy implementation of effective alcohol control policies at the national and provincial levels. Exploring the key literature and existing regulations helped us understand implementation processes and the key policy implementation agencies. It also helped us to identify key informants for the in-depth interviews carried out in the second stage.

Second, we conducted in-depth interviews among key informants. Purposive sampling and snowball techniques were employed to identify potential key informants who had worked for five years or more to support alcohol control policy implementation at the national and provincial levels in Thailand. We selected experts from the list of authors who wrote the review (Joint Assessment Report) (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020). The review of progress with policy implementation in Thailand over the previous two decades was carried out by national experts. We interviewed experts in all policy areas, except alcohol taxation policy, due to time constraints. However, we asked experts on alcohol taxation from the government sector to join the expert consultative workshop to ensure policy areas were covered. We also asked key informants from our initial list about other stakeholders we could interview to gain a deeper understanding of policy implementation at the provincial levels.

We interviewed four key informants from the government sector, two civil society members, and one academic at the national level, all of whom were supporting the implementation of effective alcohol control policies at the provincial level in Thailand. We also interviewed two civil society

members working at the regional level to support provincial alcohol control policies and one government official at the provincial level (Table 4.1).

Table 4.1 List of key informants

Key informants	Code	Role
Government sectors at national level (GO)	GO1, GO2, GO3, GO4	Supporting implementation of alcohol control policies at provincial level
Civil society organisations at national level (CSO)	CSO1, CSO2	Supporting implementation of alcohol control policies at provincial level
Academia (A)	A1	Supporting implementation of drink-driving countermeasures at provincial level
Government sector at provincial level (GOP)	GOP1	Implementing alcohol control policy at provincial level
Civil society organisations at regional level (CSOR)	CSOR1, CSOR2	Supporting implementation of alcohol control policies at provincial level

After interviewing the key informants, we developed a conceptual framework based on the PCF and centred around policy processes and the barriers and facilitators influencing the implementation of effective alcohol control policies. The design of the framework aligned with the Thai context and was informed by insights from key informants and the relevant literature.

For the third phase of the study, we invited experts to a consultative workshop to comment on the conceptual framework and its components based on their expertise and experiences. We identified experts at the national and provincial levels. The experts possessed a diverse range of knowledge and experiences related to alcohol control policy implementation. The selection of national-level experts was purposive and based on the organizations listed in the Joint Assessment Report (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020). We ensured that experts covered all policy areas. The provincial experts were those who were actively engaged in policy implementation at the provincial level, representing a mix of governmental officers and civil society members. In total, 21 participants joined the workshop, including 11 government representatives, five academics, and five civil society members. See details in the appendix table 4A.1. Following the workshop, we revised the conceptual framework based on the experts'

comments and then confirmed the changes with them. The workshop consisted of four main stages. First, JJ introduced the objectives, methods, and expected outcomes of the workshop. Second, JJ presented the framework and its components, inviting experts to comment on the importance and relevance of these components. Third, each indicator that aligned with the conceptual framework was introduced, and experts were asked to provide feedback on the importance and relevance of the indicators, as well as the data sources for each. Finally, JJ summarised the key points and suggestions provided by the experts. After the workshop, a summary of the inclusions, exclusions, and changes in the conceptual framework and indicators was sent to the experts for confirmation.

Tool

We used open-ended questions in the key informant interviews. The questions are focused on the key informants' roles in implementing alcohol control policies, the roles of their organizations, the processes for implementation of effective alcohol control policies at the provincial level, and barriers and facilitators for implementing alcohol control policies at the provincial level.

Data analysis

We conducted a thematic analysis of the interview data to develop the conceptual framework, employing a deductive approach (Braun, 2022; Braun & Clarke, 2012). The analysis followed three main steps. First, a codebook was developed based on the PCF, which served as the primary conceptual framework for data analysis. Second, two researchers independently analysed the transcribed interviews in relation to the codebook. JJ acted as the primary data analyst, while RK served as the secondary independent researcher for the analysis. Third, the researchers discussed the emerging themes in relation to the PCF. The data were categorised under the components of the PCF, as well as factors not covered by the framework. In cases of differing opinions, JJ and RK aimed to resolve any disagreements through discussion and consultation with other authors; however, no conflicts arose during the analysis. Barriers and facilitators for implementing effective alcohol control policies at the provincial level were the main information used to generate a conceptual framework based on the PCF. Information related to policy implementation processes was also integrated into the conceptual framework to make it more comprehensive. We used Microsoft Excel to analyse the data. The analysis of data from the workshop followed three steps. First, at the end of the workshop, a preliminary summary was undertaken to identify components that should be included or excluded from the framework. Second, to ensure accuracy, researchers

transcribed the workshop and cross-checked them against the summary during the workshop by JJ and RK. Third, the inclusion and exclusion of components were confirmed by consulting all experts via email. In summary, the workshop findings informed decisions on the inclusion and exclusion of framework components.

Ethics

We provided an information sheet to key informants outlining the study's objectives and explicitly communicating their right to withdraw from the study at any point. Informed consent was given verbally by key informants. The workshop was also included in the ethical approval. JJ was the primary facilitator of the workshop, during which information was provided verbally, including the project's objectives, methods, and expected outcomes. The study was approved by the Mahasarakham University Ethics Committee for Research Involving Human Subjects in Thailand (Approval number: 166-100/2022).

Results

The results illustrated that the main themes and information outlined in the PCF were evident in the Thai context, and there were additional aspects not addressed by the Framework (Table 4.2). Based on the key informant interviews and experts' feedback from the consultative workshop, we consolidated components of the PCF with other components from outside the Framework to form a conceptual framework for implementation processes for effective alcohol control policies at the provincial level in Thailand.

Table 4.2 Themes of Policy Capacity Framework and application to the Thai context

Main themes	**Policy Capacity**	**Policy Capacity components that were excluded in the Thai context**	**Other components that are not addressed in Policy Capacity**
Law content			✓
Political capacity			
Policy priority	✓		
Policy champion	✓		
Trust in governments		✓	
Political accountability			
-Multi-sectoral collaboration	✓		
-Platforms to communicate to the public		✓	

Main themes	Policy Capacity	Policy Capacity components that were excluded in the Thai context	Other components that are not addressed in Policy Capacity
-Reporting and monitoring systems		✓	
Analytical capacity			
Technical support	✓		
Availability of data	✓		
Operational capacity			
Staff	✓		
Budget/materials	✓		
Communication platforms between organizations	✓		
Implementation process			
Multi-sectoral collaboration	✓		
Strengthening capacity of staff (training of staff)			✓
Education (public and social campaign)			✓
Enforcement			✓
Evidence-based action	✓		
External factors			
Industry interference			✓
Other factors (e.g., economic factors)			✓

Policy Capacity Framework

The results of our study confirmed that the three main components of the PCF: political capacity, analytical capacity, and operational capacity, apply to the Thai context.

Political capacity

The four main domains of the political capacity component of the PCF, namely policy priority, policy champion, government trust and political accountability were addressed in the interviews with key informants.

a) Policy priority

The key factor identified for effective implementation of alcohol control policies as a policy priority in Thailand was securing political support and commitment from key policymakers. At the provincial level, the implementation of the Alcoholic Beverage Control Act 2008 and the Land Traffic Act 1979, particularly in relation to drink-driving policy, relied heavily on the pivotal role

played by provincial governors. These governors assumed chairmanship of the respective committees mentioned earlier, wielding significant influence over the direction of implementation for both Acts. Their positions and commitment were instrumental in steering the implementation processes.

Given Thailand's bureaucratic systems, the support of provincial governors, who act as administrative heads at the provincial level, has greatly influenced efforts towards implementing the two Acts. If provincial governors supported initiatives, then other implementing agencies were more likely to align and collaborate. Conversely, a lack of support from provincial governors posed challenges to the progress of implementation. As one of the civil society key informants commented, it was important to gain support from the provincial governors as well as the Chief of the Provincial Office of the Ministry of Public Health because if the head moved, the tail would follow. However, a limitation on gaining support from provincial governors is that they often move from one province to another (Chaiyasong et al., 2017).

> *"Aside from the practitioners themselves, an important factor is the policies they receive from the policymakers or head of the office (refers to Chief of the Provincial Office of the Ministry of Public Health)". In some provinces, practitioners are instructed not to file complaints or pursue legal action but only to focus on public awareness campaigns. When policies are issued in this manner, the practitioners have no choice but to comply." GO1*

The influence of provincial governors on the implementation of alcohol taxation was perceived as less pronounced as the priority for alcohol taxation is in the hands of the central government. Any protocols and indicators for law enforcement are, therefore, set by the central government (Excise Department, 2017b, 2017c).

b) Policy champions or policy entrepreneurs

The commitment of policy champions at the provincial level emerged as a key factor for sustaining the implementation of effective alcohol control policies. The key informants addressed various characteristics of people committed to addressing alcohol issues and moving implementation forward. Four main characteristics of policy champions or entrepreneurs were identified. They 1) recognized alcohol-related problems in their provinces and were willing to take a leading and committed role in addressing these issues, 2) possessed expertise and knowledge in their respective

fields (e.g., law enforcement), 3) maintained supportive networks, and 4) exhibited unwavering determination until the desired outcomes were achieved. Individuals with these four characteristics who consistently produced positive outcomes over an extended period were more likely to earn trust within their networks. Policy champions did not necessarily come from the government sector. Instead, they could be civil society members committed to alcohol issues, with strong networks and the required skills to make policy implementation happen in a sustained manner.

c) Government trust

In the realm of political capacity, government trust is emphasised in the Framework as important to ensuring the sustainability of policies. The key informants in our study also highlighted that if the population had faith in the capacity of government sectors, it became more feasible to implement effective policies in a sustainable manner. However, concerns were voiced during the expert consultative workshop regarding the measurement of government trust. Experts expressed doubts about how to accurately measure government trust, raising concerns about the potential bias, subjectivity, and conflicts that may arise in the measurement process. We, therefore, decided to exclude government trust from the conceptual framework.

d) Political accountability

The Framework gives political accountability a pivotal role in the successful implementation of policies; in this element, responsible agencies fulfil their duties and are answerable for their actions. Accountability is reflected in communication channels with the public, citizen and civil society involvement, and the establishment of reporting and monitoring systems. In the context of the implementation of effective alcohol control policies at the provincial level in Thailand, citizens and civil society involvement was deemed most relevant. The other two elements of accountability (i.e., communication channels with the public and the establishment of reporting and monitoring systems) are already embedded in the systems in all provinces. Regarding communication channels, the government sector in Thailand is legally mandated to maintain public communication channels, and citizens can access relevant public data. According to reporting and monitoring systems, the Ministry of Public Health provides financial support to the provincial levels, leading to the establishment of monitoring and support systems over the years.

Analytical capacity

Analytical capacity pertains to the ability to make decisions based on evidence and expertise. In the context of law enforcement, expertise in law content and legal processes is essential. It is also important to have existing data systems to back up decision-making and planning for policy implementation. In Thailand, different implementing agencies are responsible for providing technical expertise to support the implementation of different regulations.

Regarding the Alcoholic Beverage Control Act 2008, the major concern expressed by key informants was putting the wrong person in the wrong job. The key individuals responsible for enforcing the Act are officers working under the Provincial Office of the Ministry of Public Health. Given their responsibility for handling legal cases arising from violations, knowledge of the law's content is crucial within every office of the Provincial Office under the Ministry of Public Health. However, as key informants pointed out, the individuals responsible for law enforcement in many provinces are often nurses or public health experts who possess limited skills in dealing with legal matters.

> *"Sometimes, people are assigned to roles that don't align with their skills or expertise. For example, assigning a nurse to work in the law enforcement department…….This becomes a problem because if the legal department isn't handling it and it's assigned to someone like a nurse, it creates a mismatch. Nurses, after all, are trained and developed as healthcare professionals, not legal professionals. So when they try to address legal issues, it is not their forte, and they struggle to operate in the same way that legal experts would." CSO1*

Regarding implementation of the Land Traffic Act 1979, expertise in law enforcement was not considered a problem because police are the enforcing agency. Those responsible for providing technical support such as data or information management are officers working in the Provincial Office of the Department of Disaster Prevention and Mitigation (National Road Safety Center, 2020). For alcohol taxation, officials receive training and guidelines on how to enforce the law (Excise Department, 2017c). As a result, there were no perceived issues with enforcement.

Data and surveillance systems are crucial to policy implementation, with provinces relying solely on surveys conducted by the National Statistical Office, Thailand. However, these surveys mainly report alcohol consumption rather than collecting data on law enforcement and policy status. Key

informants highlighted the resulting deficiency in data tailored to the provincial context, emphasizing the need for comprehensive information to support effective implementation.

Operational capacity

Operational capacity is the ability to make policy implementation happen, with elements including staff, budget or materials, and platforms for communications among implementing agencies.

Key informants highlighted main three challenges regarding operational capacity: personnel shortages, the tight rules governing financial support, and a shortage of alcohol breathalysers. In addition, they also flagged the effectiveness of informal communication platforms for keeping implementing agencies up-to-date with information for law enforcement purposes.

First, a shortage of staff was identified as a common challenge, with many provinces having insufficient personnel dedicated to the implementation of alcohol control measures. In some provinces, there was only one person at the Provincial Office of the Ministry of Public Health tasked with working on implementation of the Alcoholic Beverage Control Act 2008. Moreover, these individuals might also be responsible for addressing tobacco control and other non-communicable disease (NCDs) issues. Consequently, lack of time and supporting staff were recognized as potential barriers to the effective implementation of alcohol control measures.

Second, the tight rules controlling financial support were identified as a barrier. The primary source of funding for implementation of the Alcoholic Beverage Control Act 2008 is the Thai Health Promotion Foundation, which allocates funding through the Ministry of Public Health. Key informants highlighted challenges associated with a bureaucratic system that makes it difficult to mobilise funding for programs, referring to it as a "red tape" system. Moreover, funding was often provided on an occasion or activity basis for policies related to drink-driving, such as setting up sobriety checkpoints and budgeting for alcohol blood tests during events (e.g., New Year and Thai New Year) (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020).

Third, for implementation of drink-driving countermeasures, the shortage of alcohol breathalysers was one of the key challenges identified. This was even more challenging during long holiday weekends (i.e., New Year and Thai New Year) (Waleewong, Khampang, Wichaidit, Tangjit, et al., 2020), when people tend to embark on trips more frequently than usual.

Communication platforms were identified as playing a crucial role in the implementation of alcohol control policies. Many provinces utilized meetings of the Provincial Alcoholic Beverage Control Committee as a formal communication platform. In addition, informal platforms were widely employed for regular updates, especially for specific operations such as drink-driving countermeasures during long weekends. For some occasions (e.g., New Year and Thai New Year: peak periods for road traffic accidents), an informal communication platform was often used to provide daily information updates.

Other components outside the Policy Capacity Framework

There were three main components identified in our study that are not covered by the PCF: implementation processes, external factors, and legal gaps. This section outlines our findings on these components.

Implementation processes

The PCF primarily addresses the infrastructure related to policy implementation but does not cover the implementation itself, in other words, the processes of policy implementation. Our findings showed that implementing effective alcohol control policies requires different processes. First, multisectoral actions are needed to facilitate law enforcement, such as meetings of the Provincial Committees, and coordination between different organizations.

> *"The success lies in collaborating and joining forces with the government, leveraging the capabilities they lack. They (refers to governments) are bound by orders and directives, but we (civil society members) are not constrained in the same way. We can speak freely without fear, becoming their voice. We address issues where they face obstacles and advocate on their behalf. Additionally, we take on a monitoring role, integrating ourselves into situations where we can provide support. The key is the ability to effectively unite and synergize efforts with the government." CSO2*

Second, to effectively enforce laws, education focused on strengthening the capacity of staff is required, such as providing training to the staff who enforce the law. Third, the activities that help to increase public awareness are also emerged as a factor, as well as providing public information campaigns on the content of the respective laws to promote compliance. Lastly, inspecting alcohol licensing is conducted to enforce the laws.

External factors

The influence of the alcohol industry was identified by several key informants as a significant factor impacting the commitment to policy implementation. The alcohol industry adopted different strategies, such as influencing the interest and commitment of the main Provincial Committees and sending representatives to join other provincial committees (e.g., committees for overseeing provincial events). These tactics had a negative impact on the commitment of policy makers and, in turn, the level of implementation of alcohol control policies in the provinces.

Economic development and drinking culture in the provinces, including an active night-time economy, were identified as other factors influencing policymakers' commitment to the implementation of alcohol control policies. Areas with a significant tourism industry posed challenges to the implementation of alcohol control policies. The unique dynamics of these regions, driven by economic factors and tourism, could impact the priorities and strategies employed in enforcing policies related to alcohol control. For example, in tourism areas, policymakers would prioritize the economy at the expense of focusing on enforcement of alcohol controls. Moreover, drinking cultures (e.g., belief and acceptability of drinking), which vary by region and religion, also influence implementation efforts and policy outcomes.

Legal gaps

Many key informants highlighted gaps in the laws that undermined the effectiveness of law enforcement. In several provinces, marketing control was not diligently enforced due to loopholes in the regulation of advertisements. Instances of brand sharing were reported where products like mineral water with similar logos to alcohol products could be freely advertised. This created challenges in legal interpretation, and key informants commented that law enforcement officers were hesitant to take action due to the fear of potential lawsuits arising from such cases. Additionally, the key informant highlighted that restrictions on alcohol sales to intoxicated individuals are seldom enforced due to challenges in interpreting the law.

> *" It ("It" refers to Article 32 under Alcoholic Beverage Control Act 2008: controlling alcohol advertisement) is still an issue because it involves a "similar logos." With this similar logos, the question arises: to what extent does it constitute a violation? At what*

point does it become a violation? This is the problem. However, other Articles don't have this issue." CSO1

Consolidation of the Policy Capacity Framework with other components

We consolidated all elements of the PCF and those that arose from our analysis outside PCF, to understand the implementation of effective alcohol control policies at the provincial level in Thailand. This integration involved combining the components of the PCF with external factors and implementation processes. The PCF was therefore regarded as an input into the policy processes. To ensure a comprehensive framework, we incorporated outputs and outcomes as well as evaluation aspects into the resulting framework (Figure 4.1).

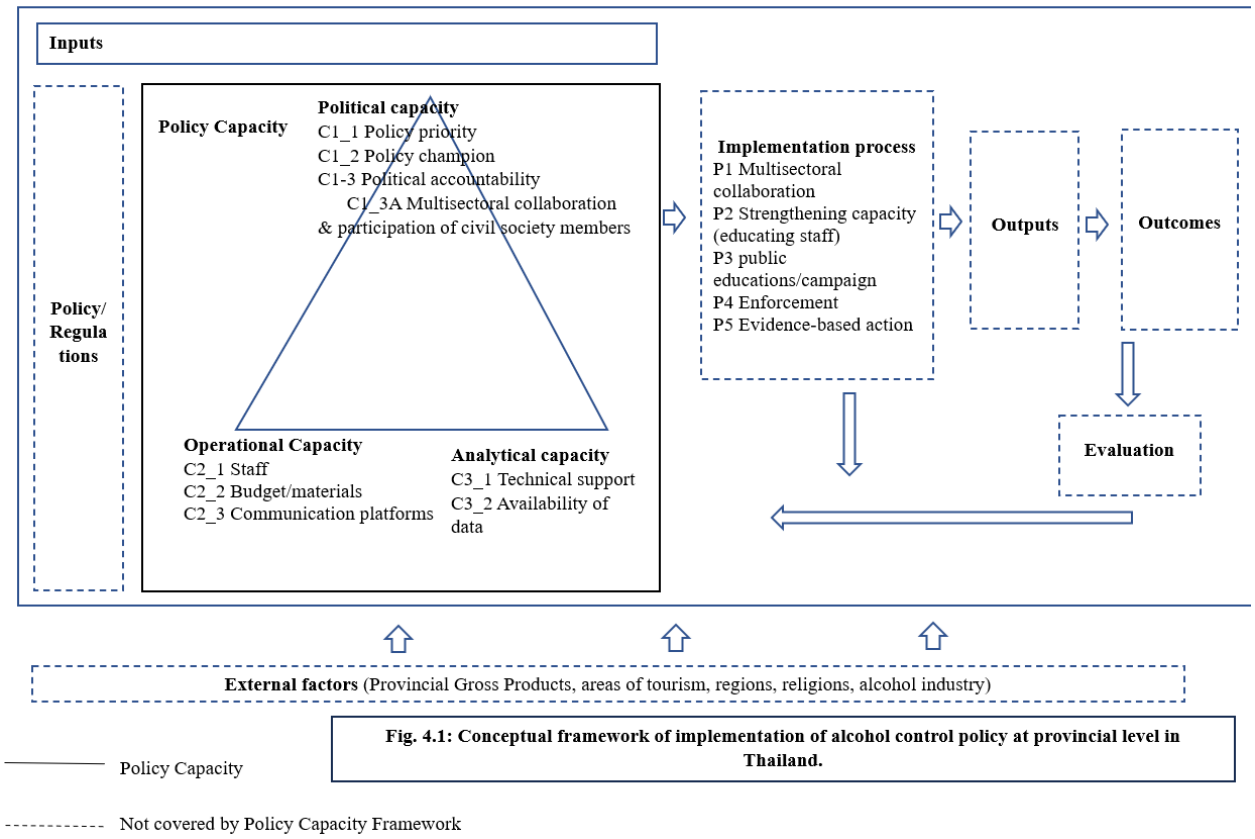

Fig. 4.1: Conceptual framework of implementation of alcohol control policy at provincial level in Thailand.

Figure 4. 1 Conceptual framework of implication of alcohol control policy at provincial level in Thailand

Discussion

Our study is the first to apply the PCF to alcohol control policies. Our findings confirm that the PCF is suited to the Thai context in relation to the implementation of alcohol control policies at the provincial level. The following discussion centres on explaining why the PCF is suited to the Thai context.

Political capacity, one of the core components of the PCF, is key to effectively implementing alcohol control policies, particularly through the policy priority mechanism. Without a commitment from policymakers at the provincial level in Thailand, it is difficult to move policy forward because bureaucratic systems require support from policymakers. As addressed earlier, commitment from provincial governors is therefore crucial. Apart from policy priority, the policy champion is also a key element of political capacity addressed by the PCF. Without stakeholders committed to working to address problems until the desired outcomes have been achieved, it is difficult to implement effective alcohol control policies at the provincial level in Thailand. However, high turnover rates among high-level policymakers have been identified at the provincial level (Chaiyasong et al., 2017). One alternative solution is to ensure there are other types of policy champions (e.g., civil society members, and governmental officers) committed to alcohol issues.

Analytical capacity can be applied in the implementation of alcohol control policies at a provincial level in Thailand. Our key informants emphasised the significance of having local data readily available to support policy implementation. A particular issue of importance identified was the capacity of personnel regarding knowledge of the content of these laws which subsequently affected enforcement strategies. Knowledge of the content of these laws and enforcement strategies emerged as key, confirming previous findings from another jurisdiction that interpreting the law presents challenges (Buvik & Baklien, 2014). This is even more apparent in relation to control of alcohol advertising in Thailand, where legal loopholes exist (Kaewpramkusol et al., 2019). Enforcing alcohol laws is not only a matter of having knowledge of their content but also requires the ability to handle conflict at the local level because law enforcement requires hard actions (e.g., fines) (Buvik & Baklien, 2014).

Operational capacity is the ability to make policy implementation happen. Resources, human and financial, as well as materials, are key to making policy implementation happen. In Thailand, there

is existing funding from the Thai Health Promotion Foundation, based on an earmark tax on alcohol and tobacco products, allocated to support civil society members (Tangcharoensathien et al., 2024) and the Provincial Office under the Ministry of Public Health across all provinces in Thailand. It is the main funding source to support the implementation of alcohol control policies in Thailand. Building operational capacity is linked to political capacity as well as analytical capacity. Creating funding support requires putting policy implementation of effective alcohol control policies onto policy makers' agenda. One way is to utilize technical capacity to show that alcohol-related problems are everyone's problem and that there are effective measures for addressing the issue.

The PCF has some limitations in relation to the implementation of effective alcohol policies at the provincial level in Thailand. As our results show, it does not cover some policy implementation processes (e.g., enforcement, education) and external factors (e.g., industry interference) identified by key informants. The PCF is focused on government or implementing agency capacities (including civil society members) and the readiness of systems to implement policy. However, the interests or incentives of different parties are lacking in the Framework; for example, the industry and alcohol retailers are motivated by profit. Therefore, the interests or incentives of all key involved parties (Howlett, 2018) should be integrated into any analysis to cover factors that influence implementation processes and policy outcomes. As shown in our study, there are factors beyond the capacities of governments or implementing agencies and, therefore, not covered by the PCF. One example is the political and/or economic situations (Hogwood & Gunn, 1984) that influence implementation processes and outcomes.

Strengths and limitations of the study

One of the main strengths of the study is that we conducted in-depth interviews to develop the framework and later validated it with the experts. However, it is important to note that the conceptual framework is grounded in a specific country context. Future studies should, therefore, consider adapting and applying the framework in their own country context to ensure relevance and applicability. Moreover, this study focused on the applicability of the PCF, from the field of policy sciences and public policy to policy implementation, where theoretical development is still limited. Alternative theory can be found in Implementation Science, a field that has contributed to further development of the PCF, but this is still in its early stages (Nilsen et al., 2013).

Conclusion

The study highlights the relevance of the PCF for alcohol policy implementation in the Thai context. Our findings confirm that all three components of the PCF: political, analytical and operational capacity apply to the Thai context in relation to implementing effective alcohol control policies at the provincial level. The three components and their sub-components can, therefore, be used to assess readiness for, as well as evaluate policy implementation to enhance the outcomes of existing policies. However, certain elements, including policy regulations, contextual factors (e.g., tourism areas, and industry interference), as well as implementation processes are not fully covered by the PCF. Governments should consider both the components of the PCF as well as other components outside the Framework to accelerate the achievement of national targets for reducing alcohol consumption per capita.

Chapter 5: A composite index of provincial alcohol control policy implementation capacity in Thailand

The findings from the previous three chapters informed the development of the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand. Chapters 2 and 3 report scoping reviews of the available tools, indicators, methods, barriers and facilitators for policy implementation of effective alcohol control policies. Then Chapter 4 provides a framework to conceptualise the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand. This chapter outlines the steps undertaken to create the indices, from conducting scoping reviews, to developing a conceptual framework, to data analysis. It then reports findings for the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index in Thailand. This study is the first to develop an index for assessing the implementation of alcohol control policies at the subnational level in low- and middle-income countries.

Abstract

Background There is a well-published literature on the effectiveness and stringency of alcohol control policies, but not many studies focus on policy implementation, where policies transform into impact. The objective of this study is to create a composite index that measures the capacity for implementing effective alcohol control policies across all provinces in Thailand.

Methods Based on the international literature, we developed a list of key indicators for tracking the implementation of alcohol policies at the subnational level. To ensure these indicators were relevant to the Thai context, we obtained feedback from Thai experts. We collected primary data according to the developed indicators using questionnaires filled in by key informants at the implementing agencies and gathered secondary data at the provincial level. On this basis, we developed indices that reflect the status of alcohol control policy implementation. We then investigated the association between the indices and the prevalence and pattern of alcohol consumption and alcohol-related harms while adjusting for potential confounders using multiple linear regression and negative binomial regression, respectively.

Results Scores on the Provincial Alcohol Policy Implementation Capacity (PAPIC) Index ranged between 39 and 79. We found that each 1-point increase in PAPIC score was associated with a 1.98% lower quantities of alcohol consumed in grams per day (coefficient: -0.02; 95%CI: -0.03, -0.00; *p*-value<0.05; $e^{-0.02}$=0.9802*)*. We also found that for each 1-point increase in PAPIC score, the proportion of regular drinkers was lower by 0.30 per cent (coefficient: -0.30; 95%CI: -0.55, -0.05; *p*-value<0.05). However, we did not find any association between the indices and alcohol-related harms.

Conclusion The level of implementation of alcohol control policy at the sub-national level is associated with alcohol consumption levels. The findings suggest the value of allocating resources to the implementation of alcohol control policy.

Keywords alcohol control policy, implementation, index, provincial level, Thailand

Introduction

Alcohol is a leading cause of death and disability globally, ranking seventh on both measures in 2016 (GBD 2016 Alcohol Collaborators, 2018). Reducing alcohol consumption is therefore one target of the United Nation's (UN) Sustainable Development Goals (SDGs) (United Nations, 2017). The UN had previously adopted the Political Declaration on Prevention and Control of NCDs, which includes alcohol control policies, among other measures (United Nations, 2011). Also seeking to reduce alcohol consumption and alcohol-related harms, in 2022, the World Health Organization adopted the Global Alcohol Action Plan to Strengthen Implementation of the 2010 Global Strategy to Reduce the Harmful Use of Alcohol. The Global Action Plan recommends the implementation of effective alcohol control policies in countries to counter the harmful use of alcohol. At the country level, governments are facing the dual problem of inertia in adopting effective alcohol control laws (Allen et al., 2022) and challenges in translating effective policies into practice (World Health Organization, 2019a).

Previous studies on the implementation of alcohol control policies have mostly used a qualitative approach to identify key barriers and facilitators to implementation (Jankhotkaew et al., 2022). Quantitative studies are also valuable for measuring progress in alcohol control policy implementation. In particular, a composite index is one method for comparing the progress of alcohol control policy implementation across countries. However, studies applying this method have mainly concentrated on the effectiveness and stringency of alcohol control policies (Brand et al., 2007; Ferreira-Borges et al., 2015; Joana & Sandro, 2018; Karlsson & Österberg, 2007; Leal-López et al., 2020). Only a few have integrated the potentially essential element of policy implementation in the indices, including a study that compared policy stringency and enforcement across countries in Western Pacific Region (Carragher et al., 2014), and more recently in impact measures reflecting implementation in a sample of countries (Casswell et al., 2022).

Implementation of alcohol control policies often happens at the subnational or local level. More importantly, alcohol control policy implementation is context-specific. Most studies measuring alcohol control policy implementation at the subnational level are set in high-income countries like the US (Blanchette et al., 2020; Naimi et al., 2014), Canada (Vallance et al., 2021), England (de Vocht et al., 2016), and Sweden (Nilsson et al., 2015). The focus of the North American studies is the stringency of local policies, while the latter two studies are concerned with implementation

activities, policies and resources. However, indices of policy implementation are lacking for low- and middle-income countries, which differ in terms of their drinking culture, political climate, stage of economic development, as well as commitment to alcohol control policies among stakeholders. Therefore, this study attempts to create a composite index of provincial alcohol control policy implementation capacity in Thailand, an upper middle-income country where alcohol control laws are well established and already implemented in the form of four effective, best-buy policies (control of alcohol advertising, control of physical availability, drink-driving countermeasures, and alcohol taxation). The aim is to measure the status of alcohol policy implementation at the provincial level in Thailand.

Background to alcohol control policy in Thailand

Thailand has a long history of alcohol control policy development. Currently, there are three main laws governing alcohol control policy in Thailand. First, the Alcoholic Beverage Control Act B.E. 2551 (2008) regulates alcohol advertising, physical availability, and alcohol treatment. After the adoption of the Act, various Ministerial Regulations were put in place to regulate alcohol advertising and control physical availability (e.g., limiting alcohol sales to certain hours, places and specific persons). Under the Act, there are three main committees: the National Alcohol Policy Committee, the Alcoholic Beverage Control Committee, and the Provincial Alcoholic Beverage Control Committee (the Provincial Committee). The Office of the Alcoholic Beverage Control Committee serves as the secretariat for the three committees. Operating across multiple government sectors, the Provincial Committee is the main agency responsible for implementing alcohol control policies at the provincial level. The second law is the Land Traffic Act B.E.2522 (1979), which regulates drink-driving behavior. The provisions of this Act are implemented by police officers under the command of the Chief of Provincial Office of the Royal Thai Police and Provincial Road Safety Committees (decision-making bodies at the provincial level). Third is the Excise Act B.E.2560 (2017), which regulates the taxation and licensing of alcohol sales and production (Waleewong, Khampang, Wichaidit, & Tangjit, 2020). This Act is mainly implemented by officers of the Provincial Office of Excise Departments and its branches. Their main roles are collecting alcohol excise taxes (including earmarked taxes) and inspecting alcohol outlets and alcohol production factories to check for illicit sales and illicit alcohol production. They also check

licenses for alcohol sales and alcohol production. These roles are authorized under the Excise Act B.E.2560 (2017).

This study is the first to create an index of alcohol control policy implementation at the subnational level in the low- and middle-income country context. Specifically, the aim is to create a composite index of provincial alcohol control policy implementation capacity across all provinces in Thailand. The indices comprise the four best-buy alcohol policies, as mentioned earlier.

Methods

Study design

We applied mixed methods across six phases to develop a composite index of provincial alcohol control policy implementation capacity in Thailand. First, we undertook a scoping review to gather tools and indicators from the international literature. Second, we employed a qualitative approach using key informant interviews to develop the conceptual framework, indicators and tools used in the study. Third, we validated the framework, indicators, and tools through an expert consultative workshop. Next, we piloted questionnaires among key informants in two selected provinces to ensure they were understandable and readable. Fifth, we applied a quantitative approach by conducting a self-administered survey among key informants across all provinces in Thailand, and we also gathered secondary data from the relevant organizations. Last, we conducted data analysis to generate the index (see the flowchart illustrating the methods of the study in the supplement, Figure 5A.1). We followed the recommended steps from the OECD handbook on constructing composite indicators (OECD, 2008). We focused on effective policies that are mainly regulatory (see a summary of effective alcohol control policies in Thailand in the supplement, Table 5A.1). Below, we outline the phases of developing the composite index, describing the participants and procedure for each step.

Phase 1: Theoretical framework and indicator development: Mapping tools and indicators from the international literature

We conducted a scoping review to map tools and indicators for assessing policy implementation by searching two main databases: SCOPUS and Web of Science. Further detail on the review method is provided elsewhere (Jankhotkaew et al., 2023). We also conducted a scoping review of

barriers and facilitators for the implementation of effective policies to ensure we captured important indicators for measuring alcohol control policy implementation (Jankhotkaew et al., 2022).

Phase 2: Theoretical framework and indicator development: Adaptation of the indicators and tools for the Thai context

a) Participants

The key informants for the semi-structured interviews were purposively selected to conceptualize and suggest possible indicators. Snowball sampling was also applied. The key informants included governmental officers and members of academia and civil society who had been involved in supporting policy implementation at the national level, and those involved in policy implementation at the provincial level. We conducted interviews with ten people (four government officers at the national level, two civil society organization (CSO) members at the national level, two CSO members at the regional level, one academic at the national level, and one government officer at the provincial level).

b) Procedures

Three steps were involved in developing the theoretical framework so that the indicators and tools fit the Thai context. First, to ensure the tools and indicators collated from the international literature were relevant to the Thai context, we conducted a narrative review of the existing regulations to understand the content, context, and policy processes around the four effective alcohol policies in Thailand, both at the national and provincial levels. Our sources included government and academic center websites. Second, we also conducted in-depth interviews to understand the process of policy implementation. We asked participants about key factors, both barriers and facilitators, that could be used as indicators for assessing policy implementation. After conducting the in-depth interviews, we revisited the conceptual framework and adapted it to the Thai context.

The framework we applied was the Policy Capacity Framework. The Policy Capacity Framework describes the capacity of government to govern policy at the national level (Wu et al., 2015). It consists of three sub-domains: political capacity, technical capacity, and operational capacity. First, political capacity is the capacity to gain support from policy-makers and populations in order to sustain policy commitment. Second, analytical capacity or technical capacity is the ability to

use evidence and technical capacity to support decision-making. Third, operational capacity is the ability to manage resources to achieve policy goals (Wu et al., 2015). We also integrated the Implementation Model to Increase the Effectiveness of Alcohol Control Policies, thereby incorporating implementation processes not covered in the Framework. These were processes for implementing the law (e.g., frequency of committee meetings), educating the public and staff, enforcement, and monitoring and evaluation (Jones-Webb et al., 2014).

Phase 3: Theoretical framework and indicator development: Validation of the indicators and tools with the Thai experts

a) Participants

We conducted a workshop with experts from both the national and provincial levels. We purposively selected experts at the national level based on the list of organizations mentioned in the joint assessment report by Waleewong et al. (2020). At the provincial level, we purposively selected two provinces (i.e., with the most and the least implemented policies) for each of the four regions (north, northeast, south, and central) and Bangkok. We decided to focus on those with the most and least implemented alcohol policies because we wanted to identify indicators that reflected levels of implementation across all regions. The criteria for provinces with higher levels of implementation were regular, at least yearly meetings of the Provincial Committee over the past three years; reporting of prosecuted cases; and regular law enforcement through setting up regular monitoring of law compliance among alcohol retailers (at least twice a year) over the last three years. Conversely, the provinces deemed to have low implementation levels did not meet these criteria. The provincial experts had to be involved in policy implementation at the provincial level. These experts included governmental officers and civil society members. One civil society member at the provincial level, one civil society member at the national level, one academic at the national level and three governmental officers at the provincial level were unable to attend the workshop. In total, 21 participants participated in the workshop: 11 from the government sector (3 national level, and 8 provincial or regional level), five academics (all national level), and five civil society members (3 national level, and 2 regional level).

b) Procedures

We conducted the expert consultative workshop online, with the Thai experts commenting on the conceptual framework, draft indicators, and the tool. The workshop was organized as follows: 1)

presentation of the overall project; 2) the experts comment on the conceptual framework; 3) the experts comment on the indicators for assessing policy implementation; and 4) the experts comment on the draft tool. However, we were only able to cover the first three issues during the workshop. We therefore asked participants to provide written comments on the tool via e-mail. After the workshop, we revised the indicators in accordance with the experts' comments. We then confirmed the deletion or insertion of indicators using two methods. First, we sent an e-mail to the experts who attended the workshop to inform them of the changes, allowing two weeks for comment and feedback. Second, to ensure the indicators' relevancy to policy implementation, we also confirmed deletions and insertions with governmental officers at the provincial level.

Phase 4: Piloting the tool

a) Participants

We selected members of the Provincial Alcoholic Beverage Control Committee (Provincial Committee) in two provinces to test the questionnaire. These key stakeholders are responsible for the implementation of alcohol control policy at the provincial level. The testing involved 29 key informants across the two provinces (one person was not available). We tightened the selection criteria for the best and worst provinces in terms of implementation compared with phase 3. The three main criteria were: 1) the Provincial Committee meeting at least four times within three years; 2) having regular law enforcement (i.e., at least 1,000 alcohol outlets inspected over the past three years); and 3) reporting more than 20 prosecuted cases over the last three years.

b) Procedures

The main purpose of the pilot was to test understanding of the questionnaire. We tested the questionnaire using an online form, also asking participants about the availability of data for the indicators gathered from secondary sources. We asked key informants to reflect on their understanding of the questionnaire and the availability of the data. After piloting, we revised the questionnaire and indicators in line with suggestions from the key informants.

Phase 5: data collection

a) Participants

In total, five key informants per province were invited to participate. They represented the following five organizations: the Provincial Office of the Ministry of Public Health, the Provincial

Office of the Excise Department, the Provincial Office of Mitigation and Disaster Relief, the Provincial Office of the Royal Thai Police, and CSOs. These organizations are key to implementing alcohol policies. Seven provinces have more than one branch of the Provincial Office of the Excise Department, so we randomly selected one branch.

b) Procedures

We sent questionnaires to key informants at the provincial level, asking them to fill these in online. The response rate for the survey was 81 per cent (312/385). For some indicators, data were available at the national level of the organizations. We therefore obtained data such as the number of reported cases prosecuted and the percentage of drivers who experienced alcohol breath testing at the national level to reduce the burden on our key informants. We collected data from August to October 2022. However, due to issues with the availability of key informants, we extended the data collection period to January 2023. We made up to three follow-up phone calls after the initial contact. Researchers from the project also joined regional meetings attended by key informants at the provincial level to encourage their participation. If key informants had already provided data but there were unclear answers, we later contacted them for clarification. We invited key informants working under the Ministry of Public Health to an online Zoom meeting to request their cooperation. During the meeting, we explained the questionnaire and provided supporting documents. Unfortunately, 22 provinces were unable to attend the online meeting. However, we made individual calls to explain the details instead.

We asked key informants to recall the implementation of alcohol control policy at the provincial level in 2019, prior to the disruptions to policy implementation caused by COVID-19. We also asked key informants to provide supporting information or documents where available.

Phase 6: Analysis methods

a) Dealing with missing data

There was on average 13 percent missing data for the various indicators. We applied two main methods to address this, namely using data from the nearest-neighboring province and median replacement. We applied data from the nearest-neighboring provinces because neighboring provinces have similar drinking cultures (Assanangkornchai, 2019b). We excluded one province due to it having no available data for any indicators.

b) Normalization of data

We applied the tertile approach to normalize the data (OECD, 2008). Specifically, for the continuous variables, we categorized the provinces into three groups using the tertile method. Provinces that fell into group 1 received a score of 1, and those falling into group 3 received a score of 3. For those provinces that reported 0, we replaced the score with 0 instead. Then, we rescaled the scores from 0 to 1 by dividing by 3. While the OECD suggests using percentiles, due to the limited number of provinces we applied tertiles instead.

c) Weight and aggregation

We applied expert opinion using Delphi techniques to weight the implementation indicators (see list of indicators in Table 5.1) (Nelson et al., 2013). We set up a workshop with experts based on the list provided in the Joint Assessment Report by Waleewong et al. (2020). Twelve experts attended the meeting and completed the survey (11 experts had experience in the implementation of alcohol control policies across all policies and one for drink-driving countermeasures alone). This phase of the research involved three stages. First, we sent questionnaires to the experts to fill in before the meeting. We then circulated the findings to the experts via email, followed by the workshop where the experts were able to clarify unclear indicators. After the workshop, we asked the experts to fill in the questionnaire again (see weighted scores in supplementary Table 5A.2 and Table 5A.3).

Table 5. 1 Indicators of indices for each policy measure

No.	Indicators	Advertise-ment	Physical availability	Drink-driving	Taxation
	Policy capacity at provincial level				
	Political capacity				
1	Establishment of written policy	✓	✓	✓	✓
2	Number of policy champions	✓	✓	✓	✓
3	Establishment of Sub-committee of the Provincial Alcoholic Beverage Control Committee (Provincial Committee) with engagement of civil society members	✓	✓	NA	NA
4	Establishment of Sub-Committee on Provincial Road Safety Committee on Law enforcement	NA	NA	✓	NA
	Analytical capacity or technical capacity				
5	Number of technical support persons	✓	✓	✓	NA
6	Number of lawyers who provide legal support	✓	✓	NA	NA
	Operational capacity				
7	Establishment of communication channel	✓	✓	✓	NA
8	Number of officers who enforce specific laws per 1,000 alcohol outlets	✓	✓	NA	✓
9	Number of officers who support implementation of specific laws per 1,000 alcohol outlets	✓	✓	NA	✓
10	Budget for law enforcement per capita	✓	✓	✓	NA
11	Number of officers who enforce drink-driving measures per 100,000 driving licenses	NA	NA	✓	NA
12	Number of officers who support implementation of drink-driving measures per 100,000 driving licenses	NA	NA	✓	NA
13	Sufficiency of alcohol breathalyzers	NA	NA	✓	NA
14	Number of alcohol breathalyzers per 100,000 driving licenses	NA	NA	✓	NA
	Implementation process for strengthening law enforcement				
15	Using evidence-based action, using evidence for decision making, planning, and action	✓	✓	✓	✓
16	Frequency of meetings of the Provincial Committee	✓	✓	NA	NA
17	Frequency of meeting of sub-committee of the Provincial Committee	✓	✓	NA	NA

No.	Indicators	Advertise-ment	Physical availability	Drink-driving	Taxation
18	Frequency of having agenda on drink-driving during meetings of the Provincial Road Safety Committee or Sub-Committee of the Provincial Road Safety Committee on Law Enforcement	NA	NA	✓	NA
19	Number of staff trained on law content and law enforcement	✓	✓	✓	✓
20	Number of activities around providing education/raising awareness for the public and alcohol outlets	✓	✓	✓	✓
	Implementation processes: Law enforcement				
21	Intensity: Frequency of law enforcement at social events or festivals at provincial level	✓	NA	NA	NA
22	Intensity: Frequency of online monitoring of alcohol advertising violation	✓	NA	NA	NA
23	Intensity: Frequency of outlet inspection regarding alcohol advertising control	✓	NA	NA	NA
24	Coverage: Percentage of alcohol outlets that have been inspected regarding alcohol advertising control	✓	NA	NA	NA
25	Intensity: Percentage of reported cases that have been prosecuted regarding alcohol advertising control	✓	NA	NA	NA
26	Intensity: Frequency of outlet inspection regarding alcohol sales in certain places	NA	✓	NA	NA
27	Intensity: Frequency of outlet inspection regarding control of alcohol sales on certain days	NA	✓	NA	NA
28	Intensity: Frequency of outlet inspection regarding control of alcohol sales at certain times	NA	✓	NA	NA
29	Intensity: Frequency of outlet inspection regarding control of alcohol sales to underage drinkers	NA	✓	NA	NA
30	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales on certain days	NA	✓	NA	NA
31	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales at certain times	NA	✓	NA	NA
32	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales to underage drinkers	NA	✓	NA	NA
33	Intensity: Percentage of reported cases that have been prosecuted regarding physical availability control	NA	✓	NA	NA
34	Intensity: Frequency of law enforcement by setting up sobriety check points	NA	NA	✓	NA

No.	Indicators	Advertise-ment	Physical availability	Drink-driving	Taxation
35	Coverage: Percentage of drivers who have experienced alcohol breath testing	NA	NA	✓	NA
36	Intensity: Frequency of law enforcement among alcohol outlets regarding Excise Act B.E.2560 (2017) and related ministerial regulations	NA	NA	NA	✓
37	Coverage: Percentage of outlets that have been inspected by officers regarding Excise Act B.E.2560 (2017) and related ministerial regulations	NA	NA	NA	✓
	Total numbers of indicators	**19**	**22**	**16**	**9**

NA: Not applicable

To obtain the overall index, we multiplied the index of each policy measure by the weighted scores and later estimated the sum of the indices of the different policy measures: alcohol advertising control, control of physical availability, drink-driving control, and alcohol taxation policies. After weighting, we rescaled the scores on a 0–100 scale by dividing the scores by the maximum scores and multiplying by 100. To obtain the specific indices of different policy measures, we divided the specific policy scores with maximum scores and multiplied by 100.

d) Associations between the indices and alcohol consumption patterns and alcohol-related harms

We tested the validity of the index by investigating the associations between the indices and the quantity of alcohol consumed, alcohol consumption patterns, rates of alcohol-related road traffic injuries, and alcoholic liver cirrhosis – both inpatient and deaths. Alcohol-related road traffic injuries and deaths in 2019 were determined through injury surveillance at emergency departments collected by the Ministry of Public Health, Thailand. The measures were based on the observations of medical officers, inquiries made by medical officers to patients, and alcohol breath or blood tests, depending on the specific circumstances of each case. We also gathered secondary data on alcoholic liver cirrhosis from the Ministry of Public Health. The alcoholic liver cirrhosis measures in 2019 were based on inpatients diagnosed with alcoholic liver cirrhosis (ICD-10: K70) and deaths from alcoholic liver cirrhosis. Deaths from alcoholic liver cirrhosis were identified using data from death registries, which were cross-checked with hospital records to ensure accuracy and completeness by the staff of Ministry of Public Health. We calculated age-standardized morbidity and mortality rates for alcoholic liver cirrhosis. For alcohol-related road traffic injuries, we received data on total case numbers in each province for age groups below 20 years and 20 years and above. Consequently, we calculated the rates of alcohol-related road traffic injuries by dividing the numbers of such injuries by the total population within those age groups.

Alcohol consumption data was derived from a national survey conducted by the National Statistical Office in 2017, which utilized provincially representative samples. The 2017 survey was chosen because it is the only survey data available. Three key measures were employed to investigate alcohol consumption patterns. Firstly, alcohol consumption was calculated based on beverage-specific questionnaires completed by drinkers. Respondents were asked to list the three beverages they most frequently consumed in the past 12 months. Subsequently, their drinking

frequency, the type and quantity of drinking containers used, and the number of units consumed were assessed. This information allowed for the estimation of overall alcohol consumption, which was then converted into a daily consumption figure by dividing by 365 days. Mean consumption per day (grams of pure alcohol per day) was chosen over the median, as median values across all provinces were found to be consistently zero. We transformed the quantity of alcohol consumption among drinkers into log form because it was not normally distributed. Secondly, binge drinking was determined through specific survey questions, identifying individuals who consumed more than five standard drinks or 50 grams in one occasion within the past 12 months. Thirdly, regular drinkers were defined as those who consumed alcohol on a weekly basis in the same time frame. Weighted analysis was employed to ensure the provincial representativeness of the samples.

We applied multiple linear regression to investigate the associations between the indices and the quantity of alcohol consumed and alcohol consumption patterns. We tested the main assumptions of linear regression, including normality of the outcomes (using Shapiro-wilk test), linear association (using scatterplots), homoscedasticity (using Breusch-Pagan /Cook-Weisberg test for heteroskedasticity), and multicollinearity (using the correlation coefficient). All assumptions were met.

We adjusted for potential confounders, including Gross Provincial Products (GPP) (Thai baht), (Cohen et al., 2002), regions (Central, North, Northeast, and South) (Chaiyasong & Thamarangsi, 2016), population percentage of Muslims (Jankhotkaew et al., 2023), and location of provinces in relation to tourist areas.

We applied negative binomial regression to investigate the association between the indices and rates of alcohol-related road traffic injuries and age-standardized alcoholic liver cirrhosis, both inpatient and deaths. We applied negative binomial regression rather than poisson regression due to the data not fitting a poisson distribution. We adjusted for region and population percentage of Muslims in calculating the association between the indices and age standardization of alcoholic liver cirrhosis. The region reflects different drinking cultures. People from the northern and northeastern regions reported a higher prevalence of alcohol consumption compared to the south and central regions (Chaiyasong & Thamarangsi, 2016). We adjusted for percentage of Muslim population because provinces with higher numbers of Muslims will have a lower prevalence of alcohol consumption, reflecting religious restrictions (Khamis et al., 2022). Region and percentage

of Muslim population are associated with drinking prevalence, and in turn alcoholic liver cirrhosis and alcohol-related road traffic injuries. We did not adjust for GPP and areas of tourism in the models because we did not find associations between these two factors and age standardization of alcoholic liver cirrhosis. In addition, we did not find any statistically significant association between the percentage of Muslims, GPP, and areas of tourism and alcohol-related road traffic injuries; therefore, we only adjusted for region to calculate the association between the indices and alcohol-related road traffic injuries. Moreover, we analyzed the association between the indices and alcohol-related road traffic injuries for two separate age groups, the population aged below 20 years and those aged 20 years and above. However, the differences were not statistically significant between the two age groups and therefore we reported the association between the indices and alcohol-related road traffic injuries for the overall population.

e) Conducting sensitivity analysis

We applied two methods to investigate the variability of the index. First, to deal with missing data from the provinces that provided no data, we applied median replacement because the continuous variables were skewed, comparing the findings with the nearest-province replacement. We also investigated both weighted and unweighted scores of the index. We employed unweighted scores to investigate the variability of the index, comparing the findings with weighted scores. In applying weighted and unweighted scores, we also employed two methods of dealing with missing data: nearest-neighboring provinces and median replacement.

Ethical issues

The study was approved by the Mahasarakham University Ethics Committee for Research Involving Human Subjects in Thailand (Approval number: 166-100/2022). In the participant information sheet, we provided information about the project and participants' right to terminate their involvement in the study at any time.

Results

The provincial alcohol control policy implementation capacity index (PAPIC) in Thailand

The mean of the overall index was 61.0 (Standard Deviation: 8.8), spanning a range from 79.3 to 38.6. The five provinces with the highest PAPIC scores, indicating strong implementation, were

Nan (northern region), Phitsanulok (lower northern region), Amnat Charoen (northeastern region), Singburi (central region), and Ranong (southern region). The lowest PAPIC scores were received by Songkhla (southern region), Nakhon Nayok (central region), Chantaburi (eastern region), Narathiwat (southern region), and Nonthaburi (central region) (Table 5.2 & Figure 5.1). We also determined the variation in the indices for different policy measures across provinces in Thailand (Appendix Figure 5A.2-5A.5 and Table 5A.4-5A.7).

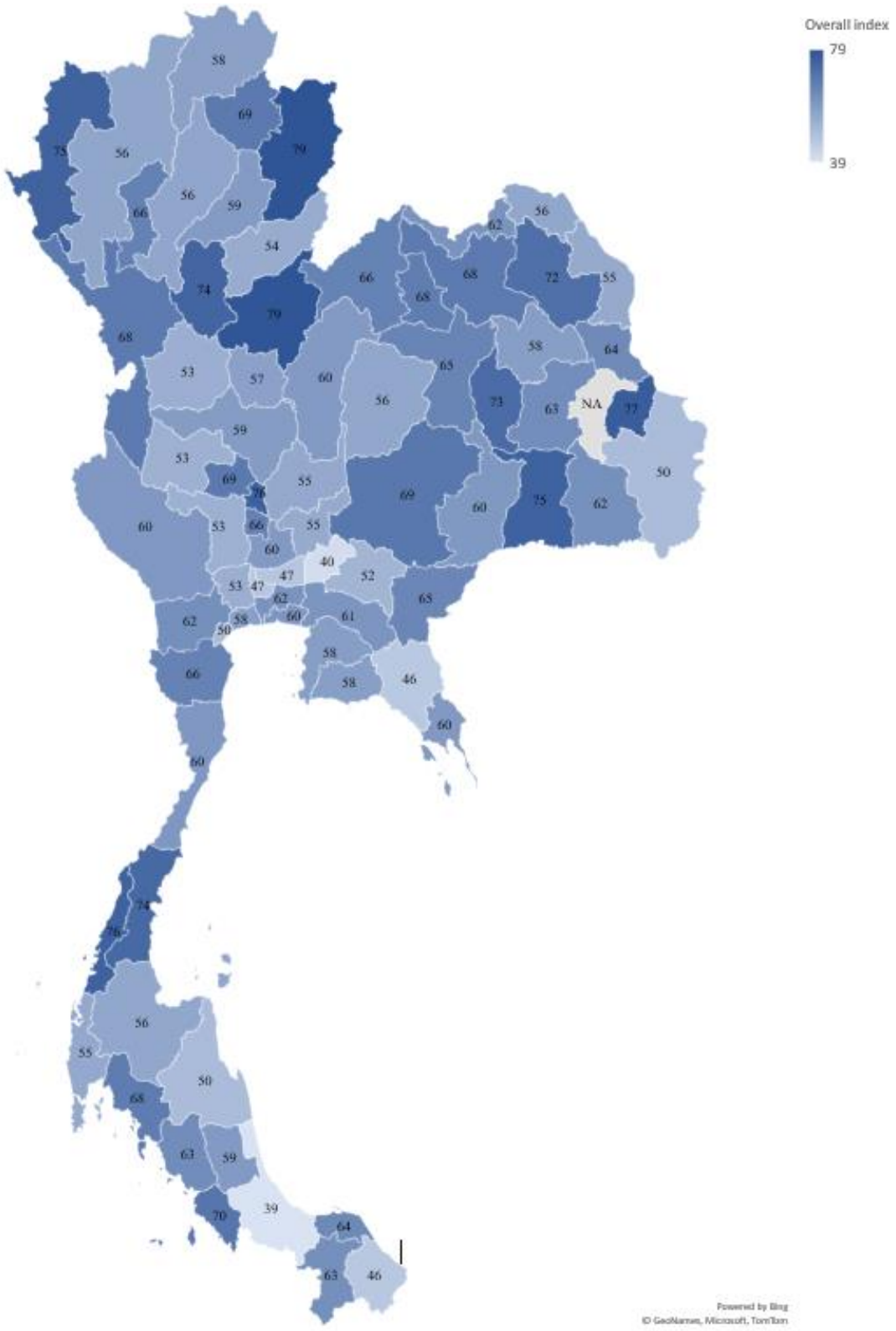

Figure 5. 1 Provincial Alcohol Control Policy Implementation Capacity Index by province

Table 5. 2 Overall index and rank on overall index by province

Province	Overall index	Rank on overall index
Nan	79.3	1
Phitsanulok	79.1	2
Amnat Charoen	76.7	3
Sing buri	75.7	4
Ranong	75.6	5
Surin	75.4	6
Mae Hong Son	75.0	7
Sukhothai	74.5	8
Chumphon	73.6	9
Maha Sarakham	72.6	10
Sakon Nakhon	71.6	11
Satun	69.8	12
Nakhon Ratchasima	69.4	13
Chai Nat	68.8	14
Phayao	68.7	15
Udon Thani	68.5	16
Tak	68.5	17
Krabi	67.8	18
Nong Bua Lamphu	67.5	19
Lamphun	66.5	20
Ang Thong	66.3	21
Loei	66.2	22
Phetchaburi	66.1	23
Khonkaen	65.5	24
Sa Kaeo	65.1	25
Pattani	64.2	26
Mukdahan	63.7	27
Trang	63.4	28
Roi Et	63.1	29
Yala	62.5	30
Ratchaburi	62.5	31
Sisaket	62.1	32
Bangkok	61.6	33
Nong Khai	61.5	34
Chachoengsao	60.7	35
Samut Prakan	60.4	36
Prachuap Khiri Khan	60.4	37
Kanchanaburi	60.0	38
Buri ram	60.0	39
Trat	59.8	40

Province	Overall index	Rank on overall index
Ayutthaya	59.6	41
Phetchabun	59.6	42
Phatthalung	59.3	43
Phara	59.1	44
Nakhom Sawan	58.8	45
Chonburi	58.5	46
Kalasin	58.3	47
Rayong	58.1	48
Samut Sakhon	57.9	49
Chiang Rai	57.5	50
Phichit	57.4	51
Chiang Mai	56.1	52
Lampang	56.0	53
Chaiyaphum	55.8	54
Surat Thani	55.7	55
Bueng Kan	55.7	56
Lop Buri	55.4	57
Phang Nga	55.3	58
Phuket	55.2	59
Nakhon Phanom	54.8	60
Saraburi	54.7	61
Uttaradit	54.5	62
Kamphaengphet	53.4	63
Nakhon Pathom	53.4	64
Suphan Buri	53.1	65
Uthai Thani	53.0	66
Prachin Buri	51.8	67
Samut Songkhram	50.0	68
Nakhon Si Thammarat	49.9	69
Ubon Ratchathani	49.7	70
Pathum Thani	47.2	71
Nonthaburi	46.6	72
Narathiwat	46.4	73
Chanthaburi	46.2	74
Nakhon Nayok	40.3	75
Songkhla	38.6	76

Associations between the provincial alcohol control policy implementation capacity index (PAPIC) and alcohol consumption patterns

We found an association between the PAPIC and alcohol consumption per drinker and by proportion of regular drinkers. Each 1-point increase in PAPIC score was associated with a 1.98% lower daily alcohol consumption in grams (coefficient: -0.02; 95%CI: -0.03, -0.00; *p*-value<0.05; $e^{-0.02}$=0.9802*)*. Also, every 1-point increase in PAPIC score was associated with a 0.30 lower proportion of regular drinkers (coefficient: -0.30; 95%CI: -0.55, -0.05; *p*-value<0.05) (Table 5.3).

Table 5. 3 The associations between the provincial alcohol control policy implementation capacity index and alcohol consumption patterns

Variables	Quantity consumed	Prevalence of alcohol consumption	Proportion of binge drinkers	Proportion of regular drinkers	Prevalence of youth drinkers
PAPIC	-0.02 (-0.03, -0.00)*	0.05 (-0.11, 0.21)	-0.05 (-0.32, 0.22)	-0.30 (-0.55, -0.05)*	-0.02 (-0.18, 0.14)
Gross Provincial Products	0.00 (-0.01, 0.01)	-0.01 (-0.12, 0.09)	0.31 (0.13, 0.49)*	-0.13 (-0.30, 0.04)	-0.05 (-0.16, 0.05)
Areas of tourism (No vs Yes)	-0.10 (-0.37, 0.18)	4.19 (0.87, 7.38)*	-4.74 (-10.27, 0.78)	-1.78 (-6.95, 3.39)	4.50 (1.23, 7.76)*
Regions (Central-reference)					
North	-0.26 (-0.61, 0.09)	8.00 (3.86, 12.13)*	8.93 (1.90, 15.96)*	-4.72 (-11.30, 1.86)	6.18 (2.03, 10.34)*
Northeast	-0.65 (-1.00, 0.30)	4.64 (0.42, 8.86)	10.93 (3.77, 18.10)*	-11.70 (-18.41, -5.00)*	4.29 (0.06, 8.53)*
South	-0.16 (-0.60, 0.27)	-6.13 (-11.31, -0.96)*	9.77 (0.98, 18.56)*	-3.26 (-11.49, 4.96)	-3.90 (-9.10, 1.29)
Percent of Muslims	-0.00 (-0.01, 0.01)	-0.19 (-0.29, -0.09)*	-0.05 (-0.23, 0.12)	0.06 (-0.10, 0.22)	-0.08 (-0.19, 0.02)
Constant	2.52 (1.67, 3.37)	20.71 (10.59, 30.84)	36.25 (19.06, 53.45)	70.19 (54.10, 86.28)	9.92 (-0.25, 20.08)
Adjusted-R square	0.28	0.62	0.11	0.22	0.38

*****p-value<0.05; PAPIC: index of the provincial alcohol control policy implementation capacity

When we investigated associations between indices for more specific measures, we found that the index of implementation of alcohol advertising control was negatively associated with quantity consumed among drinkers. We also found that for every 1-point increase in the score for alcohol advertising control, the quantity of alcohol consumed was lower by 1.98% (coefficient: -0.02; 95%CI: -0.03, -0.00; p-value<0.05; $e^{-0.02}$=0.9802). We also found a negative association between the indices of alcohol advertising control and physical availability and the proportion of regular drinkers. We found that for every 1-point increase in the score for alcohol advertising control, the proportion of regular drinkers was lower by 0.30 per cent (coefficient: -0.30; 95%CI: -0.50, -0.09; p-value<0.05). We also found that for every 1-point increase in the score for physical availability control, the proportion of regular drinkers was lower by 0.31 per cent (coefficient: -0.31; 95%CI: -0.50, -0.11; p-value<0.05). However, we did not find any association between the indices of drink-driving measures and alcohol taxation policy and patterns of alcohol consumption (Table 5.4).

Table 5. 4 The associations between the provincial alcohol control policy implementation capacity index, considering different policy measures, and alcohol consumption patterns

Variables	Quantity consumed	Prevalence of alcohol consumption	Proportion of binge drinkers	Proportion of regular drinkers	Prevalence of youth drinkers
Alcohol advertising	-0.02 (-0.03, -0.00)*	0.03 (-0.10, 0.16)	-0.02 (-0.24, 0.21)	-0.30 (-0.50, -0.09)*	-0.01 (-0.14, 0.12)
Physical availability	-0.01 (-0.01, 0.00)	0.04 (-0.09, 0.17)	0.01 (-0.20, 0.23)	-0.31 (-0.50, -0.11)*	0.05 (-0.07, 0.18)
Drink-driving	-0.01 (-0.02, 0.00)	0.06 (-0.08, 0.20)	-0.11 (-0.35, 0.12)	-0.10 (-0.33, 0.12)	-0.04 (-0.17, 0.10)
Alcohol taxation	-0.01 (-0.02, 0.00)	-0.00 (-0.10,0.10)	-0.01 (-0.18, 0.17)	-0.06 (-0.23, 0.11)	-0.04 (-0.14, 0.06)

*******p*-value<0.05**;** The models were adjusted for Gross Provincial Products, areas of tourism, regions, and percent of Muslim population

The association between the provincial alcohol control policy implementation capacity index and alcohol-related harms

We found no statistically significant results for the association between the PAPIC and alcohol-related harms (Table 5.5), nor did we find any association between the indices of implementation for different policy measures and alcohol-related harms (Table 5.6).

Table 5. 5 The associations between the provincial alcohol control policy implementation capacity index and alcohol-related harms

Variables	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among females	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among females	IRR (95%CI) RTI rates	IRR (95%CI) RTI death rates
Overall index	1.00(0.99, 1.02)	1.01 (0.99, 1.02)	0.99 (0.98, 1.01)	0.99 (0.97, 1.02)	1.01 (0.98, 1.04)	1.01(0.98, 1.03)
Region (Ref. Central)						
North	1.22 (0.94, 1.58)	0.83 (0.54, 1.26)	1.24 (0.93, 1.66)	0.86 (0.51, 1.43)	2.46 (1.21, 5.02)*	2.86 (1.60, 5.13)*
Northeast	1.31 (1.02, 1.69)*	0.86 (0.56, 1.31)	0.63 (0.46, 0.88)*	0.48 (0.27, 0.86)*	1.03 (0.50, 2.12)	1.13 (0.57, 2.25)
South	0.79 (0.56, 1.12)	0.33 (0.18, 0.60)*	0.88 (0.56, 1.36)*	0.29 (0.10, 0.87)*	0.69 (0.33, 1.44)	1.04 (0.49, 2.22)
Percent of Muslim	0.99 (0.98, 0.99)*	0.98 (0.96, 0.99)*	0.99 (0.98, 1.00)*	0.99 (0.95, 1.02)	-	-

***p*-value<0.05; IRR: incident rate ratio**;** RTI: alcohol-related road traffic injury rates

Table 5. 6 The association between the provincial alcohol control policy implementation capacity index, considering different policy measures, and alcohol-related harms

Variables	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among females	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among females	IRR (95%CI) RTI rates	IRR (95%CI) RTI death rates
Alcohol advertising	1.00 (1.00, 1.01)	1.00 (0.99, 1.02)	0.99 (0.98, 1.01)	0.99 (0.97, 1.01)	1.01 (0.99, 1.03)	1.01 (0.99, 1.03)
Physical availability	1.00 (0.99, 1.01)	1.00 (0.98, 1.01)	0.99 (0.98, 1.00)	1.00 (0.98, 1.02)	1.01 (0.98, 1.03)	1.01 (0.99, 1.03)
Drink-driving	1.01 (1.00, 1.02)	1.01 (0.99, 1.03)	1.00 (0.99, 1.01)	1.01 (0.99, 1.03)	1.01 (0.99, 1.04)	1.01 (0.99, 1.03)
Alcohol taxation	1.00 (1.00, 1.01)	1.00 (0.99, 1.01)	1.00 (0.99, 1.00)	0.99 (0.98, 1.01)	0.99 (0.98, 1.01)	0.99 (0.98, 1.01)

The models of aged standardization of alcoholic liver cirrhosis were adjusted for region and percentage of Muslims; The models of rates of alcohol-related road traffic injuries were adjusted for region; *****p-value<0.05; IRR: incident rate ratio**;** RTI: alcohol-related road traffic injury rates

Sensitivity analysis

When we compared the scores and ranking of provinces using sensitivity analysis, median replacement of missing data, and unweighted scores, we found the scores and ranking were not that different. For example, Nan province ranked number one on the overall PAPIC, with province rankings ranging between 1 and 2. Nan received a score of 79.3, with province scores ranging between 76.8 and 79.3 (see supplementary Table 5A.8).

We conducted a sensitivity analysis using the median replacement of missing data. We found the same association between the indices and alcohol consumption patterns (Table 5A.9) and alcohol-related harms (Table 5A.10). We also conducted a sensitivity analysis using unweighted methods and found that the association between the indices and alcohol consumption patterns and alcohol-related harms were similar to those using weighted methods (Table 5A.11-5A.12).

Discussion

Our study is the first to create an index of alcohol control policy implementation for the four most effective policies at the sub-national level in the low- and middle-income country context. The findings show that the overall index and the index for the implementation of alcohol advertising control are associated with the quantity of alcohol consumption and the proportion of regular drinkers. We also found an association between the index for physical availability control and the proportion of regular drinkers. However, the indices show no association with alcohol-related harms.

When we compared our findings with a Swedish study that developed indices based on implementation components (i.e., resources, policies, cooperation, supervisions and licenses, activities), we found similar results associating an increase in the indices with alcohol consumption (Nilsson et al., 2020). When we compared the findings of our study with previous research using indices based on the stringency of alcohol control policies at the state level and patterns of alcohol consumption, such as in the US, we found notable differences. The previous study showed that these indices were associated with binge drinking (Naimi et al., 2014), whereas our study did not find a significant association in this regard. Instead, our study found that the PAPIC index was associated with the proportion of regular drinkers. It might be that this association is due to the low prevalence of alcohol consumption in Thailand: Nationally, one-third of Thai are drinkers

(National Statistical Office, 2017). The reason for the lack of a relationship between the PAPIC index and binge drinking is not known.

In addition, we report similar findings compared to previous studies that have investigated the association between the indices of policy stringency across countries and alcohol consumption per capita (Carragher et al., 2014; Casswell et al., 2022). However, the PAPIC index further contributes a detailed focus on policy implementation. This is very important because policies do not automatically translate into action, which requires resources and the commitment of policymakers and operational staff at all levels. Furthermore, we also controlled for potential confounding factors, whereas other studies have created indices based on effectiveness by applying correlation coefficients (Brand et al., 2007; Casswell et al., 2022). This study, therefore, has a stronger design in terms of taking into account factors that affect the indices and outcomes.

The study findings show that the indices for implementation of two policy measures, control of alcohol advertising and control of physical availability, were associated with the proportion of regular drinkers. These policy domains were measured by the extent to which the provincial authorities conducted inspections of outlets and social events to monitor compliance with the laws controlling physical availability (e.g., selling alcohol to minors) and alcohol advertising. The findings are similar to a previous study showing that an increased index of control of alcohol advertising is significantly associated with lower alcohol consumption (Casswell et al., 2022).

We did not find any association between the indices for drink-driving measures and alcohol taxation policy and alcohol consumption among drinkers. Alcohol taxation policy is set at the national level, and is consistent across provinces (Excise Department, 2017a). The main tasks of the provincial authorities are collecting alcohol excise taxes and inspecting alcohol outlets and alcohol production factories for illicit alcohol sales and production (Excise Department, 2017a, 2017b, 2017c). They have no role in influencing alcohol taxation rates, which are set at the national level (Excise Department, 2017a). For drink-driving countermeasures, there is no evidence of a relationship between the level of implementation and alcohol consumption patterns. Unlike taxation, the provincial authorities have a role in implementing drink-driving control (National Road Safety Center, 2020). However, it may be the case that setting up sobriety checkpoints does not affect the levels of alcohol consumption and patterns of drinking.

We did not find any association between the PAPIC indices and alcoholic liver cirrhosis. Previous studies report inconsistent findings. Similarly to our study, a study conducted in Sweden found that the association between their implementation index and alcoholic liver cirrhosis was not significant (Nilsson et al., 2020). However, a US study found a significant association between an index of the stringency of policy at the state level and alcoholic liver cirrhosis among females (Hadland et al., 2015). One possible reason we did not find a significant association between the PAPIC index and alcoholic liver cirrhosis is that out study did not reveal a significant association between the index and binge drinking, and alcoholic liver cirrhosis is typically caused by heavier alcohol consumption (Norström & Skog, 2001). Consequently, we did not find an association between rates of alcoholic liver cirrhosis and the index.

We did not find any association between the PAPIC and alcohol-related road traffic injuries. This is inconsistent with findings from a previous study conducted in Sweden (Nilsson et al., 2020). There are several possible explanations for why we did not find a significant association between the index and alcohol-related road traffic injuries. First is the quality of the data. We used data from the Ministry of Public Health, but not all hospitals report alcohol-related road traffic injuries as this is done on a voluntary basis. Additionally, the majority of reporting hospitals are provincial, where they receive referrals for most severe injuries from district hospitals. Approximately 23% of the reporting hospitals providing this information are at the district level. Next, the data on alcohol-related road traffic injuries were based on people who came to a hospital emergency department. Therefore, people who do not present to hospitals with such injuries will not be included in the study. Our study also focused on the frequency of sobriety checkpoints to examine police practices around drink-driving countermeasures in Thailand. However, according to current evidence, there are limitations to employing sobriety checkpoints, as individuals can potentially more easily avoid detection compared to random breath testing (Babor et al., 2022).

Policy implication

The innovation introduced by our study is identifying indicators of policy implementation capacity. These indicators reflect the capacity of provinces to implement alcohol control policy and cover policy infrastructure and resources at the provincial level, and the policy implementation process. The resulting PAPIC can be used to help assess progress with policy implementation at

the sub-national level in Thailand. Furthermore, other low- and middle-income countries can adapt the index to their own country contexts.

The findings show a negative association between the index of implementation of alcohol advertising and quantity of alcohol consumption and proportion of regular drinkers. It is therefore recommended that policymakers at the provincial level effectively implement this policy measure.

To reduce alcohol consumption and help meet the UN's SDGs, Thailand needs to effectively implement alcohol control policies at the sub-national level. Based on this study, the stronger the implementation, the greater the reduction in alcohol consumption and number of regular drinkers.

Strengths and limitations of the study

Our study achieved high response rates of more than 80 per cent. It is also based on a national scale survey among key informants and, therefore able to explore policy implementation at the provincial level in Thailand. However, the study has some limitations that need to be taken into consideration. First, because it is a cross-sectional survey, reverse causality could have occurred, and therefore causality cannot be confirmed. Second, social desirability bias could be a factor. However, we tried to minimize this by requesting existing documents, such as annual reports, to verify key informants' answers. Third, because we asked key informants to think back to 2019 before COVID-19, recall bias could be an issue. Fourth, we applied alcohol consumption data from a 2017 survey due to the unavailability of 2019 survey data. Last, the alcohol consumption data is based on survey data; therefore, underreporting of alcohol consumption could be a factor, potentially leading to underestimation of the effect of the association between the index and alcohol consumption.

Conclusion

The index of provincial alcohol control policy implementation capacity (PAPIC) was found to be significantly associated with the quantity consumed by drinkers, particularly for the implementation of alcohol advertising control. Increased levels of overall implementation and the two policy measures of alcohol advertising and availability control were also associated with lower proportion of regular drinkers. Based on this study, to achieve SDG 3.5, Thailand needs to increase levels of implementation at the sub-national level. Also, repeated monitoring is needed to

measure the progress of policy implementation at the sub-national level. This research can also be adapted by other low- and middle-income countries to measure their progress with policy implementation at the sub-national level where alcohol policy is largely implemented.

Chapter 6: Discussion and Conclusions

This chapter consists of six main sections. The first section synthesises the key findings of the thesis. The second section addresses the three main contribution of the thesis to alcohol control policy research, as follows: 1) development of conceptual framework for the implementation of effective alcohol control policies, 2) development of tools and indicators for assessing the implementation of effective alcohol control policies, and 3) creating an index to assess the implementation of effective alcohol control policies. Third, the chapter provides direction for future work to strengthen and extend knowledge and practice around the three main contributions of the thesis. The fourth section the discusses the limitations, and strengths of the research, followed by the research and policy implications. Finally, section six provides concluding remarks.

6.1 Synthesis of findings of thesis

The primary objective of the study was to create an index of Provincial Alcohol Policy Implementation Capacity (PAPIC). When the PAPIC was applied, scores were found to vary across different provinces in Thailand. The criterion-related validity of the PAPIC was also confirmed by illustrating its association with alcohol consumption per capita (Carragher et al., 2014). The findings of the sub-studies conducted for this thesis contribute to the field of alcohol control policy research in relation to four main issues.

First, study one aimed to review existing tools and indicators that measure the implementation of effective alcohol control policies. The study found that there is no standardised tool for measuring alcohol control policy implementation. Furthermore, many of the previous studies that have assessed policy implementation either focus on drink-driving countermeasures, or only assess the implementation of two policies at the most. Because many studies that provide tools for measuring policy implementation focus on a single policy, comprehensive tools that measure policies across different areas are lacking. Furthermore, studies have mainly been conducted in high-income countries.

Study two complements study one by addressing the barriers and facilitators influencing the implementation of effective alcohol control policies. It identified five main barriers, namely resource constraints, legislative or regulatory gaps, lack of local evidence supporting policy

implementation, low prioritisation of policy implementation among responsible agencies, and insufficient skills among implementers. The facilitators of alcohol control policy implementation identified by study two are establishing monitoring systems, generating local evidence to support policy implementation, and engaging implementing agencies and communities at an early stage. Most previous studies that have assessed barriers and facilitators of policy implementation are qualitative, thus complementing the primarily quantitative focus of study one.

Study three centred on developing a conceptual framework tailored to the Thai context for evaluating policy implementation of effective alcohol control policies at the provincial level. The study determined that the Policy Capacity Framework (Wu et al., 2018) aligns well with the Thai context in terms of delineating the policy infrastructure necessary for effective implementation assessment. The policy capacity aspect of the Framework rests on key components of political capacity, including policy prioritisation, policy champions, and political accountability in the Thai context. The Framework also encompasses technical capacity, which includes the provision of technical assistance and robust data and information systems in the Thai context. The third vital aspect is operational capacity in the form of human resources and materials. However, the Policy Capacity Framework does not cover additional factors, such as industry interference, that impede the government's capacity to implement effective alcohol control policies at the provincial level in Thailand.

Study four constructed a composite index for evaluating the implementation of provincial alcohol control policies in Thailand. The study identified that overall, higher PAPIC index scores were associated with a decrease in alcohol consumption and the proportion of regular drinkers. Specifically, the study revealed that a higher score for implementation of alcohol advertising control was associated with a reduction in the quantity of alcohol consumed and the proportion of regular drinkers. Additionally, an increase in the index measuring implementation of physical availability control was also associated with a decrease in the proportion of regular drinkers. However, we did not find an association between the indices of two policy measures (i.e., alcohol taxation and drink-driving countermeasures) and alcohol consumption. In addition, the study did not find an association between the indices and alcohol-related harms.

6.2 Contribution of the thesis to alcohol control policy research

This section outlines three main contributions of the thesis to the alcohol control policy research. First, it contributes to the conceptualisation of the implementation of effective alcohol control policies. Second, it contributes to indicator and tool development for assessing the implementation of effective alcohol control policies. Last, it contributes to the development of a composite index for assessing the implementation of effective alcohol control policies at the local level. The following subsections discuss the contributions of the overall thesis and its individual sub-studies.

6.2.1 The conceptualisation of the implementation of effective alcohol control policies

A conceptual framework for effective implementation of effective alcohol control policies is needed to guide policy design, planning and evaluation. This thesis contributes to the development of a standard conceptual framework in a field that has yet to establish one. It is the first to apply the Policy Capacity Framework in the field of alcohol control policy research, and also investigates other factors not covered in the Framework.

Study three of the thesis developed a conceptualisation of the implementation of effective alcohol control policies. Only one previous study has attempted to generate a model of alcohol control policy implementation, focusing on physical availability control in USA (Jones-Webb et al., 2014). Study 3 applied the Policy Capacity Framework, as a lack of policy capacity has previously been discussed as a key factor hindering the implementation of alcohol control policies (Akselrod et al., 2019). When governments and related authorities lack elements of policy capacity, policy implementation is likely to fail (Wu et al., 2018). The thesis explores the relevance of three main capacities to the Thai context: political capacity, technical capacity and operational capacity, and implementation processes. Those capacities are found to be prerequisites for the successful implementation of effective alcohol control policies. Therefore, this concept can be used to consider policy design, planning, and evaluation to improve implementation processes and outcomes.

Beyond policy capacity, study three established that is not only the capacity of systems that ensures effective implementation of alcohol control policies, but also the law itself, as well as external factors such as industry interference. If there are gaps or loopholes in legislation, this is likely to

cause problems on the ground because it requires experts and their precise interpretation of the laws to enforce the law. In some areas, officers are reluctant to enforce the law because they fear legal challenges from the alcohol industry. Moreover, the industry employs strategies to hinder the effective implementation of effective alcohol control policies. These external factors were integrated into the conceptual framework to make it more comprehensive for designing, planning, implementing and evaluating effective alcohol control policies.

6.2.2 Tool and indicator development for assessing the implementation of effective alcohol control policies

Previous studies focusing on tools and indicators to evaluate alcohol control policy implementation have predominantly examined individual policies in isolation. However, policy implementation occurs in a multifaceted context where policies can be integrated (Rayner & Howlett, 2009). This means that policies often interact and influence one another, and the outcomes of policies are also influenced by contexts. Thus, this study offers a more integrated approach to policy implementation, emphasising effective alcohol control policies.

This thesis makes three main contributions to existing knowledge gaps related to tool and indicator development for assessing the implementation of alcohol control policies.

First, in study one, although many of the studies had assessed policy implementation, none had reviewed tools, indicators, and methods for assessing policy implementation of effective alcohol control policies. Therefore, study one gathered tools from the international literature for assessing the implementation of effective alcohol control policies. The study can be used as a guide for researchers or practitioners seeking to assess policy implementation, both its process and impact. The study also provides a list of indicators that can be used to assess policy implementation of effective alcohol control policies. Based on this study, it was determined that there are no standardised tools for assessing policy implementation.

Second, study two focused on reviewing barriers and facilitators for implementing effective alcohol control policies. It is one of the first studies to collate key barriers and facilitators from the international literature. Its contribution is therefore helping to guide policy implementation and key factors that implementers should address during planning and implementation, as well as when evaluating effective alcohol control policies.

Third, the indicators developed in study 4 for assessing policy implementation add to the literature. The indicators are conceptualised based on the Policy Capacity Framework, but also extends it by including other factors. The resulting extended framework is a useful approach to assessing the capacity of governments or implementing agencies to ensure the outcomes of policies. Its development was informed by Thai key informants for application in Thailand. The focus of the APPM from Sweden is the resources and activities required for policy implementation. The APPM has been applied in high-income countries to assess the implementation of local alcohol policies (Nilsson et al., 2015). Therefore, the generalisability of the tool to low- and middle-income countries is limited. Hence, there is a compelling need for studies conducted in low- and middle-income countries, where resources are typically limited, and alcohol control policies often lag behind the strategies employed by the industry. The research conducted for this thesis has developed indicators to assess two aspects of implementation: the capacities of implementing agencies, and the implementation process.

6.2.3 Development of an index for assessing policy implementation of effective alcohol control policies at the local level

This thesis is one among few studies to integrate some aspects of policy implementation into indices for assessment of alcohol control policies (Carragher et al., 2014; Casswell et al., 2022; Erickson, Rutledge, et al., 2015; Nilsson et al., 2015), with the majority of previous studies focusing on stringency of the alcohol control policies (Brand et al., 2007; Madureira-Lima & Galea, 2018; Thomas et al., 2012).

The PAPIC index has two main functions: 1) utilisation in policy advocacy at the provincial and national levels in Thailand, and 2) contributing to alcohol policy research knowledge, focusing on policy implementation of effective alcohol control policies.

First, in terms of utilisation, ranking provinces can help the government to allocate resources to provinces with low index scores. The provinces with low scores can bring this to the attention of policymakers, calling on them to put more effort into implementation of effective alcohol control policies. Moreover, the index can be used to track policy implementation progress in provinces through follow-up studies. Beyond Thailand, there are potential benefits for other low- and middle-income countries through applying the index to help prioritise action in areas where there are low scores. Evidence-based actions are essential to effectively managing available funding and

allocating resources where implementation capacity is deficient (World Health Organization, 2022). The index can also be used to assess progress with the implementation of alcohol control policies at the local level in other similar countries.

In addition, creating indices based on the implementation of alcohol control policies is feasible and practical in the Thai context. This is because there is an existing mechanism at the provincial levels operating under the umbrella of national law. For instance, the Provincial Alcoholic Beverage Control Committee is a testament to this. This reassures us about the feasibility of the proposed indices and their potential to strengthen the implementation of effective alcohol control policies.

This study's second contribution is to the alcohol control policy research literature, in particular through the creation of an index of policy implementation capacity of effective alcohol control policies at the provincial level. Previous studies that have attempted to create an index assessing alcohol control policies have two main focuses: 1) policy stringency, and 2) integrating the implementation aspect of alcohol control policies. Our study is among the few to focus on the second type of indices. To our best knowledge, a very limited number of indices include policy implementation or some aspect of implementation (Carragher et al., 2014; Casswell et al., 2022) and only three studies have created indices at the sub-national level (de Vocht et al., 2016; Erickson, Rutledge, et al., 2015; Nilsson et al., 2020).

This thesis contributes knowledge in the area of indices for alcohol policy implementation in two ways. First, we focused on the four effective policies (control of alcohol advertisement, control of physical availability, alcohol taxation, and drink-driving countermeasure). Second, we conceptualised the indices based on Policy Capacity Framework and added implementation processes. Among research conducted at the sub-national level, the Swedish study discussed earlier did not focus on specific policies (Nilsson et al., 2020), but rather on the implementation of alcohol policies at the local level in terms of resources, existence of alcohol policies, and coordination between relevant agencies, supervision and licensed premises (e.g., numbers of outlets, proportion of inspected alcohol outlets) and activities (e.g., media advocacy, and brief intervention) (Nilsson et al., 2020). In England, the index study focused on one policy (limiting the number of outlets) at the local level using cumulative impact zone as the index (De Vocht et al., 2017). The US study attempted to classify law enforcement activities in five domains: underage

possession, underage provision, underage sales, impaired driving, overservice at alcohol establishment. The study's focus was the activities of local enforcement officers (Erickson, Rutledge, et al., 2015).

In comparison, our research is more comprehensive in terms of policy (we covered all four effective alcohol control policies), and we also included policy capacity (readiness of the infrastructure for policy implementation) and the implementation process (Erickson, Rutledge, et al., 2015). Similar to the study conducted in Sweden, we found that a higher index score is associated with lower alcohol consumption in terms of quantity (Nilsson et al., 2020).

Although components of the indices differ (i.e., stringency of policies in previous studies, and implementation of alcohol control policies in our study), our findings are similar to those from previous studies. They find that stringency and implementation of alcohol control policies are associated with quantities of alcohol consumption at the sub-national level. It is important to note the other findings for indices based on stringency of policies at the local level are from high-income countries, namely Canada (Giesbrecht et al., 2016) and the US (Naimi et al., 2014). In addition, our findings are similar to cross-country studies of indices based on stringency of policies conducted at the national level (Brand et al., 2007; Madureira-Lima & Galea, 2018).

As well as investigating the association between index scores and alcohol consumption patterns and overall consumption, this thesis also investigated index scores and alcohol-related harms (i.e., alcoholic liver cirrhosis and alcohol-related road traffic injuries). We found similar results to those reported in a Swedish study; the study did not find a statistically significant association between the overall composite indices measuring alcohol prevention initiatives and liver cirrhosis (Nilsson et al., 2020). However, our findings are inconsistent with an American study, which found a negative association between indices and alcoholic liver cirrhosis among females (Hadland et al., 2015). The non-significant association found between the indices and alcoholic liver cirrhosis could be explained by the lack of association between the index of policy implementation and binge drinking which is a risk factor for cirrhosis (Norström & Skog, 2001). In addition, although the effects of alcohol policy interventions can be observed directly after policy changes (Norström & Skog, 2001), further investigation is needed to explore the association between the index of policy implementation and alcohol-related harms that could occur later. Due to limitations posed

by COVID-19, this thesis did not investigate effects that occurred during the pandemic, when alcohol consumption levels increased among some groups (Roberts et al., 2021).

We did not find an association between the indices and alcohol-related road traffic injuries, in contrast to a previous study (Nilsson et al., 2020). As addressed in the article published on study four, these insignificant findings were mainly due to the limitations of the data.

6.3 Future work

6.3.1 Contribution of the thesis to conceptualising the implementation of effective alcohol control policies

This thesis has contributed a robust and practical conceptualisation of the implementation of effective alcohol control policies. Exploring the conceptual framework and its components in other country contexts would strengthen the framework for wider application. Further, some elements may not be applicable in Thailand but be suited to other countries. For example, based on the current study, we found that data available to support law enforcement did not vary across provinces. However, the situation may be different in other countries.

6.3.2 Tool and indicator development for assessing the implementation of effective alcohol control policies

We developed indicators based on the Thai context and variations in practices across provinces. There might be other indicators that we looked at but did not use that could be explored in future studies. One example is the number of officers in law enforcement. We attempted to assess the full-time equivalents (FTE) of enforcement staff, however, this proved a challenging task in the period before COVID-19, and therefore we did not use this measure. Future studies could explore this issue to ensure that indicators are responsive to actual practices.

6.3.3 Developing indexes of policy implementation of effective alcohol control policies at the local level

There are two main avenues for future research into creating a composite index for assessing policy implementation of effective alcohol control policies at the local level.

The first avenue is conducting a follow-up study to increase utilisation of the findings of the present study, and the second is to adapt and improve the present index in other country contexts.

Thus, future studies should be conducted in Thailand to follow up on the progress of provinces in implementing alcohol control policies. With regard to extending the research to other countries, three elements should be considered for improvement. Firstly, a self-report method was used in the study design for this thesis. However, in countries that have managed data systems and information, secondary data sources will be an option. This would help reduce social availability bias based on agencies' actual data. Secondly, in order to create a more comprehensive index, incorporating additional elements of compliance into the index is recommended. In this way, we can ensure that short-term outcomes, particularly compliance aspects, are noticed. Thirdly, some external factors have not been integrated into the adjustment for confounding factors. For example, we found it difficult to assess industry interference because some government officers responding to our questionnaire were reluctant to answer questions about industry interference. Hence, in the next study, it is imperative to develop modules or refine measurements specifically targeting this element. These should be included as external factors to be adjusted for in the model, thereby enhancing the assessment of the association between the index and alcohol consumption per capita.

6.4 Limitations and strengths of the research

The limitations and strengths of each study have been addressed in the previous chapter. This section addresses over-arching limitations and strengths.

Study one and two used the scoping review approach, which does not involve assessing the quality of the eligible studies (as a systematic review would do) and thus could be a limitation. However, scoping reviews were appropriate for use in the context of this thesis because our study aimed to investigate the tools and indicators that are available globally.

Study four relied mostly on self-reports from key informants and therefore social desirability bias could be an issue in relation to the validity of the index. However, we also validated their answers using information from secondary sources such as annual reports and other official documents. The indicator that may have been affected the most is the number of policy champions in the domains of political capacity because interpretations of policy champion may vary. We mitigated

such issues by cross-referencing between key informants if they reported elevated figures. Other indicators are based on data such as the number of officers or budget per capita and are therefore less likely to affect the validity of the index. When creating the index of implementation of alcohol control policies at the provincial level, we relied on data during pre-COVID-19 provided by our key informants, thus raising the issue of recall bias. Again, this limitation was minimised by validating answers against available organisational reports. Another limitation is that due to the cross-sectional study design, the causal relationship between the index and outcomes cannot be confirmed. Next, the study mainly focused on the four effective alcohol control policies and thus does not cover other policy measures such as community interventions, screening and brief intervention.

Another limitation is the availability and coverage of data on alcohol-related harms in Thailand, an issue shared by other low- and middle- income countries. It is a possible reason for the insignificant association between the indices and alcohol-related road traffic injuries. The data was gathered from hospital emergency departments, but is only available from central hospitals in the provinces, with poor data coverage of medium- and small-sized hospitals. Moreover, there is potential for under-reporting of alcohol-related road traffic injuries as figures are based on medical officers' judgments, questioning patients, and less frequently on alcohol-blood test results. The frequency of alcohol-blood testing is low due to a lack of funding (Waleewong, Khampang, Wichaidit, & Tangjit, 2020). Alcohol-related mortalities may also be under-reported because those who die outside hospitals are not counted.

6.5 Policy and research implications

6.5.1 Policy implications

Policymakers face a dual problem: slow progress in the adoption of effective alcohol control policies (Allen et al., 2022) and a lack of political commitment and leadership to implement effective policies (World Health Organization, 2022). The findings of this thesis call for attention and action from policymakers at the global, national, and local levels.

At the global level, only a few studies have integrated some of the aspects of the implementation of effective alcohol control policies (Carragher et al., 2014; Casswell et al., 2022; De Vocht et al.,

2017; Nilsson et al., 2020). The findings of this thesis confirm that policymakers should pay attention to policy implementation, as higher PAPIC scores are associated with lower level of alcohol consumption. This is true even in a low- and middle-income country where resources are scarce. However, even though alcohol control policies are being adopted, there is still a bottleneck in achieving policy outcomes, which require directing resources, time, staff, and policymakers' attention to policy implementation. It is vital that Thai policymakers at the national level take notice of findings that clearly show a significant association between the implementation indices and alcohol consumption and regular drinking. This thesis provides evidence that actions at the sub-national level are relevant to reducing per capita alcohol consumption. While the Alcoholic Beverage Control Act was adopted in Thailand in 2008, implementation efforts have varied across provinces. Providing extra support to provinces that require attention is vital. Furthermore, policy actors at the provincial level also need to increase their efforts to reduce alcohol consumption in their provinces.

6.5.2 Research implications

The findings from this thesis confirm the importance of the policy implementation aspects of effective alcohol control policies. Shifting the focus from indices based on policy stringency to indices measuring policy implementation is challenging, but important. Effective regulation and effective implementation cannot operate separately as they complement each other. The collective research evidence for both aspects of alcohol control policy is important to informing effective implementation. The conceptual framework we have generated focuses on the policy capacity of governments and implementing agencies (including civil society members). The comprehensive framework can be used to guide actions, including planning, implementing, and evaluating to achieve efficient use of resources. As well as the conceptual framework, the listed tools and indicators can be used to assess policy implementation of effective alcohol control policies. In the future, the indices can be used as political tools for policy advocacy and technical tools for monitoring the progress of policy implementation, as well as applied in future studies to strengthen the research field of policy implementation of alcohol control policies for better population health.

6.6 Conclusion

This thesis has presented evidence indicating that the strength of alcohol policy implementation at the local level is associated with lower level of alcohol consumption. A clear association has been demonstrated between the index of provincial alcohol control policy implementation and both the quantity of alcohol consumption and proportion of regular drinkers. The findings underscore the need for concerted efforts by governments in implementing effective alcohol control policies to accelerate the achievement of national targets for reducing alcohol consumption per capita.

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Appendices

Appendices of chapter 1: Introduction

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STATEMENT OF CONTRIBUTION
DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the student and the student's main supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the student's contribution as indicated below in the Statement of Originality.

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In which chapter is the manuscript/published work?	Chapter 2

Describe the contribution that the student and members of the supervisory team have made to the manuscript/published work:[1]

Study design (together with supervisory team), conducting scoping review (together with supervisory team), data analysis (together with supervisory team), writing initial draft, writing- editing revision based on supervisory and peer reviewer feedback, responding to peer review.

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Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., & Phonsuk, P. (2023). Quantitative tools and measurements for assessing the implementation of regulatory policies in reducing alcohol consumption and alcohol-related harms: A scoping review. Drug and Alcohol Review, 42(1), 157-168. https://doi.org/10.1111/dar.

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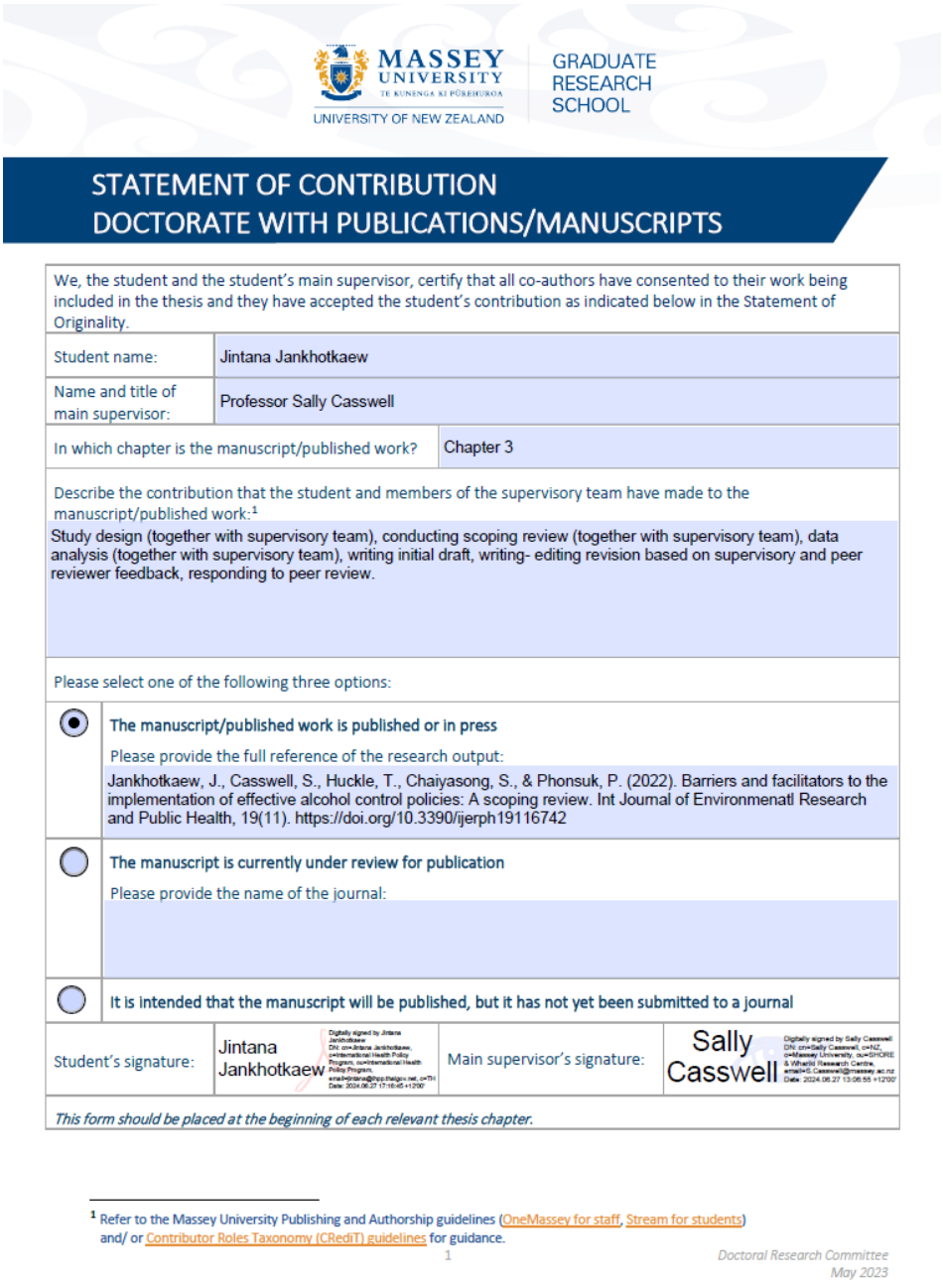
Figure 1A. 1 Statement of contribution of the publication: Quantitative tools and measurements for assessing the implementation of regulatory policies in reducing alcohol consumption and alcohol-related harms: A scoping review



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Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., & Phonsuk, P. (2022). Barriers and facilitators to the implementation of effective alcohol control policies: A scoping review. Int Journal of Environmenatl Research and Public Health, 19(11). https://doi.org/10.3390/ijerph19116742

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Figure 1A. 2 Statement of contribution of the publication: Barriers and facilitators to the implementation of effective alcohol control policies: A scoping review

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  Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., & Kalapat, R. (2024). Application of the Policy Capacity Framework to policy implementation of effective alcohol control policies in Thailand. Drug and Alcohol Review.
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Figure 1A. 3 Statement of contribution of the publication: Application of the Policy Capacity Framework to policy implementation of effective alcohol control policies in Thailand

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  Jankhotkaew, J., Casswell, S., Huckle, T., Chaiyasong, S., Kalapat, R., Waleewong, O., & Parker, K. (2024). A composite index of provincial alcohol control policy implementation capacity in Thailand. International Journal of Drug Policy, 130, 104504. https://doi.org/https://doi.org/10.1016/j.drugpo.2024.104504

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Figure 1A. 4 Statement of contribution of the publication: A composite index of provincial alcohol control policy implementation capacity in Thailand

Appendices of chapter 2: Quantitative tools and measurements for assessing the implementation of regulatory policies in reducing alcohol consumption and alcohol-related harms: A scoping review

List of tables

Supporting information

Table 2A.1 Search terms across different databases

Search terms	Number of studies found
Scopus	
((TITLE-ABS (alcohol* W/10 polic*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 regulat*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 strateg*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 law*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 legislation)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) AND NOT (TITLE-ABS ("non-alcohol*" OR “brief screening” OR screening OR “alcohol treatment”)) AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh")) AND (LIMIT-TO (LANGUAGE , "English"))	1904

Search terms	Number of studies found
(TITLE-ABS (taxes OR tax OR taxation OR pric* OR affordability OR "minimum pricing" OR "minimum unit pricing" OR "floor price")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "bz") OR LIMIT-TO (DOCTYPE , "sh")) AND (LIMIT-TO (LANGUAGE , "English"))	407
(TITLE-ABS (sale* OR “trading hour*” OR “intoxicat*” OR "on-premis*" OR "off-premis*" OR "minimum age" OR "minimum legal age" OR availabilit* OR retail* OR outlet* OR licen* OR "online deliver*" OR "online sale*")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh") OR LIMIT-TO (DOCTYPE , "bz")) AND (LIMIT-TO (LANGUAGE , "English"))	2,189
(TITLE-ABS (marketing OR promot* OR adverti* OR sponsor*)) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO	1,982

Search terms	Number of studies found
(PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh") OR LIMIT-TO (DOCTYPE , "bz")) AND (LIMIT-TO (LANGUAGE , "English"))	
(TITLE-ABS (driv* OR “blood alcohol concentration”)) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh")) AND (LIMIT-TO (LANGUAGE , "English"))	1,778
(((TITLE-ABS (alcohol* W/10 polic*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 regulat*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 strateg*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 law*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 legislation)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) AND NOT (TITLE-ABS ("non-alcohol*" OR "brief screening" OR screening OR "alcohol treatment")) AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (taxes OR tax OR taxation OR pric* OR affordability OR	6,102

Search terms	Number of studies found
"minimum pricing" OR "minimum unit pricing" OR "floor price")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (sale* OR "trading hour*" OR "intoxicat*" OR "on-premis*" OR "off-premis*" OR "minimum age" OR "minimum legal age" OR availabilit* OR retail* OR outlet* OR licen* OR "online deliver*" OR "online sale*")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (marketing OR promot* OR adverti* OR sponsor*)) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (driv* OR "blood alcohol concentration")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh") OR LIMIT-TO (DOCTYPE , "bz")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000))	
Web of Science	
((AB=(alcohol* NEAR polic*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR regulat*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR strateg*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR law*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR legislation) AND AB=(implement* OR enforc* OR monitor* OR compliance))) NOT (AB=("non-alcohol*" OR “brief screening” OR screening OR “alcohol treatment”)) NOT SU= Zoology	2,656
AB=(taxes OR tax OR taxation OR pric* OR affordability OR "minimum pricing" OR "minimum unit pricing" OR "floor price") AND AB=(alcohol*)	567

Search terms	Number of studies found
AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB="non-alcohol*" NOT SU= Zoology	
AB=(sale* OR “trading hour*” OR “intoxicat*” OR "on-premis*" OR "off-premis*" OR "minimum age" OR "minimum legal age" OR availabilit* OR retail* OR outlet* OR licen* OR "online deliver*" OR "online sale*") AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB= “non-alcohol*” NOT SU= Zoology	2410
AB=(marketing OR promot* OR adverti* OR sponsor*) AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB="non-alcohol*" NOT SU= Zoology	2,687
AB=(driv* OR “blood alcohol concentration”) AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB= "non-alcohol*" NOT SU= Zoology	1889
Combined with all #5 OR #4 OR #3 OR #2 OR #1 Refined by: PUBLICATION YEARS: (2021 OR 2005 OR 2020 OR 2004 OR 2019 OR 2003 OR 2018 OR 2002 OR 2017 OR 2001 OR 2016 OR 2000 OR 2015 OR 2014 OR 2013 OR 2012 OR 2011 OR 2010 OR 2009 OR 2008 OR 2007 OR 2006) AND DOCUMENT TYPES: (ARTICLE OR REPORT OR REVIEW OR THESIS DISSERTATION OR CASE REPORT OR CLINICAL TRIAL) AND LANGUAGES: (ENGLISH)	5,549

Table 2A.2 Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page4-5

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page5
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Page6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Additional file 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 8
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	None

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 8
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Page9
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page9 and additional file 2
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	None
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Additional file 2
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Page9-11
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Page11-12
Limitations	20	Discuss the limitations of the scoping review process.	Page 12
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Page 13
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page 13

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents)

that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Table 2A.3 Summary of included tools and measurements for assessing policy implementation across four policies

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
Physical availability control											
1.	De Vocht, F., Heron, J., Angus, C., Brennan, A., Mooney, J., Lock, K., . . . Hickman, M.	2016	Measurable effects of local alcohol licensing policies on population health in England	To investigate the impacts of intensity of enforcement of cumulative impact zone	England and Wales, national level	Alcohol retailers	Physical availability: licensing	**Study design and data collection methods**: The study used secondary data from two main sources. First, level of enforcement of CIZ, the study used data from the Home Office's Alcohol and Late-Night Refreshment	Secondary sources	**Main independent variables:** intensity of enforcement of CIZ The intensity of enforcement was estimated two different measures. 1) the authors measured whether CIZ was used (yes/no) 2) whether any	None*

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				(CIZ) in England				Licensing England and Wales. Second, the hospital admission was based on data specified as alcohol-related problems, based on diagnosis. **Data analysis method:** Hierarchical growth model		licenses for new premises were successfully challenged by the lower tier local authorities (LTLAS) in a particular year (yes/no). Then, it was coded into three categories: 1) no CIZ used and no licensing applications refused, 2) applied either one of the measures, 3)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										applied both measures. **Main dependent variables:** aged standardized alcohol-related hospital per 100,000 population **Adjusted variables:** deprivation index, numbers of population, alcohol-related crime control to control for non-random implementation of	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										policies in lower tier local authorities (e.g., more intense alcohol policies were more likely to be implemented in areas with more problems)	
2.	Dent, C. W., Grube, J. W., & Biglan, A.	2005	Community level alcohol availability and enforcement of	To assess relationship between commercial access to	USA, state level, Oregon	Community and youth grade 11th	Physical availability: commercial access and	**Study design and data collection methods:** The study used a cross-sectional survey. Researchers randomly selected	Used questionnaires	**Main independent variables:** perception on law enforcement (likelihood of being caught) **Main dependent variables:** alcohol	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			possession laws as predictors of youth drinking	alcohol, the enforcement of possession laws, and alcohol use among youth			minimum purchasing age	communities and schools in the catchment area. The study collected data from students in grades 8 and 11 each year, but in different cohorts. However, the study used data from students in grade 11 collected in 2001. **Data analysis methods:** Multilevel analysis		use, binge drinking, drink in school, and drink-driving **Adjusted variables:** sources of alcohol (e.g., from friends, parents, or any social place, and the commercial source (e.g., grocery stores, convenience stores, drug stores, and gas stations))	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
3.	Erickson, D. J., Lenk, K. M., Sanem, J. R., Nelson, T. F., Jones-Webb, R., & Toomey, T. L.	2014	Current use of underage alcohol compliance checks by enforcement agencies in the United States	To assess numbers of agencies conducted compliance checks, and numbers of agencies that conducte	USA, national level	Law enforcement agencies	Physical availability: minimum purchasing age	**Study design and data collection methods:** The study employed a cross-sectional survey and applied stratified sampling methods to select enforcement agencies and state agencies. Staff who were knowledgeable about law enforcement were	Used questionnaires	**Main independent variables:** 1) number of full-time officers per 1,000 population 2) numbers of full-time staff that are responsible for law enforcement 3) having an alcohol-related division. **Main dependent variables:** law enforcement agencies that conducted	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				d compliance check with optimal methods and characteristics of those agencies				interviewed by phone or completed questionnaires online. **Data analysis methods:** Multiple logistic regression		compliance checks (yes/no/do not know), and frequency of compliance checks **Adjusted variables:** community level: population size, percent of ethnicity (i.e., black and Hispanic), percent living in poverty, percent aged 15-20 years.	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
4.	Erickson, D. J., Lenk, K. M., Toomey, T. L., Nelson, T. F., & Jones-Webb, R.	2016	The alcohol policy environment, enforcement and consumption in the United States	To assess alcohol policy environment, enforcement and alcohol consumption	USA, national level	Local enforcement agencies	Physical availability control: underage alcohol use (e.g., underage possession, consumption,	**Study design and data collection methods:** The study used data from various sources: 1) strength of policy collected from the Alcohol Policy Information System database, 2) conducting a cross-sectional survey among enforcement agencies using multi-stage	Used questionnaires and secondary data sources	**Main independent variables:** 1) restrictiveness of alcohol policy at state level 2) presence and absence of enforcement activities and its intensity (i.e., frequency of compliance checks and coverage of alcohol outlets). The study created as a	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							internal possession, purchasing, false ID users, and use/lose driving privileges), provision of alcohol	sampling, 3) consumption measures and individual-level demographic measures were gathered from the Behavioral Risk Factor Surveillance System (BRFSS), 4) state-level demographic measures obtained from secondary data sources.		latent class and group into low, moderate, high class for enforcement. **Main dependent variables:** alcohol use during past month, binge drinking, and heavy drinking **Adjusted variables:** individual characteristics (i.e., sex, age, marital status, and	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							to underage (e.g., keg registration, underage furnishing, hosting underage drinking parties,	**Analysis methods:** Multilevel logistic regression		education), and state demographic profiles (i.e., population and unemployment rate, and religiosity)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							false ID suppliers), alcohol serving (e.g., age of servers, beverage service training), general availability				

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
5.	Findlay, R. A., Sheehan, M. C., Davey, J., Brodie, H., & Rynne, F	2002	Liquor law enforcement: policy and practice in Australia	To examine inadequacies in liquor-licensing law enforcement in Australia	Australia, sub-national level, in Queensland	Police officers	Physical availability: access to alcohol among youths, restricting trading hours, supplying alcohol to intoxicat	**Study design and data collection methods:** The study employed a cross-sectional survey by sending questionnaires to police officers in urban and rural areas. **Data analysis:** Used chi-square tests to compare enforcement	Used questionnaires	**Main independent variables:** self-report on the knowledge of alcohol control law (using a Likert scale ranging from 'very good' to 'very poor'), urban and rural areas **Main dependent variables:** enforcement activities (yes/no), and percentage of respondents who breached the alcohol	Content validity

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							ed persons	outcomes between urban and rural areas.		control law (vendors or individuals) **Adjusted variables:** none	
6.	Jones-Webb, R., Toomey, T. L., Lenk, K. M., Nelson, T. F., & Erickson, D. J.	2015	Targeting adults who provide alcohol to underage youth: results from a national survey of	To investigate the factors that influence law enforcement agencies to	USA, national level	Law enforcement agencies	Physical activities: social supply of alcohol to underage youth	**Study design and data collection methods:** Cross-sectional survey. A multistage strategy was used to select local law enforcement agencies. The states were divided into large and small. For	Used questionnaires	**Main independent variables:** 1) number of full-time officers specific to alcohol enforcement per 1,000 population , and 2) division specific to alcohol enforcement **Main dependent variables:**	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			local law enforcement agencies	conduct enforcement activities in USA				large states, 40 agencies were selected and 20 agencies for small states. At each agency, the agents or officers who were most knowledgeable about the agency's enforcement activities, were invited to join the survey. The survey was conducted by		conducting law enforcement (yes/no) **Adjusted variables:** Local level: commonness of underage drinking, regional level (wet, moderate, and dry areas), total population, proportion of African American/Black, proportion of Hispanic, proportion of population below	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								telephone interview and self-administered via an online platform. **Data analysis methods:** Multiple logistic regression		poverty line, and proportion aged between 15-20 years.	
7.	Lipperman-Kreda, S., Grube, J. W., & Paschall, M. J.	2010	Community norms, enforcement of minimum legal drinking	To investigate associations between local policy	USA, state level	Students at grade 8th and 11th	Physical availability: minimum drinking age	**Study design and data collection methods:** Cross-sectional survey among students in grade 8 and 11. A self-administered questionnaire was	Used questionnaires	**Main independent variables:** community's disapproval of alcohol use (Likert scale), perceived local alcohol policy and enforcement	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			age laws, personal beliefs and underage drinking: An explanatory model	and enforcement, community norms, and personal beliefs				used and supervised by teachers. **Data analysis methods:** Structural equations analysis		(Likert scales), and personal beliefs on alcohol use (Likert scales), perceived alcohol availability (Likert scales), perceived alcohol-related harm (Likert scale), and number of friends who consumed alcohol **Main dependent variables:** adolescents' alcohol use in the past 30	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										days **Adjusted variables:** gender, age, and ethnicity	
8.	Lipperman-Kreda, S., Paschall, M. J., & Grube, J. W.	2009	Perceived local enforcement, personal beliefs, and underage drinking: An assessme	To investigate relationships between perceived enforcement of underage drinking	USA, sub-national conducted in Oregon	Students, grade 8th and 11th	Physical availability: minimum drinking age	**Study design and data collection methods:** Cross-sectional survey design using a self-administered questionnaire. **Data analysis methods:** Linear regression	Used questionnaires	**Main independent variables:** perceived of alcohol enforcement (Likert scales, likelihood of being caught) **Main dependent variables:** underage drinking **Adjusted variables:** The model was	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			nt of moderating and main effects	laws and personal beliefs and underage drinking						adjusted by individual characteristics: gender, ethnicity, age, alcohol use before the age of 12 years, and personal beliefs (i.e., perceived alcohol availability (Likert scales), perceived alcohol-related harm (Likert scales), and personal disapproval	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										of alcohol use (Likert scales)).	
Drink-driving policy											
9.	Alonso, F., Pastor, J. C., Montoro, L., & Esteban, C.	2015	Driving under the influence of alcohol: frequency, reasons, perceived risk and punishment	To investigate frequency, reasons, and perceived risk and punishment of drink	Spain, national level	General population	Drink driving measures	**Study design and data collection methods:** Cross-sectional study, using telephone interview. The subjects were randomly selected using random digit dialling. One member who had a driving license was	Used questionnaires	**Main independent variables:** 1) reason for (not) drink-driving, 2) perceived risk of being caught for drink-driving (Likert scales), 3) perception toward punishment (Likert scales), 4) experiences of	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				driving behaviours				randomly selected. **Data analysis methods:** Student t-test and one-way ANOVA		punishment **Main dependent variables:** frequency of drink driving **Adjusted variables:** age, and gender	
10.	Bachani, A. M., Risko, C. B., Gnim, C., Coelho, S., & Hyder, A. A.	2017	Knowledge, attitudes, and practices around drinking and driving in	To illustrate current knowledge, attitudes, and practices around	Cambodia, national level	Road users, aged 18 years old and above	Drink-driving measures	**Study design and data collection methods:** Cross-sectional survey, roadside survey in three provinces in Cambodia. Multiphase sampling was used.	Used questionnaires	**Main independent variables:** 1) drivers' attitudes toward drink-driving, 2) perceived risks of drink-driving, 3) awareness of social media related to risk factors and	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			Cambodia: 2010-2012	drink-driving in three Cambodian provinces				Roads with gas stations were selected and included all types of roads (highway, secondary roads, city roads, and rural roads). Road users were randomly selected and interviewed. **Data analysis methods:** Chi-square test		enforcement 4) police enforcement levels. **Main dependent variables:** drink-driving behaviours **Adjusted variables:** None The study measured demographic characteristics (age, sex, education), but did not adjust in the analysis.	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
11.	Beck, K. H., Fell, J. C., & Yan, A. F.	2009	A comparison of drivers with high versus low perceived risk of being caught and arrested for driving	To compare perceived risk of being caught, high vs low on drink driving behaviors	USA, state level	General population	Drink driving measures	**Study design and data collection methods:** Cross-sectional survey among law enforcement officers using telephone interviews. The participants were randomly selected from a random-digit-dial telephone survey. **Data analysis**	Used questionnaires	**Main independent variables:** belief about effectiveness of sobriety checkpoints, traffic citation history, and knowledge about drink-driving laws (correct/incorrect responses). **Main dependent variables:** perceived likelihood of being arrested or stopped by the police (Likert	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			under the influence of alcohol					**methods:** Logistic regression		scale). **Adjusted variables:** age, gender, race, frequency of automobile use, and household income	
12.	Dula, C. S., Dwyer, W. O., & LeVerne, G.	2007	Policing the drunk driver: measuring law enforcement involvement in	To investigate relationship between and driving under	USA, state level	General population	Drink driving measures	**Study design and data collection methods:** The study used secondary data. **Data analysis methods:** Pearson correlation coefficient	Secondary data	**Main independent variables:** DUI arrest **Main dependent variables:** DUI-related crashes **Adjusted variables:** numbers of driving license	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			reducing alcohol-impaired driving	influence (DUI) arrests and DUI-related crashes.							
13.	Eger Iii, R. J.	2006	Policy instruments in injury crashes: traffic law enforcement and	To investigate association between law enforcement,	USA, state level	Counties	Drink driving measures	Quantitative study, **study design and data collection methods:** The study used secondary sources from Kentucky's 120 counties. **Data analysis**	Secondary data sources	**Main independent variables:** 1) using number of police officers and sheriff deputies as a proxy of law enforcement, 2) alcohol policies at county level **Main dependent**	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			alcohol prohibition	alcohol-related policies and injury crashes				**methods:** Negative binomial regression		**variables:** numbers of injuries from vehicle crashes **Adjusted variables:** number of two-lane roads, population density, number of males aged 18-24 years old, population over 65 years old, number of people driving under the influence, convictions in the county, and	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										number of suspended license drivers.	
14.	Eichelberger, A. H., & McCartt, A. T.	2016	Impaired driving enforcement practices among state and local law enforcement agencies in the	To investigate actual implementation of drink driving measures in the USA	USA, national level	Law enforcement agencies	Drink driving measures	**Study design and data collection methods:** Cross-sectional survey. A stratified sampling method was used to select enforcement agencies. The survey was conducted among enforcement agencies using telephone	Used questionnaires	**Variables of interest:** 1) types of training officers received for DUI driving enforcement 2) agency's driving under influence of alcohol enforcement activity (e.g., types of enforcement activities, frequency of enforcement	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			United States					interviews. **Data analysis methods:** Descriptive analysis		activities, whether activities were publicised) 3) challenge of inaction in driving under influence of alcohol enforcement 4) training of law enforcement	
15.	Erickson, D. J., Farbakhsh, K., Toomey, T. L., Lenk, K. M.,	2015	Enforcement of alcohol-impaired driving laws in	To investigate enforcement strategies	USA, national level	Law enforcement agencies	Drink driving measures	**Study design and data collection methods:** Cross-sectional survey among enforcement agencies at state	Used questionnaires	**Main independent variables:** the percentage of total annual resources in their agencies devoting for	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
	Jones-Webb, R., & Nelson, T. F.		the United States: a national survey of state and local agencies.	used by state and local law enforcement agencies to prevent alcohol-impaired driving law				and local level. At state level, it applied random selection of the state agencies. At the local level, enforcement agencies were selected using multi-stage sampling. Telephone/online surveys were used to collect data from the most		enforcing drink-driving laws, region (wet, moderate, and dry), population of jurisdiction, number of full-time officers per 1,000 population, having a division specifically to enforce alcohol laws, having an officer assigned to alcohol enforcement. **Main dependent variables:** frequency	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								knowledgeable persons from different agencies. **Data analysis methods:** Multiple logistic regression		of enforcement agencies in different strategies, including sobriety checkpoints, saturation patrols, and open container law **Adjusted variables:** percent of black, percentage living under the poverty line, and percentage of the population aged 15-30 years, and	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										commonness of drink-driving	
16.	Fell, J. C., Ferguson, S. A., Williams, A. F., & Fields, M.	2003	Why are sobriety checkpoints not widely adopted as an enforcement strategy in the United States?	To identify factors that influence efforts of conducting sobriety checkpoints.	USA, state level, 37 states and the district of Columbia	Enforcement agencies	Drink driving measures	**Study design and data collection methods:** The study applied mixed methods. A cross-sectional survey was used to examine frequency of sobriety checkpoints among state agencies that enforce drink-driving measures.	Used questionnaires	**Variables of interest:** frequency of conducting sobriety checkpoints, and frequency and platforms of publicity of sobriety checkpoints	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								Then, five infrequent and five frequent sobriety checkpoints were chosen to explore factors that influence sobriety checkpoints. An in-depth interview was applied to gather information from officers. **Data analysis methods:** Descriptive analysis			

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
17.	Fell, J. C., Waehrer, G., Voas, R. B., Auld-Owens, A., Carr, K., & Pell, K.	2014	Effects of enforcement intensity on alcohol impaired driving crashes	To investigate enforcement intensity on the rate of crashes.	USA, national level	General population	Drink driving measures	**Study design and data collection methods:** The study used a cross-sectional survey, national roadside survey. The data were collected by self-report and breath test. **Data analysis methods:** Log-linear regression with robust standard errors	Used questionnaires	**Main independent variables:** 1) annual number of driving under influence arrests per capita, 2) frequency of sobriety checkpoints, 3) annual number of traffic stops per capita, 4) number of sworn officers per capita, 5) number of other traffic enforcement citations per capita, (e.g., seat	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										belt citations, speeding tickets, and other moving violations and warnings), 6) impaired drink driving rates, BAC levels ≥0.08≥,0.05,≥0.08 **Main dependent variables :** alcohol-impaired driving crashes **Adjusted variables:** Community level:	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										unemployment rates, the prevalence of alcohol-related night-time activities, and alcohol availability in the primary sampling unit.	
18.	Fell, J. C., Waehrer, G., Voas, R. B., Auld-Owens, A., Carr, K., & Pell, K.	2015	Relationship of impaired-driving enforcement intensity to	To investigate associations between enforcement	USA, national level	Enforcement agencies	Drink driving measures	**Study design and data collection methods:** The study employed multisource data. The data included three main sources: 1) The National	Used questionnaires and secondary data	**Main independent variables:** six enforcement activities, including 1) driving under the influence (DUI) of alcohol arrests, 2) DUI saturation	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			drinking and driving on the roads	intensity and drunk driving behaviours				Road Side Survey (NRS) employed face-to-face interview drivers who were randomly selected at 300 locations across 60 primary sampling unit. 2) a telephone interview among police officers. The survey was undertaken among the police officers		patrols per 10,000 population, 3) traffic stops per 10,000 population, 4) sworn officers per 10,000 population, 5) other enforcement activities (the number of seat belt citations, speeding tickets, other moving violations, and warning per capita) per 10,000 population and 6) frequency of	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								that involved in NRS. 3) Census data **Data analysis methods:** Multiple logistic regression		sobriety checkpoints (weekly, monthly, less than monthly, never) Note that for independent variables, the enforcement activities were categorized into quintiles. **Main dependent variables:** 1) driving under influence (DUI) of	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										alcohol at 3 BAC levels: BAC≥0.01, BAC≥0.05, BAC≥0.08 g/dl **Adjusted variables:** characteristics of drivers: age, sex, race/ethnicity, whether passengers were in the car, seat belt usage, and where the drivers were coming from (e.g., bar, restaurant, party)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
19.	Jia, K., Fleiter, J., King, M., Sheehan, M., Ma, W., Lei, J., & Zhang, J.	2016	Alcohol-related driving in China: countermeasure implications of research conducted in two cities	To investigate knowledge on drunk driving law in two cities, China	China, city level	Police officers, drunk driving offenders and general drivers	Drink driving measures	**Study design and data collection methods:** The study applied mixed-methods. The study undertook three groups of study population. First, the study used semi-structured interviews among law enforcement officers to investigate	Used questionnaires	**Variables of interest:** Knowledge on BAC limit	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								problems that occur during enforcement. The study also conducted a cross-sectional survey among police officers to investigate their knowledge about existing regulations regarding drink driving measures. Second, the study used a cross-			

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								sectional survey among general motor vehicles drivers, which was based on a convenience sampling method to collect knowledge on drink driving law. A self-reported questionnaire was applied during the survey. Third, the study selected drink driving offenders to			

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								investigate their knowledge on existing regulations. **Data analysis methods:** Chi-square test			
20.	Jia, K., King, M., Fleiter, J. J., Sheehan, M., Ma, W., Lei, J., & Zhang, J.	2016	Drunk driving offenders' knowledge and behavior in relation	To investigate association between knowledge about	China, city level, Yinchuan	Drink driver offenders	Drink driving measures	**Study design and data collection methods:** Cross-sectional survey among drunk drivers who were in detention. A total of 106 offenders were	Used questionnaires	**Main independent variables:** knowledge about alcohol-involved driving offenses: knowledge on drunk driving law, and knowledge on legal	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			to alcohol-involved driving in Yinchuan and a comparison with Guangzhou, China	amended law, exposure to enforcement, alcohol consumption, and alcohol involved driving behaviours				recruited and interviewed by trained medical workers. The study also compared findings with previous a study using the same protocol, conducted in Guangzhou, China. **Data analysis methods:** Multiple regression		limit for drunk driving (right answer, wrong answer, and don't know), and intensity of law enforcement **Main independent variables:** drink-driving behaviours **Adjusted variables:** socio-demographic characteristics, and alcohol consumption	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
21.	Lenk, K. M., Nelson, T. F., Toomey, T. L., Jones-Webb, R., & Erickson, D. J.	2016	Sobriety checkpoint and open container laws in the United States: associations with reported drinking-driving	To investigate association between state policy on sobriety checkpoints and open container law, law enforcem	USA, national level	General population	Drink driving measures	**Study design and data collection methods:** The study used a nationally representative survey among adults aged 18 years and over, and a cross-sectional survey among enforcement agencies using telephone interviews.	Used questionnaires	**Main independent variables:** existence of sobriety checkpoints and open container law, law enforcement of open container law(yes/no) **Main dependent variables:** self-reported drink driving **Adjusted variables:** individual characteristics: sex, age, race, education, marital status, binge	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				ent and self-report drink driving				**Data analysis methods:** Multilevel modelling		drinking state level: population size, and total vehicle miles travelled	
22.	Meesmann, U., Martensen, H., & Dupont, E.	2015	Impact of alcohol checks and social norm on driving under the influence of	To investigate association between alcohol checks, social norm,	Multi-countries, European countries	Drivers	Drink driving measures	**Study design and data collection methods:** The study applied a cross-sectional survey using face-to-face interviews among car drivers. The survey applied a quota sampling or	Used questionnaires	**Main independent variables:** 1) perceived drink driving behaviours of friends (Likert scales), 2) frequency of alcohol checks by police officers, 3) perceived	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			alcohol (DUI)	and drink driving behaviors				random sampling method depending on the country. **Data analysis methods:** Multilevel logistic regression		likelihood of getting caught for drink driving (Likert scales) **Main dependent variables**: frequency of drink driving behaviours **Adjusted variables**: individual level (gender, age), and national level (legal alcohol limit, national level drunk driving of friends)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
23.	Morrison, C. N., Ferris, J., Wiebe, D. J., Peek-Asa, C., & Branas, C. C.	2019	Sobriety checkpoints and alcohol-involved motor vehicle crashes at different temporal scales	To investigate association between sobriety checkpoints and alcohol-involved motor vehicle crashes at different	USA, city level	General population	Drink driving measures	**Study design and data collection methods**: The study used registry data from two different sources. First, the alcohol-involved crash gathered from the Transport Injury Mapping Systems. Second, the number of sobriety checkpoints gathered from the	Secondary data	**Main independent variables:** number of sobriety checkpoints **Main dependent variables:** alcohol-involved crashes **Adjusted variables:** none	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				temporal scales				Los Angeles Police Department. The two measures were estimated regarding days, weeks, and months. **Data analysis methods:** Autoregressive integrated moving average models			
24.	Nazif-Munoz, J. I., Quesnel-Vallée, A.,	2015	Did Chile's traffic law	To investigate the impacts	Chile, national level	General population	Drink driving measures	**Study design and data collection methods:** The study used	Secondary data sources	**Main independent variables:** 1) traffic reform using time period as cut point, 2)	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
	& Van Den Berg, A.		reform push police enforcement? Understanding Chile's traffic fatalities and injuries reduction	of law reform and police enforcement on traffic fatalities				secondary data for both independent variables and dependent variables. **Data analysis methods:** Ordinary least squares and robust random effects models		number of police officers per population, 3) police traffic enforcement measured by number of tickets processed by a local court divided by the number of police officers, 4) road traffic instrumental mechanism generated by using law reform multiplied by police enforcement	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										Main dependent variables: number of traffic fatalities **Adjusted variables:** oil price average, unemployment, percentage of young male population, alcohol consumption per capita, road traffic infrastructure (spending on public and private on public infrastructure)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
25.	Sanem, J. R., Erickson, D. J., Rutledge, P. C., Lenk, K. M., Nelson, T. F., Jones-Webb, R., & Toomey, T. L	2015	Association between alcohol-impaired driving enforcement-related strategies and alcohol-impaired driving	To investigate the association between individual enforcement strategies, combined enforcement	USA, national level	Enforcement agencies	Drink driving measures	**Study design and data collection methods:** The study employed a cross-sectional survey among enforcement agencies using telephone interview together with an online survey. The most knowledgeable on enforcement activities was	Used questionnaires	**Main independent variables:** frequency of conducting sobriety checkpoints, conducting saturation patrols, enforcing open container laws, frequency of the use of media to publicize agency's enforcement effort and frequency of communicate or collaborate with local media **Main dependent**	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				strategy, and drink driving behaviours				selected. **Data analysis methods:** Multilevel logistic regression		**variables:** alcohol-impaired driving **Adjusted variables:** gender, age, education, race, and marital status	
26.	Stringer, R. J.	2019	Policing the drunk driving problem: a longitudinal examination of	To investigate association between DUI arrest and alcohol	USA, national level	Drunk drivers	Drink driving measures	**Study design and data collection methods:** The study used secondary data for both DUI arrests and traffic crashes. Time-series data from 1985-2015	Secondary data sources	**Main independent variables:** DUI arrest **Main dependent variables:** alcohol-related crashes **Adjusted variables:** urban and rural areas, % bachelor degree or more, % population	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			DUI enforcement and alcohol related crashes in the U.S. (1985–2015).	related crashes				was obtained. **Data analysis methods:** Multilevel latent growth curve modelling		below poverty line, race, % population 18-24 years old, % population 25-34 years old, male and female ratio, total population, dry county, moist county, administrative license suspension, mean, self-report DUI, total vehicle miles travelled, total per-capita alcohol consumption, year	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
27.	Yao, J., Johnson, M. B., & Tippetts, S.	2016	Enforcement uniquely predicts reductions in alcohol-impaired crash fatalities	To investigate association between enforcement intensity and alcohol-impaired fatal crashes	USA, national level	General population	Drink driving measures	S**tudy design and data collection methods:** The study used secondary data. **Data analysis methods:** Generalized linear mixed model	Secondary data sources	**Main independent variables:** driving under the influence of alcohol arrests per capita and funding of enforcement **Main dependent variables:** ratio of traffic fatality under influence of alcohol per number of traffic fatality without alcohol influence **Adjusted variables:** proportion of rural	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										residents, median household income, proportion of high school graduates, proportion of college graduates, proportion of males/females, race/ethnicity, proportion of population aged 21-34 years	
Multi-policy											
28.	Calvert, C., Toomey, T., Lenk, K.,	2020	Variation in alcohol policy	To investigate	USA, national level	Enforcement	Physical availability:	S**tudy design and data collection methods:** The	Used questionnaires	**Main independent variables**: urban, small town, suburban,	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
	Joshi, S., Nelson, T., & Erickson, D.		enforcement across urban and nonurban communities	differences in effort of law enforcement on alcohol policies between urban and rural communities		agencies	underage drinking, social supply to minors, alcohol sales to minors and intoxicated persons, and	study used a cross-sectional survey to investigate enforcement activities among enforcement agencies. The agencies were selected based on multi-stage sampling methods. Telephone/online surveys were used to collect data from the most		urban areas **Main dependent variables**: conducting enforcement of law in seven main activities 1) compliance checks to prevent illegal alcohol sales 2) social supply to minors 3) underage drinking 4) alcohol sales to intoxicated persons, 5) saturation patrols, 6) sobriety	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							open container law Drink-driving: sobriety checkpoints	knowledgeable persons from different agencies. **Data analysis methods:** Poisson regression		checkpoints, and 7) open container law **Adjusted variables**: percentage living under the poverty line, and percentage of population aged 18-30 years, size of agencies (large vs small; it is based on population size of the jurisdiction that agency served), and having officers assigned for	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										enforcing alcohol control law	
29.	Carragher, N., Byrnes, J., Doran, C. M., & Shakeshaft, A.	2014	Developing an alcohol policy assessment toolkit: application in the western pacific	To assess national policies aimed at reducing alcohol consumption and related problems	Multi-countries, Western Pacific Region	Nine western Pacific countries	Physical availability: minimum purchasing age, alcohol server liability, government monopol	**Study design and data collection methods:** Ecological study using multiple sources of data. The data on enforcement was obtained from peer-review papers, WHO reports, governments and relevant websites.	Used questionnaires gathering information from relevant public health and government	**Main independent variables:** Alcohol Policy Scores, constructed from level of stringency, effectiveness rating, and level of enforcement among 16 policies **Main dependent variables:** alcohol consumption per capita	Content validity, criterion validity, and reliability

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							y of alcohol retail sales, restriction of outlet density, restricted hours and days of alcohol sales Drinkin	**Data analysis method:** Pearson's or Spearman's correlation coefficient	officials in the study country and secondary data in order to generate tool so-called the Toolkit for Evaluati	**Adjusted variables:** crude associations	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							g context: community mobilization, and mandatory training of bar staff Alcohol prices, alcohol advertisi		ng Alcohol Policy Stringency and Enforcement-16 (TEASE-16)		

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							ng, drivers of motor vehicles				
30.	Casswell, S., Meier, P., MacKintosh, A. M., Brown, A., Hastings, G., Thamarangsi, T., . . . You, R. Q.	2012	The International Alcohol Control (IAC) Study-Evaluating the Impact of	To investigate the association between alcohol policy environment and impact on	England, Scotland, New Zealand, Thailand, and South Korea	Relevant stakeholders, and general population	Physical availability, pricing and taxation, alcohol advertisement, and drink-	**Study design and data collection methods:** The study applied mixed methods by using various types of methods for data collection: 1) document review of existing alcohol control policies,	Used questionnaires	**Variables of interest:** Place and time of purchase, amounts purchased and price paid; ease of access to alcohol purchase; alcohol marketing measures; social supply; perceptions of alcohol	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			Alcohol Policies	alcohol consumption			driving measures	2) qualitative interviews, interviewing relevant stakeholders with knowledge of alcohol control, 3) routinely collected data such as alcohol outlets 4) longitudinal survey among populations aged 16-65 years. Data analysis		affordability and availability and salience of price; perceptions of enforcement; people's experiences with specific alcohol restrictions; support for policy and consumption (typical quantity, frequency using beverage and location-specific measures)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								methods: Generalized estimating equation			
31.	Casswell, S., Morojele, N., Williams, P. P., Chaiyasong, S., Gordon, R., Gray-Phillip, G., . . . Parry, C. D. H.	2018	The Alcohol Environment Protocol: A new tool for alcohol policy	To describe the implementation of alcohol control policies and level of enforcement	Multi-countries: Scotland, New Zealand, St. Kitts and Nevis, Thailand, South	Stakeholders who implemented alcohol control policies	Control of alcohol advertisement, control of physical availability, drink driving	**Study design and data collection methods**: The study used mixed methods, including document review, observational surveys, administration and commercial data, and a key informant interview.	Used questionnaires	**Variables of interest:** restrictiveness of alcohol regulation, and key informants' perception toward enforcement and compliance of regulations	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				regarding availability, marketing, and drink-driving measures, in high income countries, upper middle-income countries,	Africa, Vietnam		measures, and pricing policy	**Data analysis method**: not applicable			

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				and lower-middle income countries							
32.	Erickson, D. J., Rutledge, P. C., Lenk, K. M., Nelson, T. F., Jones-Webb, R., & Toomey, T. L	2015	Patterns of alcohol policy enforcement activities among local law	To assess levels and patterns of alcohol policy enforcement	USA, national level	Implementing agencies (law enforcement	Physical availability: 1) underage possession/consumption, 2)	**Study design and data collection methods:** Cross-sectional survey using a multi-stage sampling strategy. The data was collected using self-administered	Used questionaries	**Main independent variables:** number of officers per 1,000 population, 2) whether any full-time offers assigned to enforce alcohol-related laws. **Main dependent**	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			enforcement agencies: a latent class analysis	activities among U.S. local law enforcement agencies		agencies)	underage provision 3) overservice of alcohol at alcohol establishment Drink-driving measure:	questionnaires. **Data analysis methods:** Using latent class to categorize groups of enforcement activities into low and high class (probability of enforcement activities less than 30% and more than 70%, respectively) and applied multinomial		**variables:** conducting enforcement activities **Adjusted variables:** 1) Agency characteristics: number of officers and whether those work full-time for enforcement of alcohol control policy law. Number of officers was based on a	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							impaired driving	regression for multiple regression.		ratio/1000 resident in the agency's jurisdiction 2) Community characteristics: total population, percentage living in poverty, percentage of Black and Hispanic, region based on alcohol consumption level: dry, moderate, or wet, and	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										3) Perceptions on how common three problems are in their community: underage drinking, impaired driving, and overservice of alcohol (Likert scales).	
33.	Huckle, T., Casswell, S., Mackintosh, A. M., Chaiyasong,	2018	The International Alcohol Control Study:	To report methods and implementation of the	Multi-countries, Australia, England	Population aged 16-65 years old	Physical availability, pricing, promotion, and	**Study design and data collection methods:** The study applied mixed methods. There are two parts	Used questionnaires There were	**Variables of interest:** perception towards different aspects (i.e., enforcements, compliance, and	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
	S., Viet Cuong, P., Morojele, N., . . . Parker, K.		Methodology and implementation.	International Alcohol Control Policy (IAC) Study	, Scotland, New Zealand, St Kitts and Navis, Thailand, South Africa, Peru, Mongolia, And	and key informants	drink driving	under IAC, including IAC survey, and Alcohol Environment Protocol, using document review, observation, and key informant interview. IAC study used a random sample and some countries applied multi-stage sampling. Data collection was	two tools used 1) IAC, includes alcohol consumption, mediating policy variables (alcohol purchasing	availability), patterns of alcohol consumption, and individual characteristics	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
					Vietnam			based on face-to-face interviews and telephone interviews depending on the country. AEP used document review and key informant interviews. The sampling methods was based on purposive sampling.	behaviours, respondents' usual travel-time to obtain alcohol and mode of travel, alcohol marketing		

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								Data analysis methods: Not applicable	measures, social supply, perceptions of alcohol affordability and availability, perceptions of enforcement, and		

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
									perceptions of specific alcohol restrictions) 2) AEP includes regulatory environment, knowledge on alcohol		

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
									control among key stakeholders, enforcement, and compliance, perception of the alcohol environment,		

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
									availability, marketing exposure. Levels of enforcement were measured on a Likert scale.		

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
34.	Maclennan, B., Kypri, K., Connor, J., Potiki, T., & Room, R.	2016	New Zealand's new alcohol laws: Protocol for a mixed-methods evaluation	To evaluate the effectiveness of the new laws in three aspects, including 1) improving community input	New Zealand, national level	Five target groups of the study 1) general population 2) Māori people or tribes 3)	Physical availability: trading hours, outlet locations, alcohol licensing drink-driving, BAC limit	**Study design and data collection methods:** The study used mixed methods: 1) a national longitudinal survey 2) semi-structured interviews using a telephone survey, among Maoris, community groups, territorial authorities, and local governments	Used questionnaires	**Main independent variables:** introduction of new laws **Main dependent variables:** 1) restrictiveness, number of local alcohol policies adopted/being developed by mid-2017 2) change in number of objections per license application	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				into licensing decisions 2) reducing the availability of alcohol in NZ communities and 3) reducing hazardou		comm unity groups who have taken action s on alcoho l issues 4) territo rial author	among young groups	3) GIS to map alcohol outlets 4) secondary data (e.g., hospitals). **Data analysis methods:** Using different analysis methods such as comparison of proportions, descriptive, logistic regression, negative binomial or Poisson regression		3) hazardous drinking 4) alcohol-related harms (i.e., second-hand and community amenity effects, late-night assaults per month and alcohol-involved traffic crashes per month) 5) community level: alcohol outlet density 6) changes in proportion of residents participating in local	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				s drinking and alcohol - related harm		ities 5) local government staff				decision-making **Adjusted variables:** not mentioned	
35.	Nilsson, T., Leifman, H., & Andréasson, S.	2015	Monitoring local alcohol prevention in Sweden: Application of	To develop an Alcohol Prevention Magnitude	Sweden, national level	Municipalities	Physical availability (age limits for alcohol, responsible	**Study design and data collection methods:** The study used data from two main sources, including data from the former Swedish	Used questionnaires and secondary data sources	The study included 37 indicators in five main components to create APMM, including 1) staff and budget, 2) policy, 3) organizing cooperation with	Validity (i.e., Known-group technique), and reliability

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			Alcohol Prevention Magnitude Measure (APMM)	Measure (APMM) based on local data and to analyse the development of local alcohol prevention by using APMM.			beverage service), drink-driving measures, and brief intervention	National Institute of Public Health, and web-based survey targeting all 290 municipalities in Sweden. The survey consisted off three areas, including inspections according to alcohol law and municipal alcohol and drug prevention **Data analysis**		authorities, 4) supervision and licenses, and 5) licenses and activities Staff and budget: 1) number of staff positions for alcohol and/or drug prevention in the municipality, 2) funding for alcohol and/or drug prevention is provided in the regular budget of the	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								methods: Wilcoxon signed rank test		municipality and 3) a particular alcohol prevention coordinator is designated. Policy: 1) municipal alcohol policy, 2) years since alcohol policy was adopted, 3) plan for implementation of the municipal alcohol policy, 4) measurable goals in municipal alcohol policy, 5)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										plan for follow-up in municipal alcohol policy, 6) particular funding set aside to perform activities in municipal alcohol policy, 7) the municipality as an employer has an alcohol policy, 8) The municipality has a policy for alcohol consumption in public places, 9) NGOs are required to	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										have an alcohol policy to be eligible for municipal funding, and 10) the municipality has a policy for alcohol prevention in elementary schools. Organized cooperation with the authorities included three main sectors: 1) governmental organizations/	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										authorities: police, health care, Swedish Transport Agency, other municipalities, county administrative board, 2) businesses (restaurant owners, and entertainment businesses 3) NGOs (sport, temperance, and religious organizations)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										Supervision and license: 1) number of regular alcohol licenses to the public per 10,000 inhabitants, 2) proportion of licensed premises to the public closing later than 1 am, 3) extent of supervision at licensed premises (public and private), and	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										4) proportion of inspected grocery shops selling alcohol. Activities: 1) arranging drug-free activities (e.g., school, dances and concerts), 2) information to parents (e.g., leaflets and brochures), 3) active work with media advocacy groups in order to	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										increase awareness about alcohol and/or drugs, 4) activities to limit illegal sales of alcohol to youth (e.g., information campaigns or police interventions), 5) activities to enforce age limits for alcohol sales, 6) responsible beverage services,	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										7) parental programmes (with educated instructors) on alcohol and drugs in grades 6-9, 8) group activities for children of substance misusing parents, 9) activity for traffic sobriety, in addition to policy efforts, 10) brief intervention in primary health care.	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
36.	Nilsson, T. Norström, T. Leifman, H. Andréasson, S. Guldbrandsson, K. Allebeck, P.	2020	Effects of Local Alcohol Prevention Initiatives in Swedish Municipalities, 2006–2014	To examine whether local alcohol prevention reduced consumption and alcohol-related harm in Swedish municipalities.	Sweden, national level	Municipal prevention coordinators or individuals in similar positions	Physical availability (age limits for alcohol, responsible beverage service), drink-driving measures, and	**Study design and data collection methods:** The study used multiple sources of data, based on Swedish municipalities. Data for the Alcohol Prevention Magnitude Measure (APMM) originated from a yearly web-based survey regarding 1) local drug prevention	Used questionnaires and secondary data sources	**Main independent variables**: Alcohol Prevention Magnitude Measure (APMM), an index measured implementation at the local level **Main dependent variables:** alcohol sales (in litters per inhabitant), single-vehicle accidents between 10 pm and 5 am (per 10,000	Validity (i.e., Known-group technique), and reliability

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							brief intervention	initiatives and 2) inspections pursuant to the Alcohol Act conducted by the Public Health Agency of Sweden (PHAS). The survey was completed by municipal prevention coordinators or individuals in similar positions.		inhabitant), police-reported assaults, outdoors, where the perpetrator was unknown to the victim per 10,000 inhabitants, treated patients and inpatient care with alcohol intoxication diagnosis as the primary and/or bi-diagnosis (morbidity), treated patients (morbidity), inpatient care with	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								Register data on licensed premises were also used in the APMM. The selection of municipalities was based on availability of data for at least the past nine years. Data on consumption and harm were based on data that was available at the local level.		liver disease as the primary diagnosis (morbidity), deceased with explicit alcohol diagnosis as the underlying and/or contributory cause of death (mortality) **Adjusted variables:** median income, unemployment rate, post-secondary education, and population size	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								Data analysis methods: fixed-effect model		The study included 37 indicators in five main components to create the APMM, including: 1) staff and budget, 2) policy, 3) organizing cooperation with authorities, 4) supervision and licenses, and 5) licenses and activities. See details of each indicator in the study from	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
										Nilsson, T., Leifman, H., & Andréasson, S., 2015	
37.	Paschall, M. J., Grube, J. W., Thomas, S., Cannon, C., & Treffers, R	2012	Relationships between local enforcement, alcohol availability, drinking norms,	To investigate relationships between local alcohol policies, enforcement,	USA, city level	50 cities in California and youth	1) control of physical availability: conditional use permit required for new	**Study design and data collection methods:** The study included different data sources: 1) youth survey based on telephone interviews (adolescent alcohol use and heavy	Used questionnaires and secondary data	**Main independent variables:** 1) local enforcement activities, used funding on activities as proxy 2) stringency and comprehensiveness of each type of ordinance, city received +1 if had the	Reliability

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			and adolescent alcohol use in 50 California cities	alcohol outlet density, adult alcohol use, and underage drinking in 50 California cities.			establishments selling or serving alcohol (e.g., designating hours of operation; approved selling or	drinking, perceived availability of alcohol, perceived enforcement of underage drinking laws, perceived acceptability of alcohol use), 2) adult drinking survey, telephone interviews (adult drinking), 3) secondary data sources (population and outlet data,		relevant type of law existed and a 0 if no such law existed. **Main dependent variables:** adolescent alcohol use, and heavy drinking **Adjusted variables**: City level: 1) alcohol outlet density, outlets per roadway mile in each city, 2) adult alcohol use	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							serving comply with minimum operational standards; public drinking prohibition; special outdoor events	funding of enforcement activities). **Data analysis methods:** Multi-level linear analysis		Individual level: 1) perceived availability of alcohol (Likert scales), 2) perceived enforcement of underage drinking laws by asking about the likelihood of being caught by police in six situations (Likert scales) 3) perceived acceptability of	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							policies 2) harm reduction policies: social host policies 3) alcohol advertisement: outdoor advertising/billb			alcohol use (Likert scales) 4) age 5) gender 6) race/ethnicity	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							oards of alcoholic beverages prohibited; window advertising of alcoholic beverages				

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							prohibited.				
38.	Paschall, M. J., Lipperman-Kreda, S., & Grube, J. W. (	2014	Effects of the local alcohol environment on adolescents' drinking behaviours and beliefs.	To investigate associations between characteristics of the local alcohol environment and adolescen	USA, state level	Adolescents, 13-17 years old	Physical availability control: conditional use permit required for new establishment selling or	**Study design and methods of data collection:** The study used data from various sources and one source was a cohort study design: 1) youth survey, 3 waves using computer-assisted telephone interviews to	Used questionnaires and secondary data	**Main dependent variables:** Alcohol environment 1) stringency and comprehensiveness of each type of ordinance 2) local enforcement activities, used funding on activities as proxy 3) alcohol outlet density, outlets per	Reliability

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
				t alcohol use and beliefs in 50 California cities			serving alcohol, deemed approved (DA) requirements that pre-existing establishment selling or serving alcohol	investigate adolescent alcohol use, heavy drinking, perceived availability of alcohol, perceived enforcement of underage drinking laws, perceived approval of alcohol use, and youth demographics 2) online survey and interviews with city clerks for local		roadway mile in each city 4)adult alcohol use **Main dependent variables:** past year alcohol use and past year heavy drinking among youth **Adjusted variables:** city level: city demographics individual level: perceived alcohol availability (Likert scales), perceived	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							comply, s, public drinking prohibition, responsible beverage service training required for staff of establishments	alcohol policy data, 3) other secondary data sources were used for local enforcement activities, bar and density 4) adult survey using telephone interview on alcohol use **Analysis method:** Multilevel logistic regression		enforcement of underage drinking laws (Likert scales), perceived parental approval of alcohol use (Likert scales)	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							selling or serving alcohol, social host policies, special outdoor events policies governing alcohol services				

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							(street fair) alcohol advertisement: outdoor advertising/billboard, and window advertising of alcohol beverag				

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
							e prohibition				
39.	Randerson, S., Casswell, S., & Huckle, T.	2018	Changes in New Zealand's alcohol environment following implementation of the sale and supply of	To assess the impact of the Sale and Supply of Alcohol Act 2012 (SSAA)	New Zealand, national level	Police officers, liquor licensing inspectors, and public health	Physical availability: social supply to minors, trading hours, and supply to	**Study design and data collection methods:** The study applied mixed methods. Key informant interview for rating of law enforcement and compliance and also provided reasons for rating. Key informants	Used questionnaires	**Variables of interest:** Compliance and enforcement level of policies Likert scale questions were used to assess level of enforcement and compliance in different policy domains: social supply to minors,	None

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
			alcohol act (2012)			officers	intoxicated persons Marketing: point-of-sale marketing, and drink driving	were purposively selected, including those involved in monitoring licensed environments, enforcing alcohol regulations, checking license conditions, and reviewing alcohol license applications. **Data analysis methods:** Ordered logistic regression		trading hours, supply of alcohol to intoxicated persons, point-of-sale marketing, and drink driving.	

	Author	Year	Title	Aims	Country of origin and level of the study	Population	Policy areas	Methods	Tools used	Measurements	Validity and reliability
								and thematic analysis			

*Not reported/did not assess validity or reliability

Appendices of chapter 3: Barriers and facilitators to the implementation of effective alcohol control policies: A scoping review

List of tables

Table 3A.1 Search terms across different databases

Search terms	Number of studies found
Scopus	
((TITLE-ABS (alcohol* W/10 polic*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 regulat*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 strateg*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 law*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 legislation)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance))) AND NOT (TITLE-ABS ("non-alcohol*" OR “brief screening” OR screening OR “alcohol treatment”)) AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh")) AND (LIMIT-TO (LANGUAGE , "English"))	1904
(TITLE-ABS (taxes OR tax OR taxation OR pric* OR affordability OR "minimum pricing" OR "minimum unit pricing" OR "floor price")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT	407

Search terms	Number of studies found
SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "bz") OR LIMIT-TO (DOCTYPE , "sh")) AND (LIMIT-TO (LANGUAGE , "English"))	
(TITLE-ABS (sale* OR “trading hour*” OR “intoxicat*” OR "on-premis*" OR "off-premis*" OR "minimum age" OR "minimum legal age" OR availabilit* OR retail* OR outlet* OR licen* OR "online deliver*" OR "online sale*")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh") OR LIMIT-TO (DOCTYPE , "bz")) AND (LIMIT-TO (LANGUAGE , "English"))	2,189
(TITLE-ABS (marketing OR promot* OR adverti* OR sponsor*)) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY(implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (	1,982

Search terms	Number of studies found
PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh") OR LIMIT-TO (DOCTYPE , "bz")) AND (LIMIT-TO (LANGUAGE , "English"))	
(TITLE-ABS (driv* OR “blood alcohol concentration”)) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh")) AND (LIMIT-TO (LANGUAGE , "English"))	1,778
(((TITLE-ABS (alcohol* W/10 polic*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 regulat*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 strateg*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 law*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) OR ((TITLE-ABS (alcohol* W/10 legislation)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance))) AND NOT (TITLE-ABS ("non-alcohol*" OR "brief screening" OR screening OR "alcohol treatment")) AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (taxes OR tax OR taxation OR pric* OR affordability OR "minimum pricing" OR "minimum unit pricing" OR "floor price")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (sale* OR "trading hour*" OR	6,102

Search terms	Number of studies found
"intoxicat*" OR "on-premis*" OR "off-premis*" OR "minimum age" OR "minimum legal age" OR availabilit* OR retail* OR outlet* OR licen* OR "online deliver*" OR "online sale*")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (marketing OR promot* OR adverti* OR sponsor*)) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) OR ((TITLE-ABS (driv* OR "blood alcohol concentration")) AND (TITLE-ABS (alcohol*)) AND (TITLE-ABS-KEY (implement* OR enforc* OR monitor* OR compliance)) AND NOT "non-alcohol*" AND NOT SUBJAREA (vete)) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "sh") OR LIMIT-TO (DOCTYPE , "bz")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010) OR LIMIT-TO (PUBYEAR , 2009) OR LIMIT-TO (PUBYEAR , 2008) OR LIMIT-TO (PUBYEAR , 2007) OR LIMIT-TO (PUBYEAR , 2006) OR LIMIT-TO (PUBYEAR , 2005) OR LIMIT-TO (PUBYEAR , 2004) OR LIMIT-TO (PUBYEAR , 2003) OR LIMIT-TO (PUBYEAR , 2002) OR LIMIT-TO (PUBYEAR , 2001) OR LIMIT-TO (PUBYEAR , 2000))	
Web of Science	
((AB=(alcohol* NEAR polic*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR regulat*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR strateg*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR law*) AND AB=(implement* OR enforc* OR monitor* OR compliance)) OR (AB=(alcohol* NEAR legislation) AND AB=(implement* OR enforc* OR monitor* OR compliance))) NOT (AB=("non-alcohol*" OR “brief screening” OR screening OR “alcohol treatment”)) NOT SU= Zoology	2,656
AB=(taxes OR tax OR taxation OR pric* OR affordability OR "minimum pricing" OR "minimum unit pricing" OR "floor price") AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB="non-alcohol*" NOT SU= Zoology	567
AB=(sale* OR “trading hour*” OR “intoxicat*” OR "on-premis*" OR "off-premis*" OR "minimum age" OR "minimum legal age" OR availabilit* OR retail* OR outlet* OR licen* OR "online deliver*" OR "online sale*")	2410

Search terms	Number of studies found
AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB= “non-alcohol*” NOT SU= Zoology	
AB=(marketing OR promot* OR adverti* OR sponsor*) AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB="non-alcohol*" NOT SU= Zoology	2,687
AB=(driv* OR “blood alcohol concentration”) AND AB=(alcohol*) AND AB=(implement* OR enforc* OR monitor* OR compliance) NOT AB= "non-alcohol*" NOT SU= Zoology	1889
Combined with all #5 OR #4 OR #3 OR #2 OR #1 Refined by: PUBLICATION YEARS: (2021 OR 2005 OR 2020 OR 2004 OR 2019 OR 2003 OR 2018 OR 2002 OR 2017 OR 2001 OR 2016 OR 2000 OR 2015 OR 2014 OR 2013 OR 2012 OR 2011 OR 2010 OR 2009 OR 2008 OR 2007 OR 2006) AND DOCUMENT TYPES: (ARTICLE OR REPORT OR REVIEW OR THESIS DISSERTATION OR CASE REPORT OR CLINICAL TRIAL) AND LANGUAGES: (ENGLISH)	5,549

Table 3A.2 Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page 1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page 1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page 1-2
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page 2

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 2
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page 3
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Page 2
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	supplementary file 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 3
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 3
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 3
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	None
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 3
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for	Page 4

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		exclusions at each stage, ideally using a flow diagram.	
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 4-7
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	None
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Page 4-7
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Page 7-9
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Page 9
Limitations	20	Discuss the limitations of the scoping review process.	Page 10
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Page 10
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page 10

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of

"risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Appendices of chapter 4: Application of the Policy Capacity Framework to policy implementation of effective alcohol control policies in Thailand

List of tables

Table 4A. 1 Experts who joined the expert consultative workshop

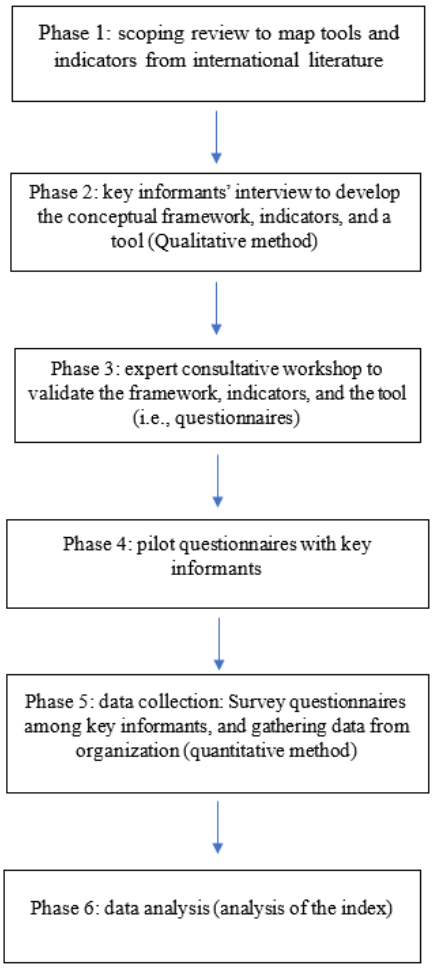
Number	Numbers of experts	Role	Work and responsibility
1.	3 1 expert focused on supporting law enforcement, 1 person focused on supporting provinces to implement alcohol control policies, and 1 person focused on supporting policy implementation and campaign	Civil Society Members	Supporting implementation of alcohol control policies at national and provincial levels
2.	1	Government	Supporting implementation of alcohol control policies at national and provincial levels
3.	1	Government	Supporting implementation of drink-driving counter measures
4.	2	Academic	Supporting implementation of alcohol control policies at national level
5.	1	Academic	Supporting implementation of drink-driving counter measures
6.	1	Government	Supporting implementation of alcohol taxation law
7.	1	Academic	Supporting implementation of alcohol marketing regulations
8.	1	Academic	Supporting implementation of alcohol policies at the national level
9.	2	Civil Society Member	Supporting implementation of alcohol control policies at the provincial level

Number	Numbers of experts	Role	Work and responsibility
10.	8	Government	Implementation of alcohol control policies at the provincial level
total	**21**		

Appendices of chapter 5: A composite index of provincial alcohol control policy implementation capacity in Thailand

List of tables

List of figures



Appendix Figure 5A.1:

Flow chart of the methods of the study

Figure 5A.1 Flow chart of the methods of the study

Table 5A.1 Effective alcohol control policies in Thailand

Main policy measures	**Policy measures**
Physical availability	
Restriction of alcohol sales in certain places	• temples or places where religious rituals are practised • government healthcare facilities, and hospitals • government facilities • dormitories • educational institutions • petrol stations

Main policy measures	Policy measures
	• state enterprises' premises or areas and other state agencies • industrial areas • public parks of state enterprises or other government agencies • areas under the supervision of, or utilised by state enterprises or other government agencies • transportation terminals • roads and footpaths • train stations or on trains • public ferry terminals or on public ferry service • within the premises or vicinity of educational institutions, or nearby dormitories in the vicinity of educational institutions • national parks
Restriction of alcohol drinking in certain places	• temples or places where religious rituals are practised • government healthcare facilities, and hospitals • government facilities • educational institutions • petrol stations • state enterprises' premises or areas and other state agencies • industrial areas • public parks of state enterprises or other government agencies • areas under the supervision of, or utilised by state enterprises or other government agencies • transportation terminals • roads and footpaths or in cars • train stations or on the trains • public ferry terminals or on public ferry services • within the premises or vicinity of educational institutions, or nearby dormitories in the vicinity of educational institutions • national parks

Main policy measures	Policy measures
Restriction of alcohol sales to certain persons	• persons aged below 20 years • intoxicated persons
Restriction of alcohol sales at certain times	Alcohol sales are allowed from 11 am to 2 pm and from 5 pm to midnight.
Restriction of alcohol sales on certain days	Makha Bucha Day, Visakha Bucha Day, Asalha Bucha Day, Beginning of Buddhist Lent, End of Buddhist Lent, Election Day, Day before Election Day
Licensing	Alcohol licensing fees; there are two types of alcohol license by volume of alcohol sold: 1) 10 litres or above on one occasion. and 2) less than 10 litres on one occasion.
Control of alcohol advertising	• Alcohol advertising in direct and indirect ways is prohibited, with exception of providing information or socially constructive knowledge and not displaying products. These restrictions do not apply to advertising that originates from outside Thailand. • Pricing reductions • Promotion (e.g., offering or proposing the right to attend competitions, shows, lottery services, raffles, or any other benefits as compensation to purchasers of alcoholic beverages, or to holders of coupons or any other items related to alcoholic beverages for exchange or purchase)
Alcohol taxation policies	• Tax levy regarding ad-valorem tax and specific tax rates and earmarked tax for local tax, sport, media and the Thai Health Promotion Foundation
Drink-driving countermeasures	Adults BAC limit 50 milligrams per cent 20 milligram per cent limit applied to: • young people • holders of temporary driving licenses • Drivers who hold a driver's license for other types of vehicles that cannot be substituted. • Drivers who do not have a driver's license or whose driver’s license has been suspended or revoked.

Main policy measures	Policy measures
	People who refuse an alcohol breath test.

Table 5A.2 Weighted scores for effectiveness with regard to reducing alcohol consumption

No.	Indicators	Alcohol advertising	Physical availability	Drink-driving control	Alcohol taxation
	Policy capacity at provincial level				
	Political capacity				
1	Establishment of written policy	3.67	3.67	3.67	3.67
2	Number of policy champions	4.08	4.08	4.08	4.08
3	Establishment of Sub-committee of the Provincial Alcoholic Beverage Control Committee (Provincial Committee) with engagement of civil society members	3.90	3.90	NA	NA
4	Establishment of Sub-Committee on Provincial Road Safety Committee on Law enforcement	NA	NA	4.10	NA
	Operational capacity				
5	Number of officers who enforce specific laws per alcohol outlets	3.60	3.60	NA	4.00
6	Number of officers who support implementation of specific laws per outlets	2.80	2.80	NA	3.83
7	Budget for law enforcement per capita	3.50	3.50	4.00	NA
8	Number of officers who enforce drink-driving measures per driving licenses	NA	NA	4.10	NA
9	Number of officers who support implementation of drink-driving measures per driving licenses	NA	NA	3.80	NA
10	Sufficiency of alcohol breathalyzers	NA	NA	4.30	NA
11	Number of alcohol breathalyzers per 100 000 driving licenses	NA	NA	4.30	NA
12	Establishment of communication channels	3.50	3.50	3.50	NA
	Analytical capacity or technical capacity				
13	Number of technical support persons	3.33	3.33	3.33	NA
14	Number of lawyers who provide legal support	3.50	3.50	NA	NA
	Implementation process for strengthening law enforcement				
15	Frequency of meetings of the Provincial Committee	3.50	3.50	NA	NA
16	Frequency of meetings of sub-committee of the Provincial Committee	3.40	3.40	NA	NA

No.	Indicators	Alcohol advertising	Physical availability	Drink-driving control	Alcohol taxation
17	Frequency of having agenda on drink-driving in Provincial Road Safety Committee meetings or Sub-Committee meeting of Provincial Road Safety Committee on Law Enforcement	NA	NA	3.60	NA
18	Using evidence-based action, using evidence for decision making, planning, and action	3.90	3.90	3.90	3.90
19	Number of staff trained on law content and law enforcement	3.80	3.80	3.80	3.83
20	Number of activities around providing education/raising awareness for the public and outlets	3.30	3.30	3.60	3.33
	Implementation processes: Law enforcement				
21	Intensity: Frequency of law enforcement at social events or festivals at provincial level	4.00	NA	NA	NA
22	Intensity: Frequency of online monitoring of alcohol advertising violations	3.78	NA	NA	NA
23	Intensity: Frequency of outlet inspections in relation to alcohol advertising control	4.00	NA	NA	NA
24	Coverage: Percentage of alcohol outlets have been inspected regarding alcohol advertising control	4.00	NA	NA	NA
25	Intensity: Percentage of reported cases that have been prosecuted	3.78	NA	NA	NA
26	Intensity: Frequency of outlet inspections regarding alcohol sales in certain places	NA	4.00	NA	NA
27	Intensity: Frequency of outlet inspections regarding control of alcohol sales on certain days	NA	3.60	NA	NA
28	Intensity: Frequency of outlet inspections regarding control of alcohol sales at certain times	NA	3.90	NA	NA
29	Intensity: Frequency of outlet inspections regarding control of alcohol sales to underage drinkers	NA	4.10	NA	NA
30	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales on certain days	NA	3.80	NA	NA
31	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales at certain times	NA	3.90	NA	NA
32	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales to underage drinkers	NA	4.20	NA	NA
33	Intensity: Percentage of reported cases that have been prosecuted	NA	3.70	NA	NA
34	Intensity: Frequency of law enforcement by setting up sobriety check points	NA	NA	4.60	NA
35	Coverage: Percentage of drivers who have experienced alcohol breath testing	NA	NA	4.20	NA

No.	Indicators	Alcohol advertising	Physical availability	Drink-driving control	Alcohol taxation
36	Intensity: Frequency of law enforcement among alcohol outlets regarding Excise Act 2017 and related regulations	NA	NA	NA	4.00
37	Coverage: Percentage of alcohol outlets that have been inspected by officers regarding Excise Act 2017 and related regulations	NA	NA	NA	4.00

Table 5A.3 Weighted scores for effectiveness regarding reducing alcohol-related harms

No.	Indicators	Alcohol advertising	Control of physical availability	Drink-driving control	Alcohol taxation
	Policy capacity at provincial level				
	Political capacity				
1	Establishment of written policy	3.67	3.67	3.67	3.67
2	Number of policy champions	4.08	4.08	4.08	4.08
3	Establishment of Sub-committee of the Provincial Alcoholic Beverage Control Committee (Provincial Committee) with engagement of civil society members	3.90	3.90	NA	NA
4	Establishment of Sub-Committee of the Provincial Road Safety Committee on Law Enforcement	NA	NA	4.10	NA
	Operational capacity				
5	Number of officers who enforce specific laws per alcohol outlets	3.60	3.60	NA	4.00
6	Number of officers who support implementation of specific laws per alcohol outlets	2.80	2.80	NA	3.83
7	Budget for law enforcement per capita	3.50	3.50	4.00	NA
8	Number of officers who enforce drink-driving measures per driving license	NA	NA	4.10	NA
9	Number of officers who support implementation of drink-driving measures per driving licenses	NA	NA	3.80	NA
10	Sufficiency of alcohol breathalyzers	NA	NA	4.30	NA
11	Number of alcohol breathalyzers per 100 000 driving licenses	NA	NA	4.30	NA
12	Establishment of communication channels	3.50	3.50	3.50	NA
	Analytical capacity or technical capacity				
13	Number of technical support persons	3.33	3.33	3.33	NA
14	Number of lawyers who provide legal support	3.50	3.50	NA	NA
	Implementation process for strengthening law enforcement				
15	Frequency of meetings of the Provincial Committee	3.50	3.50	NA	NA
16	Frequency of meetings of sub-committee of the Provincial Committee	3.40	3.40	NA	NA

No.	Indicators	Alcohol advertising	Control of physical availability	Drink-driving control	Alcohol taxation
17	Frequency of having agenda on drink-driving in Provincial Road Safety Committee meeting or Sub-Committee meetings of the Provincial Road Safety Committee on Law Enforcement	NA	NA	3.60	NA
18	Using evidence-based action, using evidence for decision making, planning, and action	3.90	3.90	3.90	3.90
19	Number of staff trained on law content and law enforcement	3.80	3.80	3.80	3.83
20	Number of activities around providing education/raising awareness for the public and outlets	3.30	3.30	3.60	3.33
	Implementation processes: Law enforcement				
21	Intensity: Frequency of law enforcement at social events or festivals at provincial level	3.89	NA	NA	NA
22	Intensity: Frequency of online monitoring of alcohol advertising violations	3.67	NA	NA	NA
23	Intensity: Frequency of outlet inspections regarding alcohol advertising control	3.89	NA	NA	NA
24	Coverage: Percentage of alcohol outlets have been inspected regarding alcohol advertising control	4.00	NA	NA	NA
25	Intensity: Percentage of reported cases that have been prosecuted	3.78	NA	NA	NA
26	Intensity: Frequency of outlet inspection regarding alcohol sales in certain places	NA	4.11	NA	NA
27	Intensity: Frequency of outlet inspection regarding control of alcohol sales on certain days	NA	3.60	NA	NA
28	Intensity: Frequency of outlet inspection regarding control of alcohol sales in certain times	NA	3.78	NA	NA
29	Intensity: Frequency of outlet inspection regarding control of alcohol sales to underage drinkers	NA	4.30	NA	NA
30	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales on certain days	NA	3.90	NA	NA
31	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales at certain times	NA	3.90	NA	NA
32	Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales to underage drinkers	NA	4.20	NA	NA
33	Intensity: Percentage of reported cases that have been prosecuted	NA	3.60	NA	NA

No.	Indicators	Alcohol advertising	Control of physical availability	Drink-driving control	Alcohol taxation
34	Intensity: Frequency of law enforcement by setting up sobriety check points	NA	NA	4.70	NA
35	Coverage: Percentage of drivers who have experienced alcohol breath testing	NA	NA	4.30	NA
36	Intensity: Frequency of law enforcement among alcohol outlets regarding Excise Act 2017 and related regulations	NA	NA	NA	3.71
37	Coverage: Percentage of outlets that have been inspected by officers regarding Excise Act 2017 and related regulations	NA	NA	NA	3.71

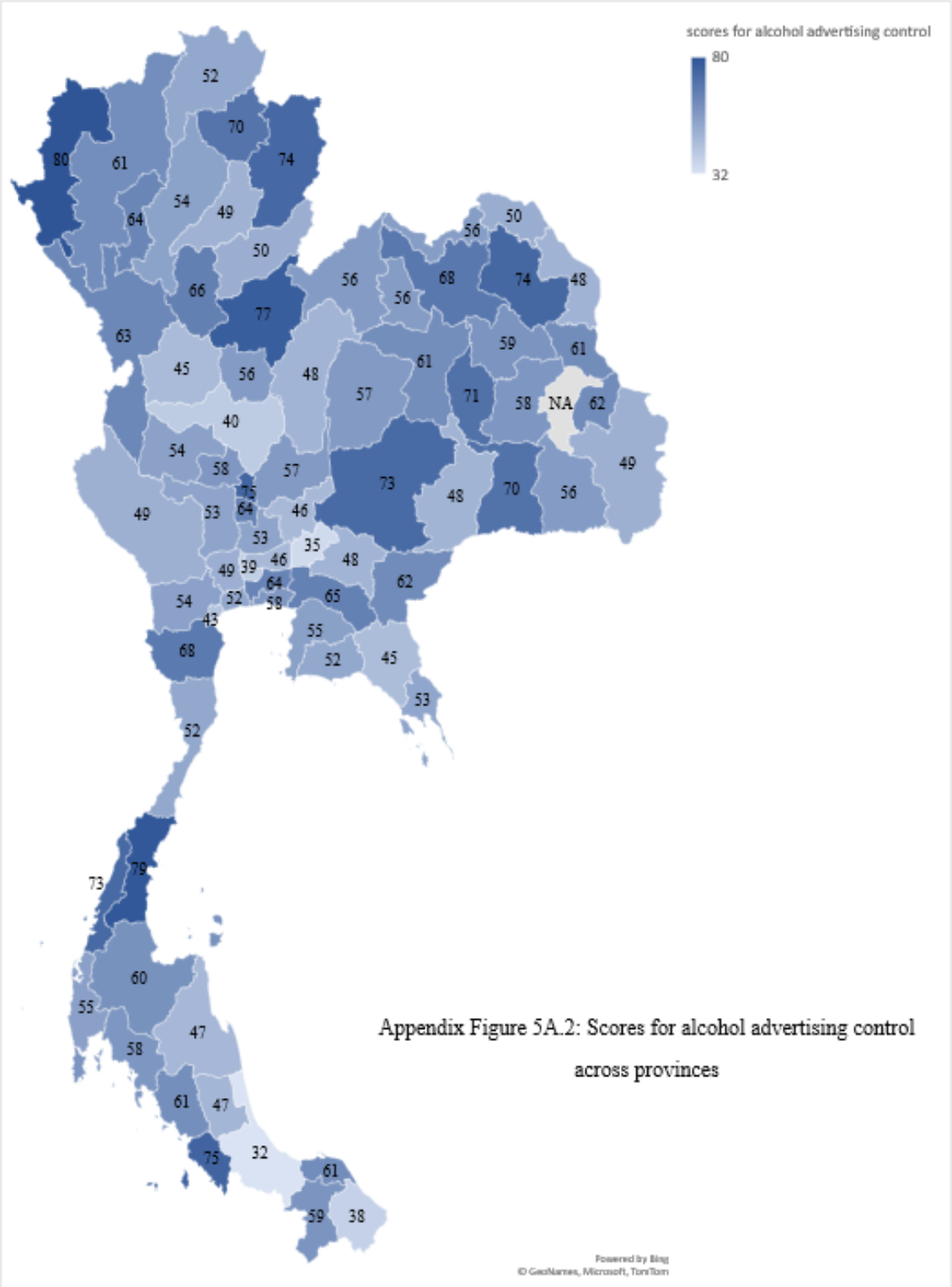


Figure 5A.2 Scores for alcohol advertising control across provinces

Table 5A.4 Scores for alcohol advertising control across provinces

Provinces	Scores for advertising control
Mae Hong Son	80.1
Chumphon	79.3
Phitsanulok	77.2
Satun	75.1
Sing Buri	74.7
Sakon Nakhon	73.8
Nan	73.5
Ranong	73.3
Nakhon Ratchasima	72.8
Maha Sarakham	70.7
Surin	70.2
Phayao	69.7
Udon Thani	68.3
Phetchaburi	67.7
Sukhothai	65.5
Chachoengsao	65.2
Ang Thong	64.1
Bangkok	64.1
Lamphun	63.7
Tak	62.9
Amnat Charoen	61.7
Sa Kaeo	61.6
Pattani	61.2
Mukdahan	61.1
Chiang Mai	60.9
Khon Kaen	60.8
Trang	60.5
Surat Thani	59.5
Kalasin	58.9
Yala	58.9
Phuket	58.7
Krabi	57.8
Roi Et	57.8
Chai Nat	57.7
Samut Prakan	57.6
Chaiyaphum	56.8
Lop Buri	56.6
Sisaket	56.2
Phichit	56.2
Loei	56.2

Nong Bua Lamphu	56.1
Nong Khai	55.5
Chon Buri	54.8
Phangnga	54.6
Uthai Thani	54.3
Ratchaburi	54.2
Lampang	53.8
Suphan Buri	53.5
Ayutthaya	53.2
Trat	52.5
Samut Sakhon	52.3
Rayong	52.2
Prachuap Khiri Khan	52.1
Chiang rai	52.0
Bueng Kan	50.2
Uttaradit	49.8
Nakhon Pathom	49.5
Kanchanaburi	49.3
Ubon Ratchathani	49.2
Phrae	48.7
Nakhon Phanom	48.1
Buri Ram	48.0
Prachin Buri	47.8
Phetchabun	47.8
Phatthalung	47.1
Nakhon Si Thammarat	46.7
Saraburi	46.2
Pathum Thani	46.1
Kamphaengphet	45.4
Chanthaburi	45.0
Samut Songkhram	42.9
Nakhon Sawan	40.2
Nonthaburi	38.9
Narathiwat	37.9
Nakhon Nayok	34.9
Songkhla	32.0

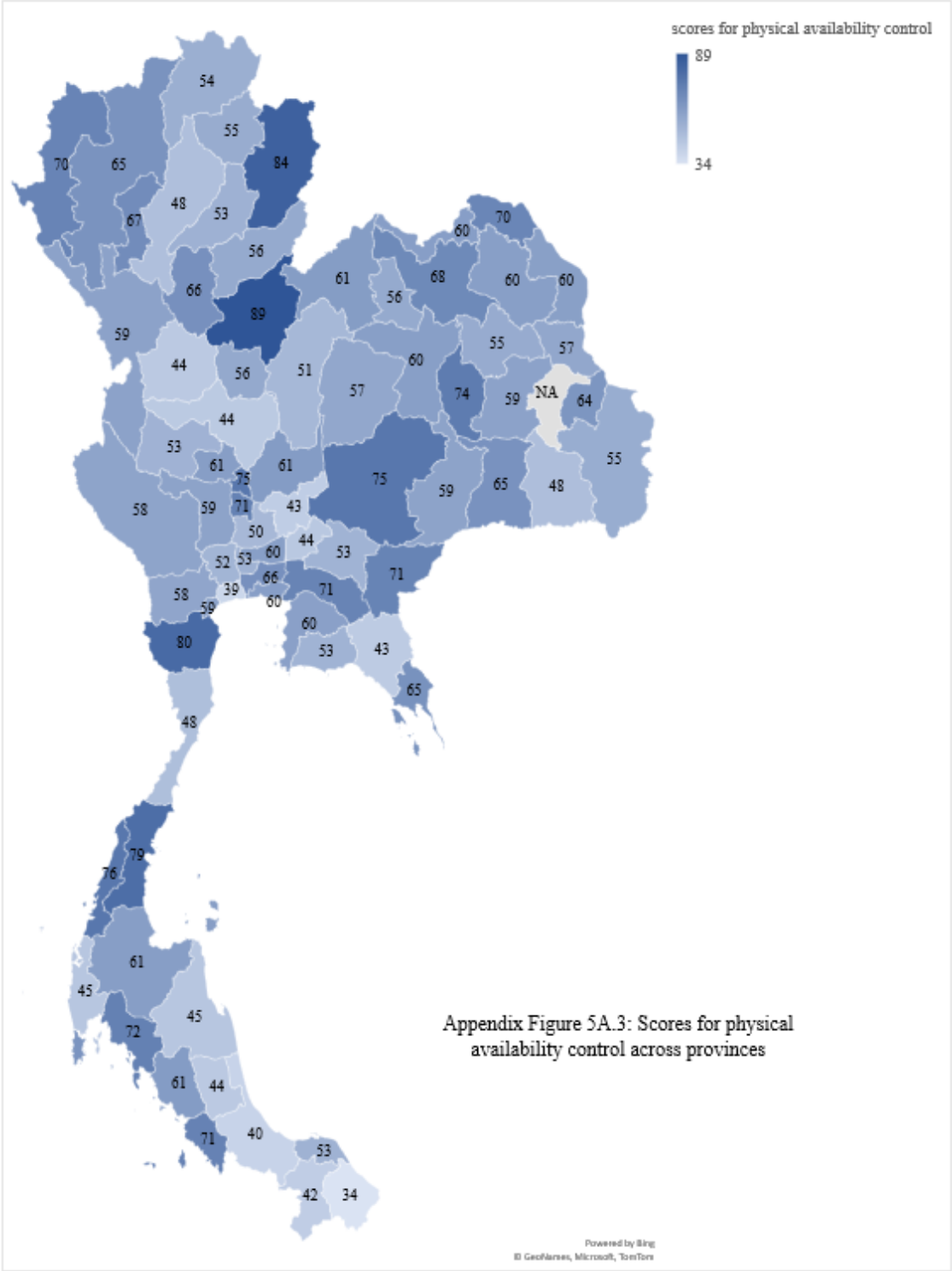


Figure 5A.3 Scores for physical availability control across provinces

Table 5A.5 Scores for physical availability control across provinces

Provinces	Scores for physical availability control
Phitsanulok	88.6
Nan	83.9
Phetchaburi	80.5
Chumphon	79.1
Ranong	75.6
Sing Buri	75.5
Nakhon Ratchasima	75.4
Maha Sarakham	73.6
Krabi	71.7
Ang Thong	71.2
Satun	71.1
Sa Kaeo	70.6
Chachoengsao	70.6
Mae Hong Son	70.4
Bueng Kan	69.8
Udon Thani	68.4
Lamphun	67.4
Bangkok	65.8
Sukhothai	65.8
Trat	65.3
Surin	65.1
Chiang Mai	64.7
Phuket	64.4
Amnat Charoen	63.8
Lop Buri	61.5
Trang	61.5
Loei	61.1
Chai Nat	60.6
Surat Thani	60.5
Nong Khai	60.4
Samut Prakan	60.4
Sakon Nakhon	60.2
Khon Kaen	60.2
Pathum Thani	60.1
Nakhon Phanom	59.9
Chon Buri	59.7
Samut Songkhram	59.2
Tak	59.1
Roi Et	58.9
Suphan Buri	58.8
Buri Ram	58.7

Provinces	Scores for physical availability control
Kanchanaburi	58.3
Ratchaburi	57.7
Mukdahan	57.1
Chaiyaphum	57.0
Phichit	56.3
Uttaradit	56.0
Nong Bua Lamphu	56.0
Kalasin	55.5
Phayao	55.2
Ubon Ratchathani	55.0
Chiang Rai	54.0
Phrae	53.3
Pattani	53.0
Nonthaburi	52.8
Uthai Thani	52.7
Rayong	52.6
Prachin Buri	52.6
Nakhon Pathom	51.8
Phetchabun	50.7
Ayutthaya	50.4
Sisaket	48.2
Prachuap Khiri Khan	48.0
Lampang	47.8
Phangnga	45.2
Nakhon Si Thammarat	45.2
Nakhon Nayok	44.4
Kamphaengphet	44.0
Phatthalung	44.0
Nakhon Sawan	43.8
Chanthaburi	43.4
Saraburi	42.6
Yala	42.5
Songkhla	40.0
Samut Sakhon	38.7
Narathiwat	34.1

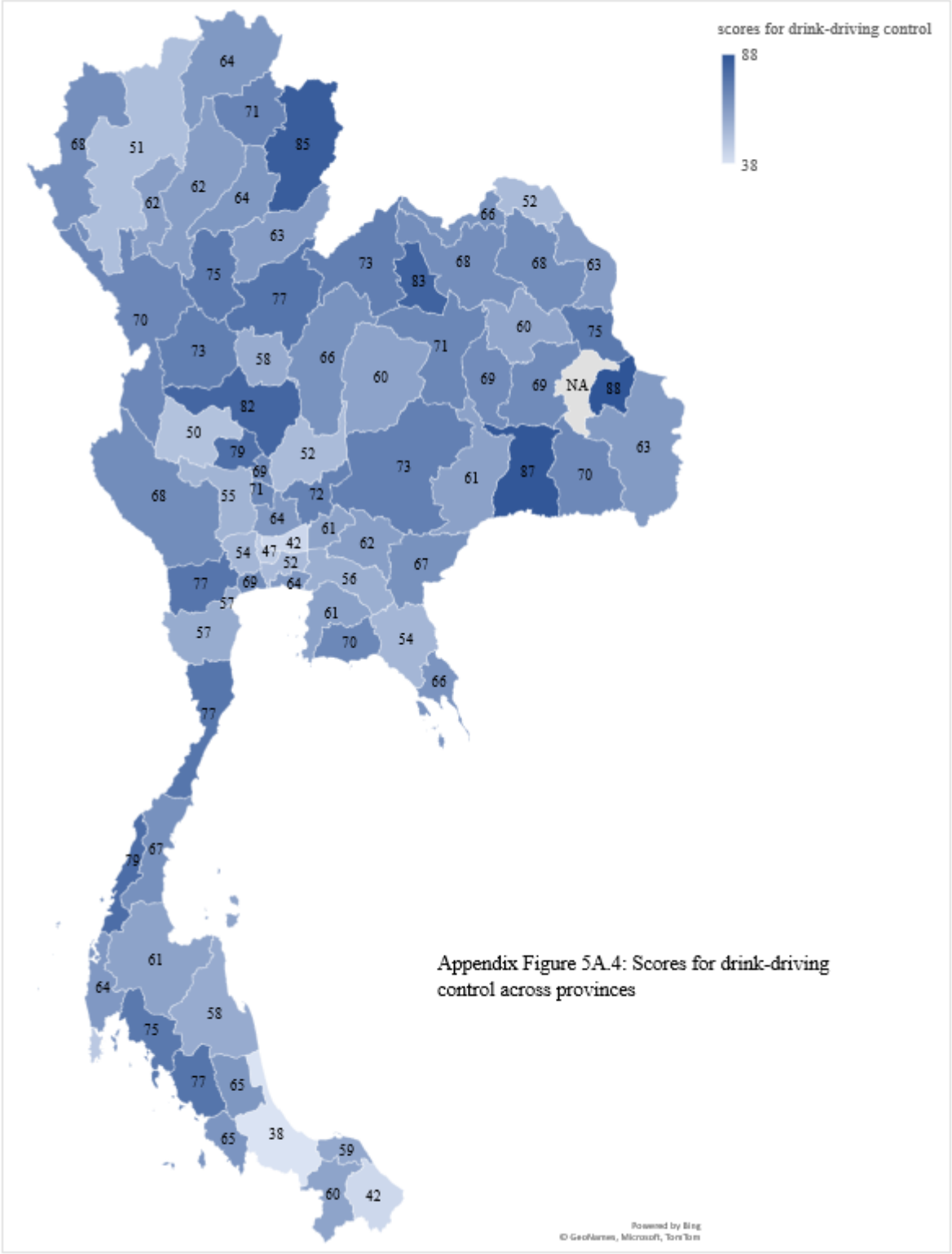


Figure 5A.4 Scores for drink-driving control across provinces

Table 5A.6 Scores for drink-driving control across provinces

Provinces	Scores for drink-driving control
Amnat Charoen	88.1
Surin	87.3
Nan	85.1
Nong Bua Lamphu	83.0
Nakorn Sawan	82.0
Ranong	79.4
Chai Nat	79.1
Trang	76.9
Phitsanulok	76.8
Ratchaburi	76.6
Prachuap Khiri Khan	76.5
Krabi	75.4
Mukdahan	75.3
Sukhothai	75.0
Kamphaengphet	73.3
Loei	73.2
Nakhon Ratchasima	72.8
Saraburi	72.1
Phayao	71.3
Ang Thong	70.5
Khon Kaen	70.5
Tak	70.3
Rayong	70.1
Sisaket	69.9
Roi Et	69.0
Sing Buri	68.9
Samut Sakhon	68.8
Maha Sarakham	68.6
Kanchanaburi	68.3
Sakon Nakhon	68.1
Udon Thani	67.8
Mae Hong Son	67.6
Chumphon	66.8
Sa Kaeo	66.6
Phetchabun	66.3
Nong Khai	66.2
Trat	65.9
Satun	65.4
Phatthalung	64.9
Phrae	64.5
Phang Nga	64.2
Chiang Rai	64.2

Samut Prakan	64.0
Ayutthaya	64.0
Ubon Ratchathani	63.3
Nakhon Phanom	62.8
Uttaradit	62.6
Lampang	62.2
Prachin Buri	61.9
Lamphun	61.8
Buri Ram	61.1
Chon Buri	61.0
Nakhon Nayok	60.6
Surat Thani	60.5
Chaiyaphum	60.4
Yala	60.1
Kalasin	59.6
Pattani	58.8
Nakhon Si Thammarat	57.6
Phichit	57.5
Phetchaburi	57.4
Samut Songkhram	56.6
Chachoengsao	56.3
Suphan Buri	54.5
Chanthaburi	53.8
Nakhon Pathom	53.7
Bangkok	52.2
Lop Buri	52.1
Bueng Kan	52.0
Chiang Mai	50.7
Uthai Thani	49.6
Phuket	47.3
Nonthaburi	46.7
Pathum Thani	41.9
Narathiwat	41.6
Songkhla	37.9

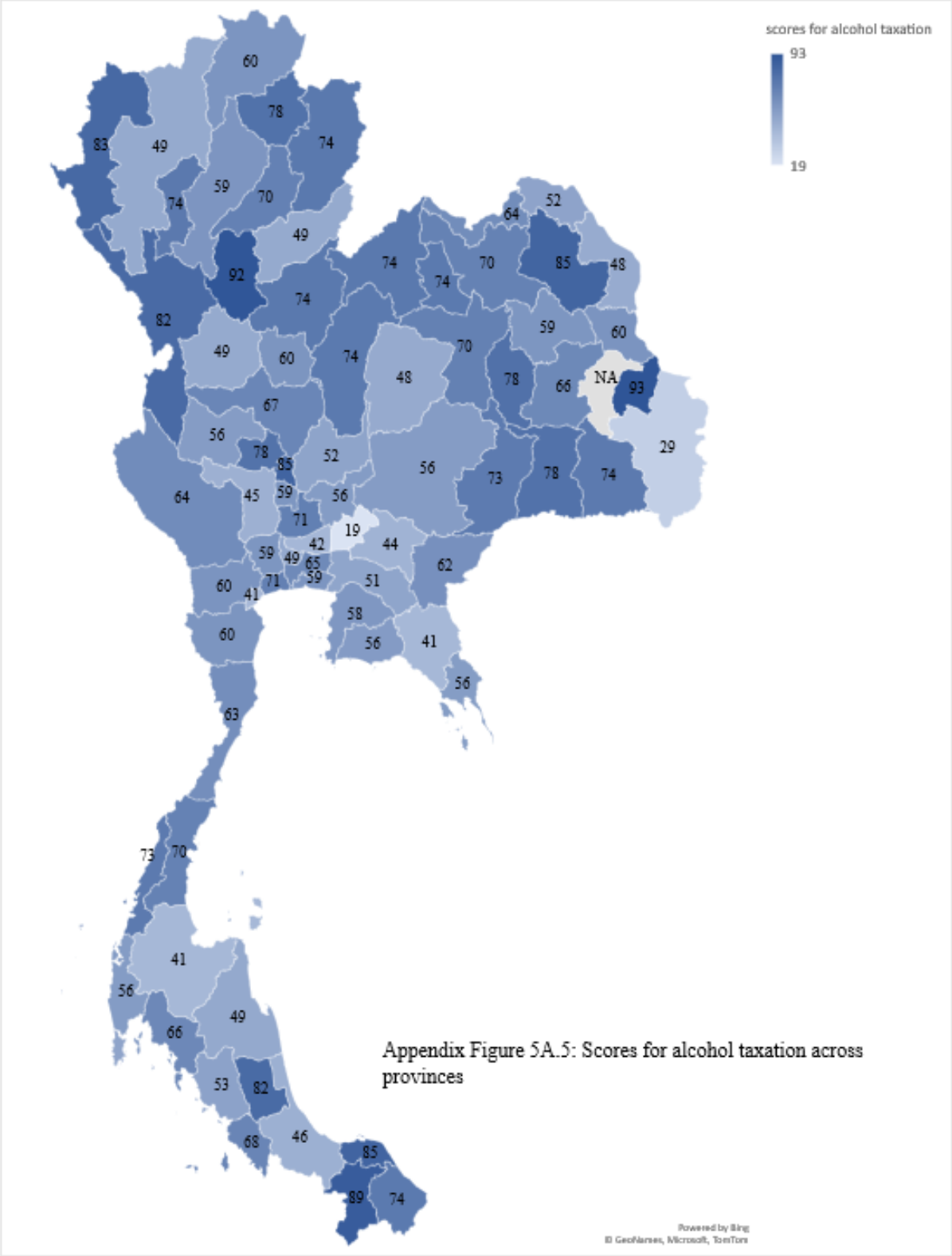


Figure 5A.5 Scores for alcohol taxation across provinces

Table 5A.7 Scores for alcohol taxation across provinces

Provinces	Scores for alcohol taxation
Amnat Charoen	93.1
Sukhothai	92.5
Yala	89.4
Pattani	85.1
Sing Buri	85.1
Sakon Nakhon	84.8
Mae Hong Son	82.5
Tak	81.9
Phatthalung	81.7
Maha Sarakham	78.4
Phayao	78.1
Surin	77.9
Chai Nat	77.6
Phitsanulok	74.4
Loei	74.4
Nan	74.4
Lamphun	74.2
Narathiwat	73.9
Phetchabun	73.8
Nong Bua Lamphu	73.8
Sisaket	73.5
Ranong	73.5
Buri Ram	73.2
Ayutthaya	70.8
Samut Sakhon	70.5
Khon Kaen	70.1
Phrae	70.0
Chumphon	69.7
Udon Thani	69.5
Satun	67.7
Nakorn Sawan	67.4
Krabi	66.2
Roi Et	66.1
Bangkok	65.4
Kanchanaburi	64.2
Nong Khai	63.8
Prachuap Khiri Khan	63.1
Sa Kaeo	61.9
Ratchaburi	59.9
Mukdahan	59.9

Phichit	59.7
Phetchaburi	59.7
Chiang Rai	59.5
Samut Prakan	59.4
Lampang	59.4
Kalasin	59.1
Nakhon Pathom	59.0
Ang Thong	58.9
Chon Buri	58.3
Rayong	56.2
Phang Nga	56.0
Saraburi	56.0
Nakhon Ratchasima	55.8
Uthai Thani	55.7
Trat	55.5
Trang	52.8
Bueng Kan	52.0
Lop Buri	51.7
Phuket	51.5
Chachoengsao	51.1
Nakhon Si Thammarat	49.2
Nonthaburi	48.9
Kamphaengphet	48.7
Chiang Mai	48.7
Uttaradit	48.6
Chaiyaphum	48.5
Nakhon Phanom	47.9
Songkhla	45.5
Suphan Buri	45.2
Prachin Buri	43.7
PathumThani	41.6
Chanthaburi	41.3
Surat Thani	41.2
Samut Songkhram	41.0
Ubon Ratchathani	29.3
Nakhon Nayok	18.7

Table 5A.8 Sensitivity analysis estimating scores and ranking

Province	Scores of the main analysis	Rank of the main analysis	Minimum of scores	Maximum of scores	Minimum of ranking	Maximum of ranking
Nan	79.3	1	76.8	79.3	1	2
Phitsanulok	79.1	2	79.1	80.5	1	2
Amnat Charoen	76.7	3	75.4	76.7	3	5
Sing Buri	75.7	4	74.3	76.3	4	8
Ranong	75.6	5	75.6	76.4	4	5
Surin	75.4	6	75.0	75.4	6	7
Mae Hong Son	75.0	7	74.8	75.5	6	7
Sukhothai	74.5	8	74.4	76.7	3	8
Chumphon	73.6	9	72.7	73.7	9	9
Maha Sarakham	72.6	10	71.2	72.6	10	11
Sakon Nakhon	71.6	11	71.6	72.6	10	11
Satun	69.8	12	63.9	69.8	12	27
Nakhon Ratchasima	69.4	13	68.7	70.1	12	16
Chai Nat	68.8	14	68.6	68.9	14	16
Phayao	68.7	15	68.7	68.7	15	16
Udon Thani	68.5	16	68.5	70.0	12	16
Tak	68.5	17	67.8	68.6	17	17
Krabi	67.8	18	66.2	67.8	18	20
Nong Bua Lamphu	67.5	19	67.0	67.5	19	19
Lamphun	66.5	20	66.5	69.2	14	20
Ang Thong	66.3	21	66.3	67.4	18	22
Loei	66.2	22	61.1	66.2	22	34
Phetchaburi	66.1	23	65.7	66.6	21	23
Khon Kaen	65.5	24	62.1	65.5	24	31
Sa Kaeo	65.1	25	61.0	65.2	24	35
Pattani	64.2	26	64.2	65.0	22	26
Mukdahan	63.7	27	63.3	64.9	22	27

Province	Scores of the main analysis	Rank of the main analysis	Minimum of scores	Maximum of scores	Minimum of ranking	Maximum of ranking
Trang	63.4	28	62.6	63.4	28	30
Roi Et	63.1	29	56.1	63.1	29	55
Yala	62.5	30	62.5	64.1	25	30
Ratchaburi	62.5	31	62.1	64.0	26	33
Sisaket	62.1	32	62.1	64.4	24	32
Bangkok	61.6	33	59.3	62.6	31	40
Nong Khai	61.5	34	61.1	61.6	33	34
Chachoengsao	60.7	35	60.7	63.4	26	35
Samut Prakan	60.4	36	60.4	61.1	36	36
Prachuap Khiri Khan	60.4	37	58.5	60.4	37	44
Kanchanaburi	60.0	38	58.7	60.0	38	42
Buri Ram	60.0	39	56.0	60.0	39	56
Trat	59.8	40	59.8	61.3	32	40
Ayutthaya	59.6	41	59.4	62.4	30	42
Phetchabun	59.6	42	59.5	60.6	37	42
Phatthalung	59.3	43	57.7	59.3	43	48
Phrae	59.1	44	59.1	60.6	37	44
Nakhon Sawan	58.8	45	55.4	58.8	45	59
Chon Buri	58.5	46	58.3	58.5	44	46
Kalasin	58.3	47	58.3	60.0	39	47
Rayong	58.1	48	57.3	58.1	48	50
Samut Sakhon	57.9	49	57.8	58.4	45	49
Chiang Rai	57.5	50	57.5	58.6	43	50
Phichit	57.4	51	56.4	57.4	51	54
Chiang Mai	56.1	52	55.7	56.8	52	58
Lampang	56.0	53	56.0	56.2	53	57
Chaiyaphum	55.8	54	55.2	57.0	51	57
Surat Thani	55.7	55	52.1	55.7	55	66
Bueng Kan	55.7	56	55.7	57.4	49	56

Province	Scores of the main analysis	Rank of the main analysis	Minimum of scores	Maximum of scores	Minimum of ranking	Maximum of ranking
Lop Buri	55.4	57	55.2	55.9	57	59
Phang Nga	55.3	58	55.0	57.9	47	59
Phuket	55.2	59	55.0	55.3	56	60
Nakhon Phanom	54.8	60	54.3	59.1	41	60
Saraburi	54.7	61	53.1	54.7	61	64
Uttaradit	54.5	62	53.6	54.8	61	62
Kamphaengphet	53.4	63	52.7	53.4	63	65
Nakhon Pathom	53.4	64	53.4	53.9	63	64
Suphan Buri	53.1	65	52.2	56.4	54	66
Uthai Thani	53.0	66	53.0	54.3	62	66
Prachin Buri	51.8	67	48.7	51.8	67	70
Samut Songkhram	50.0	68	44.5	50.0	68	74
Nakhon Si Thammarat	49.9	69	49.8	50.2	67	70
Ubon Ratchathani	49.7	70	49.7	50.3	68	70
PathumThani	47.2	71	47.2	48.0	71	71
Nonthaburi	46.6	72	46.0	47.5	72	74
Narathiwat	46.4	73	46.4	50.6	67	73
Chanthaburi	46.2	74	44.9	46.2	73	74
Nakhon Nayok	40.3	75	39.5	41.3	75	75
Songkhla	38.6	76	35.3	39.0	76	76

The sensitivity analysis was based on four methods: 1) the main analysis using weighted scores and applying nearest-neighbour province replacement for missing data 2) using weighted scores and applying median replacement for missing data 3) using unweighted scores and applying nearest-neighbour province replacement for missing data; and 4) using unweighted scores and applying median replacement for missing data

Some variation in ranking resulted from median replacement for missing data

Table 5A.9 Sensitivity analysis: The association between the provincial alcohol control policy implementation capacity index, considering different policy measures, and alcohol consumption patterns, using median replacement.

Variables	Alcohol consumption per capita	Prevalence of alcohol consumption	Proportion of binge drinkers	Proportion of regular drinkers	Prevalence of youth drinkers
PAPIC	-0.02 (-0.03,-0.00)*	0.06 (-0.10,0.22)	-0.09 (-0.36,0.18)	-0.29 (-0.54,-0.04)*	-0.01 (-0.17,0.15)
Alcohol advertising	-0.02 (-0.02,-0.01)*	0.05 (-0.07,0.17)	-0.05 (-0.25,0.16)	-0.30 (-0.48,-0.11)*	0.02 (-0.10,0.14)
Control of physical availability	-0.01 (-0.02,0.00)	0.05 (-0.07,0.17)	-0.00 (-0.21,0.20)	-0.28 (-0.46,-0.09)*	0.07 (-0.05,0.19)
Drink-driving	-0.01 (-0.02,0.00)	0.05 (-0.09,0.19)	-0.11 (-0.35,0.13)	-0.08 (-0.31,0.15)	-0.03 (-0.17,0.11)
Alcohol taxation	-0.01 (-0.01,0.00)	-0.00 (-0.10,0.09)	-0.05 (-0.21,0.11)	-0-03 (-0.18,0.13)	-0.05 (-0.14,0.04)

*p-value<0.05; The models were adjusted for Gross Provincial Products, areas of tourism, regions, and percent of Muslim population

Table 5A.10 Sensitivity analysis: The association between the provincial alcohol control policy implementation capacity index (PAPIC), considering different policy measures, and alcohol-related harms, using median replacement.

Variables	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among females	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among females	IRR (95%CI) RTI rates	IRR (95%CI) RTI death rates
PAPIC	1.00 (0.99, 1.01)	1.00 (0.99,1.02)	0.99 (0.98,1.01)	0.99 (0.97,1.02)	1.00 (0.97,1.03)	1.01 (0.98,1.03)
Alcohol advertising	1.00 (1.00, 1.01)	1.00 (0.99,1.02)	1.00 (0.98,1.01)	0.99 (0.97,1.01)	1.01 (0.98,1.03)	1.01 (0.99,1.03)
Control of physical availability	1.00 (0.99,1.01)	1.00 (0.98,1.01)	1.00 (0.99,1.01)	1.00 (0.98,1.02)	1.00 (0.98,1.02)	1.01 (0.99,1.02)
Drink-driving	1.00 (0.99,1.01)	1.01 (0.99,1.02)	0.99 (0.98,1.01)	1.01 (0.98,1.03)	1.00 (0.98,1.03)	1.01 (0.98,1.03)
Alcohol taxation	1.00 (1.00,1.01)	1.00 (0.99,1.02)	1.00 (0.99,1.00)	1.00 (0.98,1.01)	0.99 (0.98,1.01)	0.99 (0.98,1.01)

IRR: incident rate ratio; The models of age standardization of alcoholic liver cirrhosis were adjusted for region and population percentage of Muslims; The models of rates of alcohol-related road traffic injuries were adjusted for region.

Table 5A.11 Sensitivity analysis: The association between the provincial alcohol control policy implementation capacity index, considering different policy measures, and alcohol consumption patterns, applying unweighted scores

Variables	Alcohol consumption per capita	Prevalence of alcohol consumption	Proportion of binge drinkers	Proportion of regular drinkers	Prevalence of youth drinkers
PAPIC	-0.02 (-0.03,-0.00)*	0.05 (-0.11,0.21)	-0.04 (-0.31,0.23)	-0.31 (-0.56,-0.06)*	-0.02 (-0.18,0.14)
Alcohol advertising	-0.02 (-0.03,-0.00)*	0.03 (-0.10,0.16)	-0.01 (-0.24,0.21)	-0.31(-0.52,-0.11)*	-0.01 (-0.14,0.12)
Control of physical availability	-0.01 (-0.02,0.00)*	0.04 (-0.09,0.17)	0.02 (-0.20,0.23)	-0.32 (-0.52,-0.13)*	0.05 (-0.08,0.18)
Drink-driving	-0.01 (-0.02,0.00)	0.06 (-0.07,0.20)	-0.12 (-0.35,0.11)	-0.12 (-0.34,0.11)	-0.04 (-0.17,0.10)
Alcohol taxation	-0.01 (-0.02,0.00)	0.00 (-0.10,0.10)	-0.00 (-0.18,0.17)	-0-06 (-0.22,0.11)	-0.04 (-0.14,0.06)

*p-value<0.05; The models were adjusted for Gross Provincial Products, areas of tourism, regions, and percent of Muslim population

Table 5A.12 Sensitivity analysis: The association between the provincial alcohol control policy implementation capacity index, considering different policy measures, and alcohol-related harms, applying by applying unweighted scores.

Variables	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of morbidity of alcoholic liver cirrhosis among females	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among males	IRR (95%CI) Age standardization of mortality of alcoholic liver cirrhosis among females	IRR (95%CI) RTI rates	IRR (95%CI) RTI death rates
PAPIC	1.00 (0.99, 1.02)	1.01 (0.99,1.02)	0.99 (0.98,1.01)	0.99 (0.97,1.02)	1.01 (0.98,1.04)	1.01 (0.98,1.03)
Alcohol advertising	1.00 (1.00, 1.01)	1.00 (0.99,1.02)	0.99 (0.98,1.01)	0.99 (0.97,1.01)	1.01 (0.99,1.03)	1.01 (0.99,1.03)
Control of physical availability	1.00 (0.99,1.01)	1.00 (0.98,1.01)	0.99 (0.98,1.00)	1.00 (0.98,1.02)	1.01 (0.98,1.03)	1.01 (0.99,1.03)
Drink-driving	1.01 (1.00,1.02)	1.01 (0.99,1.03)	1.00 (0.99,1.01)	1.01 (0.99,1.03)	1.01 (0.99,1.04)	1.00 (0.99,1.03)
Alcohol taxation	1.00 (1.00,1.01)	1.00 (0.99,1.01)	1.00 (0.99,1.00)	0.99 (0.98,1.01)	0.99 (0.98,1.01)	0.99 (0.98,1.01)

IRR: incident rate ratio; The models of age standardization of alcoholic liver cirrhosis were adjusted for region and percent of Muslim; The models of rates of alcohol-related road traffic injuries were adjusted for region.

Table 5A. 13 List of indicators, sources of data and measurement of indicators

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
		Policy capacity				
		Political capacity				
1.	PA,AD, PRICE,DD*	Prioritizing alcohol policy (policy priority) by policy makers	Establishment of written policy	Survey the agencies (An officer at Provincial Office of Ministry of Public Health and a civil society member)	Yes/No	70.1-70.2
2.	PA,AD, PRICE,DD*	Having individuals who create policy changes (Policy champion)	Number of policy champions	Survey the Agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, Provincial Office of Excise Department, and a civil society member)	Number of people	79
Political accountability refers to the responsibility for one's roles and actions within the government sector, with a focus on transparency. To achieve political accountability, government agencies must have practices that involve openness in disclosing information, communicating with the public, engaging relevant stakeholders from both the public and private sectors, and implementing social monitoring and reporting of performance outcomes (Bellamy & Palumbo, 2016; World Health Organization, 2019b). However, this study focused on the multisectoral coloration as it reflects working mechanism at provincial levels.						
		Multisectoral collaboration/participation of civil society members				

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
3.	PA,AD		Establishment of Sub-committee of the Provincial Alcoholic Beverage Control Committee (Provincial Committee) with engagement of civil society members	Survey the Agencies (An officer at Provincial Office of Ministry of Public Health, and a civil society member)	Yes/No	70.3
4.	DD		Establishment of Sub-Committee on Provincial Road Safety Committee on Law enforcement	Survey the agencies (An officer at Provincial Office of Mitigation and Disaster Management)	Yes/No	70.4
		Analytical capacity or technical capacity				

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
5.	PA,AD,DD	Technical support	Number of technical support persons	Survey the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, Provincial Office of Excise Department, and a civil society member)	Number of technical support persons	29
6.	PA,AD		Number of lawyers who provide legal support	Survey the agency (An officer at Provincial Office of Ministry of Public Health)	Number of lawyers who provide legal support	28
		Operational capacity				
7.	PA,AD,DD	Communication channels between organizations	Establishment of communication channel	Survey the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, Provincial Office of Excise Department, and a civil society member)	Yes/No	41

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
8.	PA, AD, PRICE	Personnel or staff	Number of officers who enforce specific laws per 1,000 alcohol outlets	Survey the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Excise Department Secondary data on number of alcohol outlets from Excise Department	The number of law enforcement personnel per 1000 of alcohol outlets. Number of law enforcement personnel per 1000 of alcohol outlets = (number of personnel/number of alcohol outlets) *1000	Alcohol advertisement and control of physical availability: questions number 13 Taxation: question number 15
9.	PA, AD, PRICE		Number of officers who support implementation of specific laws per 1,000 alcohol outlets	Survey the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Excise Department Secondary data: alcohol outlets from Excise Department	The number of personnel who supported law enforcement = (number of personnel/number of alcohol outlets)*1000	Alcohol advertisement and control of physical availability: questions number: question number 10 subtracted by question number 13 and question number 22

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
						Taxation: question number 11 subtracted by question number 15 and question number 24
10.	PA,AD, DD		Budget for law enforcement per capita	Survey the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, and a civil society member)	The budget for law enforcement per capita= budget for law enforcement/population aged 15 and above	Alcohol advertisement and control of physical availability: questions number 32-33 Drink-driving counter measures: question number 36-37 Taxation: question

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
						number 34-35
11.	DD		Number of officers who enforce drink-driving measures per 100,000 driving licenses	Officer at Provincial Office of Royal Thai Police Secondary data: Ministry of Transportation	Number of police officers per driving license=(number of officers who enforce drink-driving measures/driving license)*100,000	Drink-driving counter measures: question number 17
12.	DD		Number of officers who support implementation of drink-driving measures per 100,000 driving licenses	Survey agencies (An officer at Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, and a civil society member)	Number of personnel per driving license= (number of officers who support implementation of drink-driving measures /driving license)*100,000	Drink-driving counter measures: question number 19, 20, and 26

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
13.	DD		Sufficiency of alcohol breathalysers	Surveying agencies (An officer at Provincial Office of Mitigation and Disaster Management, and Provincial Office of Royal Thai Police)	Likert scale (level of adequacy1-10 1 means the least sufficient and 10 means the most sufficient)	68
14.	DD		Number of alcohol breathalysers per 100,000 driving licenses	Survey the agencies (An officer at Provincial Office of Royal Thai Police) Secondary data on numbers of driving licenses from Ministry of Transportation	the number of breathalysers devices per 100,000 driving licenses= (number of breathalysers devices/driving license)*100,000	67
		Implementation process				
15.	PA,AD,DD,PRICE	Evidence-based actions	Using evidence-based action, using evidence for decision making, planning, and action	Survey the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, Provincial Office of Excise Department, and a civil society member)	Yes/No	76

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
16.	PA, AD	Multisectoral collaboration	Frequency of meetings of the Provincial Committee	Survey the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency of meetings	72
17.	PA,AD		Frequency of meeting of sub-committee of the Provincial Committee	Survey the agencies (an officer at Provincial Office of Ministry of Public Health)	Frequency of meetings	73
18.	DD		Frequency of having agenda on drink-driving during meetings of the Provincial Road Safety Committee or Sub-Committee of the Provincial Road Safety Committee on Law Enforcement	Survey the agencies (An officer at Provincial Office of Mitigation and Disaster Management)	Frequency of having agenda	74
19.	PA, AD,DD,PRICE	capacity building	Number of staff trained on law content and law enforcement	Surveying the agencies (An officer at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, Provincial Office of Excise Department)	The number of participants per year	Alcohol taxation: question number 46 Alcohol advertisement: question number 54

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
						Physical availability: question number :60 Drink-driving: question number 66
20.	PA,AD, DD,PRICE	education/raising awareness/publicizing	Number of activities around providing education/raising awareness for the public and alcohol outlets	Survey the agencies (an officers at Provincial Office of Ministry of Public Health, Provincial Office of Mitigation and Disaster Management, Provincial Office of Royal Thai Police, Provincial Office of Excise Department, and a civil society member)	Number of activities	Alcohol taxation: question number 47-48 Alcohol advertisement: question number 55-56 Physical availability: question number 61-62 Drink-driving: question number 69

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
21.	AD		Intensity: Frequency of law enforcement at social events or festivals at provincial level	Surveying the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency per social event = frequency of inspections/ number of social events	51
22.	AD		Intensity: Frequency of online monitoring of alcohol advertising violation	Surveying the agency (An officer at Provincial Office of Ministry of Public Health and a civil society member)	Frequency per year	53
23.	AD		Intensity: Frequency of outlet inspection regarding alcohol advertising control	Surveying the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency per year	52
24.	AD		Coverage: Percentage of alcohol outlets that have been inspected regarding alcohol advertising control	Surveying the agency (An officer at Provincial Office of Ministry of Public Health) Secondary data: number of alcohol outlets in province from the Excise Department	Numbers of alcohol outlets that were inspected/numbers of outlets in the province	52
25.	AD		Intensity: Percentage of reported cases that have been prosecuted	Secondary data: Office of Alcoholic Beverage Control Committee	Percent	-

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
			regarding alcohol advertising control			
26.	PA		Intensity: Frequency of outlet inspection regarding alcohol sales in certain places	Surveying the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency	59a
27.	PA		Intensity: Frequency of outlet inspection regarding control of alcohol sales on certain days	Surveying the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency	59d
28.	PA		Intensity: Frequency of outlet inspection regarding control of alcohol sales at certain times	Surveying the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency	59e
29.	PA		Intensity: Frequency of outlet inspection regarding control of alcohol sales to underage drinkers	Surveying the agency (An officer at Provincial Office of Ministry of Public Health)	Frequency/year	59c

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
30.	PA		Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales on certain days	Surveying the agency (An officer at Provincial Office of Ministry of Public Health) Secondary data: alcohol outlets from the Excise Department	Percent	59d
31.	PA		Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales at certain times	Surveying the agency (An officer at Provincial Office of Ministry of Public Health) Secondary data: alcohol outlets from the Excise Department	Percent	59e
32.	PA		Coverage: Percentage of outlets that have been inspected by officers regarding restriction of alcohol sales to underage drinkers	Surveying the agency (An officer at Provincial Office of Ministry of Public Health) Secondary data: alcohol outlets from the Excise Department	Percent	59c

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
33.	PA		Percentage of reported cases that have been prosecuted regarding physical availability control	Secondary data: Office of Alcoholic Beverage Control Committee	Percent	-
34.	DD		Frequency of law enforcement by setting up sobriety check points	Survey the agency (An officer at Provincial Office of Royal Thai Police)	Frequency of law enforcement by setting up sobriety check points per year	65
35.	DD		Coverage: Percentage of drivers who have experienced alcohol breath testing	Secondary data from National Statistical Office	Percent	-
36.	PRICE		Intensity: Frequency of law enforcement among alcohol outlets regarding the Excise Act B.E.2560 (2017) and related ministerial regulations	Survey the agencies (An officer at Provincial Office of Excise Department)	Frequency/year	45

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
37.	PRICE		Coverage: Percentage of outlets that have been inspected by officers regarding the Excise Act B.E.2560 (2017) and related ministerial regulations	Survey the agencies (An officer at Provincial Office of Excise Department) Secondary data on licenses of alcohol sales from Excise Department	Percentage	45
		Impact These following variables are used as the outcomes of the indices.				
38.		Alcohol consumption per drinkers	Alcohol consumption in grams per days	Secondary data: Smoking and Drinking Behavior in 2017, Survey National Survey with provincial representative samples, National Statistical Office	Alcohol consumption in grams per day	-
39.		Drinking behaviour or Alcohol consumption behaviour	The prevalence of alcohol consumption among individuals aged 15 years and above	Secondary data: Smoking and Drinking Behavior in 2017, Survey National Survey with provincial representative samples, National Statistical Office	Percent	-

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
40.			The prevalence of heavy drinking (consuming more than 50 grams of alcohol in a single occasion)	Secondary data: Smoking and Drinking Behavior in 2017, Survey National Survey with provincial representative samples, National Statistical Office	Percent	-
41.			Proportion of regular drinkers (weekly drinkers)	Secondary data: Smoking and Drinking Behavior in 2017, Survey National Survey with provincial representative samples, National Statistical Office	Percent	-
42.			Prevalence of youth drinkers (15-19 years)	Secondary data: Smoking and Drinking Behavior in 2017, Survey National Survey with provincial representative samples, National Statistical Office	Percent	-
43.		Consequences of alcohol consumption	The overall rate of injuries related to alcohol consumption	Secondary data: Collaboration Center for Injury Data, Department of Disease Control, Ministry of Public Health, Thailand	Road traffic injuries= (road traffic injuries/total population) *100,000	-
44.			The overall rates of death due to road traffic injuries related to alcohol consumption	Secondary data: Collaboration Center for Injury Data, Department of Disease Control, Ministry of Public Health, Thailand	Death rates due to road traffic injuries related to alcohol consumption=	-

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
					(road traffic injuries/total population) *100,000	
45.			Aged standardised rates of morbidity of alcoholic liver cirrhosis among males and females, separately. ICD-10: K70	Secondary data: Ministry of Public Health	Direct aged-standardisation of alcoholic liver cirrhosis is estimated by using step below. 1. Estimate morbidity rates = number of patients/population in each age groups in each province 2. Use estimated morbidity rates to find expected numbers of patients by using estimated morbidity rates multiply	-

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
					by Thai population in each age group 3. Aged standardized morbidity is estimated by use total expected inpatient divided by total Thai population(Naing, 2000) 4. Multiplied by 100,000 to estimate the rates per 100,000 people	
46.			Aged standardised rates of mortality of alcoholic liver cirrhosis among males and females, separately. ICD-10: K70	Secondary data: Ministry of Public Health	Direct aged-standardisation of alcoholic liver cirrhosis is estimated by using step below.	-

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
					1. Estimate mortality rates = number of deaths/population in each age groups in each province 2. Use estimated mortality rates to find expected deaths by using estimated mortality rates multiply by Thai population in each age group 3. Aged standardized mortality rates is estimated by using total expected	

Number	Policies	Main domains/sub-domains	Indicators	Source of data	Measurement	Number in the questionnaire
					death divided by total Thai population (Naing, 2000) 4. Multiplied by 100,000 to estimate the rates per 100,000 people	
		Contextual factors				
47.			Gross Provincial Products (GPP)	Secondary data: Office of the National Economic and Social Development Council	Thai baht per capita	-
48.			Percent of Muslim population	Secondary data: National Statistical Office	Percent	-
49.			Areas of tourism	Secondary data: Ministry of Tourism and Sports	Provinces located in tourist areas/non-tourist areas.	-
50.			Regions	Secondary data: National Statistical Office	1, Central, 2 North, 3Norhteast, and 4 South	-

Questionnaires

Supplementary 2: Questionnaires
Provincial Alcohol Control Policy Implementation Project

Information sheet:

The study on alcohol policy implementation at the provincial level is a part of the project "Public policies, laws and non-communicable diseases in Thailand: a policy implementation and system research". This project is conducted by the International Health Policy Program under the Ministry of Public Health, in collaboration with the Office of the Alcoholic Beverage Control Committee, the Department of Disease Control, and the Alcohol Policy and Health Promotion Research Unit at Mahasarakham University, Faculty of Pharmacy. The research is supported by research funding from the Thailand Science Research and Innovation.

The study on alcohol policy implementation at the provincial level aims to investigate how alcohol policies are implemented at the provincial level. It focuses on studying the policies related to taxation and pricing, physical availability control (control of days, hours, locations, and sales to individuals under the age of 20), marketing and advertising control, and drink-driving control.

The study is conducted using document analysis, key informant interviews with key stakeholders involved, and expert meetings to develop tools for assessing policy implementation and conducting questionnaires in agencies operating at the provincial level. These agencies are primarily responsible for enforcing the laws related to the control of alcohol consumption. The relevant laws include the Alcoholic Beverage Control Act B.E.2551 (2008), the Excise Act B.E.2560 (2017), and the Land Traffic Act B.E.2522 (1979), as well as collecting secondary data to create an index for evaluating policy implementation at the provincial level. The ultimate goal is to use this information to drive the development of alcohol control measures at the provincial level.

The questionnaire consists of 8 sections, including:

1. General information of the respondents.
2. Information on the provincial policy implementation structure for alcohol.
3. Taxation and pricing measures.
4. Marketing and advertising control measures.
5. Physical availability control measures.
6. Drink-driving control measures.
7. Structural factors supporting policy implementation.
8. Support received from alcohol businesses.

The research team kindly requests approximately 30-60 minutes of your time to complete the questionnaire. You have the right to refuse to participate or withdraw at any time during the survey. All information collected will be kept strictly confidential and will only be presented in an aggregated form for the research study. The research project has been approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University (Approval No. 166-100/2022). As a token of appreciation for your participation, the research team will provide a compensation of 300 Baht, which will be transferred to your account after completing the questionnaire.

Therefore, we kindly request your cooperation in providing information relevant to your involvement and opinions for the benefit of ongoing policy development and evaluation related to alcohol. If you have any questions, please feel free to contact the main researchers at any time. Ms. Jintana Jankhotkaew at the International Health Policy Program, Ministry of Public Health, Tiwanon Road, Muang District, Nonthaburi 11000, Thailand. Office phone: 02 590 2379 or 085 6636 004, Fax: 02 590 2380, Email: jintana@ihpp.thaigov.net or Research Assistant, Ms. Romtawan Kalapathana, Phone: 091 4999 619, Email: romtawan.k@ihpp.thaigov.net.

Instruction for filling in questionnaires

Please answer the questions truthfully based on your own experiences or actions taken by your province to reflect the implementation in your area as accurately as possible. If there are any questions that you or your province have not addressed, please feel free to skip those questions. Your responses in the survey will be considered as a representation of the province's actions. If possible, kindly collaborate by attaching additional documents such as annual reports or reports from meetings of the provincial alcohol control committee. You can send these documents via email to jintana@ihpp.thaigov.net or send them to the address of the main researcher mentioned above. These documents will contribute to further research endeavors.

Questions	**Organisation***
Section 1: General information of the respondents	
1. Currently, which province are you working in?.....	all
2. Respondents [ ] a. The Director of the Provincial Office of Ministry of Public Health or representative [ ] b. The Chief of Provincial Office of Royal Thai Police or representative [ ] c. Director of Provincial Office of Disaster Prevention and Mitigation or representative [ ] d. The Director of Provincial Office of Excise Department in the area or representative [ ] e. Civil society members or representative of StopDrink network	all

Questions	Organisation*
3. Position.....	all
4. Name- Surname.....	all
5. Mobile phone.....	all
6. Email address.....	all
7. Please provide the duration of your work related to alcohol (if less than 1 year, please specify as 0). ..... year	all
8. Please provide the duration of your work related to alcohol policy in your current area/province (if less than 1 year, please specify as 0)……..year	all
9. Please provide your role in implementing alcohol policy at the provincial level.....	all
Section 2 : Information on the provincial structure and the implementation of alcohol policy. For the following questions, please use the timeframe from January 1, 2019, to December 31, 2019.	
Alcohol control policy includes tax and pricing policies, physical access control (regulating days, hours, and locations of alcohol sales and restricting sales to individuals under 20 years old), marketing and advertising control, and measures to prevent drinking and driving. **2.1 Human resources**	
10. In your province, how many of the total number of personnel supporting law enforcement or law enforcement according to the Alcoholic Beverage Control Act B.E. 2551 (2008) (excluding civil society members) during the period from January 1, 2019, to December 31, 2019? [ ] Number of people.....[ ] 0. None [ ] No data	moph
11. In your province, how many of the total number of personnel supporting law enforcement or law enforcement according to the following laws: the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017) (excluding civil society members) during the period from January 1, 2019, to December 31, 2019?	excise

Questions	Organisation*
[ ] Number of people.....[ ] 0. None [ ] No data	
12. In your province, how many of the total number of personnel supporting or enforcing the law according to the Land Traffic Act B.E. 2522 (1979) and related ministerial regulations (law enforcement personnel, personnel supporting law enforcement, researchers providing data support, and lawyers supporting law enforcement) during the period from January 1, 2019, to December 31, 2019? [ ] Number of people?.....[ ] 0. None [ ] No data	Police and mitigation
13. In your province, how many law enforcement officers were there who were responsible for enforcing the Alcoholic Beverage Control Act B.E. 2551 (2017) and held official identification cards/appointments from the provincial governor and performed their duties during the period from January 1, 2019, to December 31, 2019? [ ] Total number of people.....people [ ] 0. None [ ] No data From Provincial Office of Ministry of Public Health/Health Office in Bangkok, the number is.....people From other government agencies, please specify.....number of persons..... persons	moph
14. If you estimate that out of 100 units of time worked by the staff from the Provincial Office of Ministry of Public Health/Health Office in Bangkok, they spent a certain percentage of time on law enforcement activities related to the Alcoholic Beverage Control Act B.E.2551 (2008) (including activities such as coordinating with relevant agencies, conducting inspections, team meetings for inspections, and summarizing inspection results), what percentage would that be during the period from January 1, 2019, to December 31, 2019? (In one month, the total number of inspections is 5 times per week, and each inspection takes an average of 3 hours. So, the total time spent is 5 x 3 = 15 hours. In general, the total working days in a month are 20, and there are 8 hours of work per day. The total time spent working is 160 hours. Therefore, the time spent on law enforcement is (15/160) x 100 = 9.37 percent.) ..... per cent	moph
15. In your province, there are how many personnel who are authorized to enforce the law, hold an officer card, and carry out duties of inspecting compliance with the following laws: the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017), during the period from 1 January 2019 to 31 December 2019? [ ] Number of personnel.....people [ ] 0. None [ ] No data	excise
16. How many days per month and how many hours per day, on average, do officers with official credentials for enforcing the laws, the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the	excise

Questions	Organisation*
Production of Liquor B.E. 2560 (2017), spend on duties related to inspecting shops or distilleries, team meetings for inspections, and summarizing inspection results? Please provide the number of days and hours for the month of January 2019 to December 2019. (If less than 1 hour, please indicate as 1 hour. If never, please specify as 0.) Number of days.....days/month and time spent.....hours per day.	
17. In your province, how many law enforcement officers are there who are responsible for enforcing the law on controlling drinking and driving, according to the Land Traffic Act B.E.2522 (1979) and relevant ministerial regulations, and are involved in setting up checkpoints for alcohol detection (traffic police and crime suppression officers) during the period from January 1, 2019, to December 31, 2019? Please specify the number of officers. Number of people.....people [ ] 0. None [ ] No data	police
18. Traffic police and crime suppression officers, who are responsible for enforcing the Land Traffic Act B.E. 2522 (1979) and relevant ministerial regulations (including setting up checkpoints for breath alcohol detection, conducting team meetings for checkpoint setup, and summarizing checkpoint activities), approximately how many days per month and how many hours per day did they work during the period from January 1, 2019, to December 31, 2019? (If it is less than 1 hour, please enter 1 hour. If never, please specify 0)." Number of days.....days/month and time spent.....hours per day.	police
19. In your province, how many volunteer traffic police officers supported the enforcement of the Land Traffic Act B.E. 2522 (1979) and relevant ministerial regulations (by setting up checkpoints for breath alcohol detection) during the period from January 1, 2019, to December 31, 2019? [ ] Number of people.....people [ ] 0. None [ ] No data	police
20. In your organization, how many officers supported the enforcement of the Land Traffic Act B.E. 2522 (1979) and relevant ministerial regulations (such as coordinating law enforcement on drinking and driving and participating in setting up checkpoints) during the period from January 1, 2019, to December 31, 2019? [ ] Number of people.....people [ ] 0. None [ ] No data	mitigation
21. The staff members in your organization who support the enforcement of the law on controlling drinking and driving, as stipulated in the Land Traffic Act B.E.2522 (1979) and related ministerial regulations (such as coordinating law enforcement related to drinking and driving, and setting up breathalyzer checkpoints in support of law enforcement), approximately how many days per month and how many hours per day did they work during the period from January 1, 2019, to December 31, 2019? (If less than 1 hour, please indicate 1 hour. If never, please specify 0.)	mitigation

Questions	Organisation*
Number of days.....days/month and time spent.....hours per day.	
22. In your province, there is a civil society member that supports law enforcement according to the Alcoholic Beverage Control Act B.E.2551 (2008), such as coordinating with the government sector for law enforcement, monitoring violations, filing complaints, and collecting data during the period from January 1, 2019, to December 31, 2019. How many people were involved in these activities? [ ] Number of people.....people [ ] 0. None [ ] No data	cso
23. In your overall working hours, the time you spent supporting law enforcement activities related to the Alcoholic Beverage Control Act B.E.2551 (2008) (such as coordinating with the government sector for law enforcement, monitoring violations, filing complaints, and collecting data) during the period from 1st January 2019 to 31st December 2019 accounted for what percentage of your total working time? For example, let's say in one month, you supported law enforcement activities related to the Alcoholic Beverage Control Act of 2008 a total of 5 times. On average, each of these activities took 3 hours. So, the total time spent would be 5 x 3 = 15 hours. Assuming you worked a total of 20 days per month, with 8 hours of work per day, your total working time would be 160 hours. To calculate the percentage, you would do: (15/160) x 100 = 9.37%. .....per cent	cso
24. In your province, there is a civil society member that supports law enforcement according to the following laws: the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017). This support includes coordinating with the government sector for law enforcement, monitoring violations, filing complaints, and collecting data during the period from 1st January 2019 to 31st December 2019. How many people were involved in these activities? [ ] Number of people.....people [ ] 0. None [ ] No data	cso
25. In the total working hours, the time you spent on supporting the enforcement of the following laws: the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017) (Supporting law enforcement activities such as coordinating with government agencies, monitoring violations, lodging complaints, and collecting information) during the period from 1 January 2019 to 31 December 2019 is what percentage of the total working hours? (For example, in one month, you spend time supporting law enforcement activities related to the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017),	cso

Questions	Organisation*
a total of 5 times per week, and each time takes an average of 3 hours. So, the total time spent is 5 times x 3 hours = 15 hours. In general, the total working days in a month are 20, and there are 8 hours of work per day. The total time spent working is 160 hours. Therefore, the time spent on supporting law enforcement activities is (15/160) x 100 = 9.37 percent). .....per cent	
26. In your province, there is a civil society member that supports law enforcement in controlling drinking and driving (excluding traffic volunteers) according to the Land Traffic Act B.E. 2522 (1979), and related ministerial regulations. They are involved in activities such as setting up checkpoints for alcohol testing, coordinating with the government sector for law enforcement, monitoring violations, filing complaints, collecting data, and supporting the establishment of checkpoints (excluding traffic volunteers) during the period from 1st January 2019 to 31st December 2019. How many people were involved in these activities? [ ] Number of people.....people [ ] 0. None [ ] No data	cso
27. In your overall working hours, the time you spent on supporting law enforcement in controlling drinking and driving (activities for supporting law enforcement includes supporting checkpoints, coordinating with governmental sectors, monitoring violation of the laws, reporting on suspected cases, data collection), according to the Land Traffic Act B.E. 2522 (1979), and related ministerial regulations, during the period from 1st January 2019 to 31st December 2019 accounted for what percentage of your total working time? For example, if in one month, you supported law enforcement in controlling drinking and driving a total of 5 times, and each activity took an average of 3 hours, the total time spent would be 5 x 3 = 15 hours. Assuming you worked a total of 20 days per month, with 8 hours of work per day, your total working time would be 160 hours. To calculate the percentage, you would do: (15/160) x 100 ≈ 9.37%. ..... per cent	cso
28. In your organization, how many legal professionals are there who support or engage in the enforcement of the Alcoholic Beverage Control Act B.E.2551 (2008)? These legal professionals may provide consultations and advice, interpret laws, and handle legal cases in court, among other responsibilities, during the period from 1st January 2019 to 31st December 2019. [ ] Number of people.....people [ ] 0. None [ ] No data	moph
29. In your province, how many academia or staff members perform the following duties during the period from 1st January 2019 to 31st December 2019: ➢ Supporting data-related tasks (e.g., monitoring establishments selling alcoholic beverages, monitoring service establishments for law violations, shops selling	all

Questions	Organisation*
alcoholic beverages near accident-prone areas related to drinking, positions of shops, repeat offenders, etc.). ➢ Supporting research and academic work for the enforcement of laws controlling alcoholic beverage consumption. ➢ Supporting data for public relations campaigns to promote law compliance, such as regional-level and provincial-level researchers, university professors, etc. [ ] Number of people.....people [ ] 0. None [ ] No data	
2.2 Budget 30. In your province, was there a budget allocated to support the control of alcoholic beverage consumption during the period from 1st January 2019 to 31st December 2019? [ ] 1. Yes [ ] No	all
31. In your province, what is the total budget allocated for controlling alcoholic beverage consumption? [ ] 1. If available, please specify the source of the budget. [ ] 0. Not available. [ ] No data. a. From the Thai Health Promotion Foundation, the amount is ..... baht. b. From the Thai Health Promotion Foundation, supported through the Department of Disease Control, Ministry of Public Health, the amount is ..... baht (excluding the amount mentioned in item a) c. From other sources, please specify ..... and the amount is ..... baht.	all
32. In your province, there is a budget for the enforcement of the Alcoholic Beverage Control Act B.E. 2551 (2008) which includes expenses such as coordination with other agencies for inspections, inspection costs, team meeting expenses, and remuneration for officers involved in inspections. The budget amount is ..... baht. [ ] 1. If available, please specify the source of the budget. [ ] 0. Not available. [ ] No data. a) From the Thai Health Promotion Foundation, the amount is ..... baht. b) From the Thai Health Promotion Foundation, supported through the Department of Disease Control, Ministry of Public Health, the amount is ..... baht (excluding the amount mentioned in item a). c) From other sources, please specify ..... and the amount is ..... baht.	moph, cso
33. In your province, is there a budget allocated for public relations campaigns related to the enforcement of the Alcoholic Beverage Control Act B.E.2551 (2008)? This budget	moph, cso

Questions	Organisation*
includes expenses for producing media materials (signs, stickers) and promoting content related to the law (excluding the budget for law enforcement in item 32). If there is a budget, please specify the amount in baht. Amount: ..... baht. [ ] 1. If available, please specify the source of the budget. [ ] 0. Not available. [ ] No data. a. From the Thai Health Promotion Foundation, the amount is ..... baht. b. From the Thai Health Promotion Foundation, supported through the Department of Disease Control, Ministry of Public Health, the amount is ..... baht (excluding the amount mentioned in item a). c. From other sources, please specify ..... and the amount is ..... baht.	
34. In your province, is there a budget allocated for enforcing the following laws: the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017)? This budget includes expenses for coordination with other agencies for inspections, inspection costs for alcohol-selling establishments/producers, inspection meetings, and reporting on inspections. If there is a budget, please specify the amount in baht. Amount: ..... baht [ ] 1. If available, please specify the source of the budget. [ ] 0. Not available. [ ] No data.	excise, cso
35. In your province, is there a budget allocated for public relations campaigns related to the enforcement of the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017)? This budget includes expenses for producing media materials (posters, stickers) and public relations campaigns related to the content of the laws (excluding the budget for law enforcement under Section 34) If there is a budget, please specify the amount in baht. Amount of money: ..... baht [ ] 1. If available, please specify the source of the budget. [ ] 0. Not available. [ ] No information available.	excise,cso

Questions	Organisation*
36. In your province, is there a budget allocated for enforcing the Land Traffic Act B.E. 2522 (1979) and related ministerial regulations (e.g., coordination expenses with other agencies for inspections, expenses for setting up checkpoints, team meeting expenses for checkpoint establishment)? If yes, please specify the budget amount. [ ] 1. Please specify the source of the budget. [ ] 0. Not available [ ] No data	police, mitigation, cso
37. How much budget is allocated for public relations campaigns related to law enforcement under the Land Traffic Act of 2522 B.E. (1979) and related ministerial regulations, such as production costs for media materials (signs, stickers) and public awareness campaigns related to legal content (excluding the budget for law enforcement under Section 36)? Amount of money .....baht [ ] 1. Please specify the source of the budget. [ ] 0. Not available [ ] No data	police, mitigation, cso
2.3 Data Systems and Communication 38. In your province, are there any data to support law enforcement during the period from 1 January 2019 to 31 December 2019? If yes, please provide the information (multiple answers are possible). [ ] 1. Shops selling alcoholic beverages or entertainment establishments that need to be monitored for law violations. [ ] 2. Shops selling alcoholic beverages near accident-prone areas or accidents related to drinking. [ ] 3. Alcohol outlet location [ ] 4. Repeat offenders. [ ] 5. Data of drivers under the influence [ ] 6. Other please specify..... [ ] No data available [ ] Do not know	all
39. In your province, was there a provincial-level survey on alcohol control during the period of 1st January 2019 to 31st December 2019, excluding surveys conducted by the National Statistical Office? (Multiple answers are possible.) [ ] 1. Compliance with alcohol control laws. [ ] 2. Violation of alcohol control laws. [ ] 3. Alcohol consumption. [ ] 4. Impacts of alcohol consumption. [ ] 5. Awareness and attitudes towards alcohol control laws/measures.	all

Questions	Organisation*
[ ] 6. Attitudes towards alcohol consumption. [ ] 7. Other (please specify)..... [ ] No survey conducted. [ ] Not sure.	
40. In your province, was there any monitoring, work reviews, work summaries presented to policymakers, lesson extraction, or evaluation of the implementation of alcohol policies or law enforcement (process and performance evaluation) during the period of 1st January 2019 to 31st December 2019? [ ] 1. Yes [ ] 0. No [ ] No data available	all
41. In your province, were there communication channels established for implementing alcohol control measures between relevant agencies during the period of 1st January 2019 to 31st December 2019? (For example, Line groups, monthly meetings, Facebook groups) Excluding the Provincial Alcoholic Beverage Control Committee meetings. [ ] 1. Line group, please specify the group name..... [ ] 2. Facebook group, please specify the group name..... [ ] 3. Monthly inter-agency team meeting, please specify the team name..... [ ] 4. Other communication channels, please specify..... [ ] 0. None [ ] No data available	all
Section 3 : Taxation policy For the following questions, please use the timeframe from 1st January 2562 to 31st December 2562.	
The tax and pricing measures refer to the implementation of policies for tax collection according to the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017), as well as the enforcement of measures against smuggling of alcoholic beverages.	
42. In your province, were tax and pricing measures implemented to control alcohol consumption during the period of 1st January 2019 to 31st December 2019? [ ] 1. Yes [ ] 0. Not implemented (No)	excise

Questions	Organisation*
43. In your province, were there any licensed alcohol production facilities operating between 1st January 2019 to 31st December 2019? **[ ] has [ ] 0. None, skip to question 45.**	excise
44. In your province, were there inspections conducted on the quality of alcohol production facilities and their production licenses between 1st January 2019 to 31st December 2019? If so, how many inspections were conducted, and how many alcohol production facilities were inspected (including at the sub-district, district, and provincial levels)? [ ] a. Ever conducted...times/year [ ] 0. Never [ ] No data [ ] b. Number of distilleries...distilleries/year [ ] 0. Never [ ] No data	excise
45. In your province, were there inspections conducted on alcohol beverage distribution establishments (both licensed and unlicensed) between 1st January 2019 to 31st December 2019? If so, how many inspections were conducted, and how many establishments were inspected (including at the sub-district, district, and provincial levels)? (For example, if inspections were conducted 5 days per month in each district, and there are 5 districts in the province, the total number of inspections per year would be 5 days x 12 months x 5 districts = 300 inspections per year) [ ] a. Ever conducted...times/year [ ] 0. Yes [ ] No [ ] No data [ ] b. Number of alcohol beverage outlets...outlets/year [ ] 0. Yes [ ] No [ ] No data	excise
46. In your province, were there any training sessions conducted to develop the capabilities of officials or personnel at the local level (e.g., sub-district or branch-level officials) related to the enforcement of laws regarding the control of alcohol production licenses and sales permits (the Excise Act B.E. 2560 (2017), the Ministerial Regulation on the Sale of Liquor B.E. 2560 (2017), and the Ministerial Regulation on the Production of Liquor B.E. 2560 (2017) during the period of 1st January 2019 to 31st December 2019? (Only consider training organized by the province itself). If so, how many training sessions were conducted, and how many individuals participated in total? (For example, if there were 5 training sessions, and each session had 50 participants, the total number of participants would be 5 sessions x 50 participants per session = 250 participants in total). [ ] a. Yes,…….. [Number of training sessions per year] [ ] 0. No [ ] No data available [ ] b. If yes, the number of participants:…… [Number of participants per year] [ ] 0. No [ ] No data available	excise
47. In your province, were there any public relations campaigns related to the content of the Excise Act B.E. 2560 (2017) and the ministerial regulations regarding tax and pricing measures conducted for alcohol production facilities and alcohol beverage distribution establishments (e.g., grocery stores, convenience stores, pubs, bars, restaurants) during the	excise,cso

Questions	Organisation*
period of 1st January 2019 to 31st December 2019? If yes, please specify the communication channels used (Multiple answers are possible). [ ] 1. Distributing stickers or factsheets [ ] 2. Displaying signage [ ] 3. Posting on social media platforms such as Facebook, Twitter, Instagram [ ] 4. Promoting during traditional festivals and events (e.g., New Year, Songkran) [ ] 5. Organizing training meetings for alcohol producers and distributors [ ] 6. Publicizing through radio [ ] 7. Providing knowledge during surveillance and awareness campaigns [ ] 8. Local newspapers [ ] 9. Online news agencies [ ] 10. Agency websites [ ] 11. Other (please specify) ..... [ ] 0. Never conducted [ ] No data available	
48. In your province, were there any public relations campaigns conducted to promote information about the content of the Excise Act B.E. 2560 (2017) and the ministerial regulations regarding tax and pricing measures to the general public during the period of 1st January 2019 to 31st December 2019? If yes, please specify the communication channels used (Multiple answers are possible). [ ] 1. Distributing stickers or factsheets [ ] 2. Displaying signage [ ] 3. Posting on social media platforms such as Facebook, Twitter, Instagram [ ] 4. Promoting during traditional festivals and events (e.g., New Year, Songkran) [ ] 5. Organizing training meetings for the general public [ ] 6. Publicizing through radio [ ] 7. Providing knowledge during surveillance and awareness campaigns [ ] 8. Local newspapers [ ] 9. Online news agencies [ ] 10. Agency websites [ ] 11. Other (please specify) ..... [ ] 0. Never conducted [ ] No data available	excise,cso
49. In your province, were there any dissemination of inspection results of violations under the Excise Act B.E. 2560 (2017) and ministerial regulations related to tax and pricing measures to encourage compliance among alcohol producers and general beverage retailers (e.g., publicizing inspection activities, reporting the number of violators through media)	excise,cso

Questions	Organisation*
during the period of 1st January 2019 to 31st December 2019? If yes, how many times did this dissemination occur? Yes,…….. [Number of times per year] [ ] 0. No [ ] No data available	
Section 4: Marketing and advertisement control **The following questions are based on the timeframe (1 January 2019 - 31 December 2019).**	
Marketing and advertisement control refers to the regulation of advertising and marketing communication as stipulated in the Alcoholic Beverage Control Act B.E. 2551 (2008), both under Section 30 and Section 32.	
Article 32 "No person shall advertise alcoholic beverages or display the name or mark of alcoholic beverages in a way that directly or indirectly encourages others to drink, either by advertising or promoting in any form. All types of alcoholic beverage producers are allowed to provide information, news, and constructive social knowledge, without displaying product images or packaging of alcoholic beverages, except for the appearance of alcoholic beverage symbols or symbols of the alcoholic beverage manufacturing company. These regulations are in accordance with the provisions of the ministerial regulations in Sections One and Two, and do not apply to advertising originating outside the kingdom." Article 30: Restrictions of alcohol sales in following forms. 1. Offering discounts for the purpose of promoting sales. 2. Providing or offering rights to participate in competitions, shows, services, lucky draws, prize contests, or any other benefits as compensation to buyers of alcoholic beverages or as an exchange or purchase incentive for purchasing or obtaining alcoholic beverages, packages, tickets, or any other related items. 3. Exchanging, giving away, or exchanging with alcoholic beverages or other products, or providing other services depending on the circumstances. Distributing alcoholic beverages as samples or as incentives to motivate the public to consume alcoholic beverages, including imposing conditions on sales that directly or indirectly force the purchase of alcoholic beverages.	
50. In your province, have measures been enforced to control marketing and advertising in accordance with the Alcoholic Beverage Control Act B.E. 2551 (2008) during the period of January 1, 2019, to December 31, 2019, or not?"	moph

Questions	Organisation*
[ ] 1. Implemented [ ] 0. Not Implemented [ ] No Data Available	
51. In your province, has there been any inspection for compliance with the Alcohol Beverage Control Act B.E. 2551 (2008) concerning advertising and marketing communication during provincial events such as religious ceremonies, festivals, music concerts, etc., from January 1, 2019, to December 31, 2019? If so, how many inspections were conducted, and how many events were involved? [ ] a. Previously.....times/year [ ] 0. Never [ ] No data available [ ] b. Provincial events that were inspected, number of.....events/year [ ] 0. Never [ ] No data available [ ] c. Provincial events that were and were not inspected, number of.....events/year [ ] 0. Never [ ] No data available	moph
52. In your province, has there been any inspection for compliance with the Alcohol Beverage Control Act B.E. 2551 (2008) concerning advertisements and marketing in alcohol outlets (e.g., convenience stores, supermarkets, pubs, bars, restaurants) or general advertisements billboard from January 1, 2019, to December 31, 2019? If yes, how many times were the inspections conducted, and how many alcohol outlets (counting at the sub-district, district, and provincial levels) were involved? (For example, if inspections were conducted 5 days per month in each district, and there are 5 districts, the total inspections would be 5 days x 12 months x 5 districts = 300 inspections per year). [ ] a. Previously.....times/year [ ] 0. Never [ ] No data available [ ] b. Number of establishments selling alcoholic beverages.....alcohol outlets/year [ ] 0. Never [ ] No data available	moph
53. Has there been any monitoring of violations of the Alcohol Beverage Control Act B.E. 2551 (2008) concerning advertising and marketing through online channels, specifically pages created by alcohol industry or establishments selling alcoholic beverages, in your province from January 1, 2019, to December 31, 2019? If yes, how many times was the monitoring conducted? [ ] Ever monitored.....times/year [ ] 0. Never [ ] No data available	moph,cso
54. In your province, has there been any training conducted to develop the capabilities of officials or personnel at the local level (e.g., district, sub-district) regarding the enforcement of the Alcohol Beverage Control Act B.E. 2551 (2008) concerning advertising and marketing, from January 1, 2019, to December 31, 2019? (Only include the training organized by the province itself). If there was training, how many times did it	moph

Questions	Organisation*
occur? (For example, calculate the total number of participants by multiplying the number of sessions by the number of attendees per session). [ ] a. Ever conducted...times/year [ ] 0. Never [ ] No data available [ ] b. If yes, the number of participants in the training was.....people/year [ ] 0. Never [ ] No data available	
55. In your province, has there been any promotion or public awareness campaign regarding the laws to control advertising and marketing, as per the Alcoholic Beverage Control Act B.E. 2551 (2008), targeted at establishments selling alcoholic beverages (e.g., convenience stores, supermarkets, pubs, bars, restaurants) during the period from January 1, 2019, to December 31, 2019? If yes, through which channels did the promotion occur? (You may choose more than one channel in your response.) [ ] 1. Distributing stickers or factsheets [ ] 2. Displaying banners/signs [ ] 3. Posting on social media platforms such as Facebook, Twitter, Instagram [ ] 4. Publicizing during traditional events and festivals (e.g., New Year, Songkran) [ ] 5. Organizing meetings and training for producers and sellers of alcoholic beverages [ ] 6. Publicizing through radio [ ] 7. Providing information during monitoring and awareness campaigns [ ] 8. Local newspapers [ ] 9. Online news portals [ ] 10. Government agency websites [ ] 11. Others, please specify: .....[ ] [ ] 0. Never [ ] No data available	moph,cso
56. In your province, has there been any public awareness campaign regarding the laws to control advertising and marketing, as per the Alcoholic Beverage Control Act B.E. 2551 (2008), targeted at the general public during the period from January 1, 2019, to December 31, 2019? If yes, through which channels did the campaign occur? (You may choose more than one channel in your response.) [ ] 1. Distributing stickers or factsheets [ ] 2. Displaying banners/signs [ ] 3. Posting on social media platforms such as Facebook, Twitter, Instagram [ ] 4. Publicizing during traditional events and festivals (e.g., New Year, Songkran) [ ] 5. Organizing meetings and training for the general public [ ] 6. Publicizing through radio [ ] 7. Providing information during monitoring and awareness campaigns [ ] 8. Local newspapers [ ] 9. Online news portals	moph,cso

Questions	Organisation*
[ ] 10. Government agency websites [ ] 11. Others, please specify: .....[ ] [ ] 0. Never [ ] No data available	
57. In your province, have the results of monitoring actions related to the laws for controlling advertising and marketing been utilized to promote public awareness and encourage compliance (e.g., promoting monitoring and awareness campaigns, reporting the number of establishments violating the laws through media channels) during the period from January 1, 2019, to December 31, 2019? If yes, how many times were these efforts made? [ ] Ever been utilized.....times/year [ ] 0. Never [ ] No data available	moph,cso
Section 5: Control of Physical Availability **The following questions please use the timeframe (January 1, 2019 - December 31, 2019)**	
Physical availability control refers to controlling the sale in places where sales are prohibited, selling to minors under the age of 20, drinking in places where drinking is prohibited, selling on days and times when sales are prohibited.	
58. Has your organization enforced laws to control physical availability from January 1, 2019 - December 31, 2019? [ ] 1. Action was taken [ ] 0. No action was taken"	moph
59. Has there been inspections in your province for locations, days, times, and sales to minors under 20 years of age as detailed below, from January 1, 2019 - December 31, 2019? If so, how many times and in how many shops? (Counting at all levels: subdistrict, district, and province) (For example, in calculating the number of inspections per year, if you inspect 5 days per month in each district and there are 5 districts, the total number of inspections would be 5 days x 12 months x 5 districts = 300 times per year)	moph
a. Sales in prohibited places Including 1) Temples 2) Hospitals, Clinics, and Pharmacies 3) Government Offices and State Enterprises 4) Areas under the supervision of the Government and State Enterprises 5) Factories 6) Schools and areas close to schools 7) Dormitories 8) Fuel stations 9) Public parks of Government and State Enterprises 10) National Parks 11) Railway stations and on trains 12) Bus stations 13) Ports and on public passenger boats 14) On the way [ ] a. Have been...times/year [ ] 0. Never [ ] No data available	moph
b. Drinking in prohibited places, including 1) Temples 2) Hospitals and Pharmacies 3) Government offices and State enterprises 4) Areas under the supervision of the	moph

Questions	Organisation*
government and state enterprises 5) Factories 6) Schools and areas close to schools 7) Fuel stations 8) Public parks of the government and state enterprises 9) National parks 10) Railway stations and on trains 11) Bus stations 12) Ports and on public passenger boats 13) On the road. [ ] a. Have been...times/year [ ] 0. Never [ ] No data available	
c. Sales to minors under 20 years old [ ] a. Have occurred...times/year [ ] b. Number of alcohol outlets...outlets/year [ ] 0. Never [ ] No data available	moph
d. Sales on prohibited sale days (including 5 major Buddhist holidays: Makha Bucha, Visakha Bucha, Asalha Bucha, the beginning of Buddhist lent period, the end of Buddhist lent period, election day, and the day before the election) [ ] a. Have occurred...times/year [ ] b. Number of alcohol outlets...outlets/year [ ] 0. Never [ ] No data available	moph
e. Selling during prohibited hours (Selling is only allowed from 11:00 AM to 2:00 PM and 5:00 PM to 12:00 AM). [ ] a. Have occurred...times/year [ ] b. Number of alcohol outlets...outlets/year [ ] 0. Never [ ] No data available	moph
60. Has there been training to strengthen capacity of officers or personnel at the local level (such as district, sub-district) regarding the enforcement of laws to control physical availability control to alcohol in your province between January 1, 2019 - December 31, 2019? (Only for provinces that organize the training themselves) If yes, how many times? (Example of calculation: number of times x number of participants each time = total number of training participants) [ ] a. Have occurred...times/year [ ] 0. Never [ ] No data available [ ] b. If yes, the number of training participants was...people/year [ ] No data available"	moph
61. Has there been any public campaigning in your province about the law related to physical availability control to alcoholic beverages for shops selling alcoholic beverages (such as grocery stores, convenience stores, pubs, bars, restaurants) to encourage compliance with	moph,cso

Questions	Organisation*
the law, during the period of January 1, 2019 - December 31, 2019? If so, through what channels (multiple answers possible)? [ ] 1. Distributing stickers or fact sheets [ ] 2. Posting signs [ ] 3. Social media posts, e.g., Facebook, Twitter, Instagram [ ] 4. Publicizing at religious or festive events (such as New Year, Songkran) [ ] 5. Organizing meetings or trainings for alcohol manufacturers and sellers [ ] 6. Publicizing on the radio [ ] 7. Providing information during monitoring visits and public relations [ ] 8. Local newspapers [ ] 9. Online news agencies [ ] 11. Department websites [ ] 12. Others, please specify ..... [ ] 0. Never [ ] No information available	
62. Has your province conducted a public campaign about laws related to controlling physical availability to alcoholic beverages for the general public to stimulate compliance with the law in the general public between January 1, 2019 - December 31, 2019, or not? If yes, through which channels? (More than one answer can be selected) [ ] 1. Distributed stickers or factsheets [ ] 2. Posted signs [ ] 3. Posted on social media such as Facebook [ ] 4. Advertised in traditional and festival events (such as New Year, Songkran) [ ] 5. Organized a training session for alcohol producers and sellers [ ] 6. Organized a training session for the general public [ ] 7. Advertised on the radio [ ] 8. Provided information during monitoring and promotion activities [ ] 9. Advertised in local newspapers [ ] 10. Advertised on an agency's website [ ] 11. Other, please specify ..... [ ] 0. Never [ ] No information available	moph,cso
63. Has your province used the results of physical availability control inspections to promote public awareness in order to encourage compliance with the law (for example, publicizing surveillance inspections, reporting the number of non-compliant establishments through the media) during the period from January 1, 2019 - December 31, 2019? If so, how many times? [ ] 1. Yes.....times/year [ ] 0. No [ ] No data available	moph,cso

Questions	Organisation*
Section 6: Measures to control drinking-driving behavior **The following questions please use the time frame (from January 1, 2019 to December 31, 2019)**	
The measures for controlling drinking and driving refer to prohibiting driving while intoxicated, with the blood alcohol concentration exceeding 50 milligrams per cent of blood for regular drivers, and not exceeding 20 milligrams per cent of blood for the following individuals: (a) Drivers under the age of 20 years old. (b) Drivers holding a temporary driving license according to the traffic laws. (c) Drivers holding driving licenses for other types of vehicles that cannot be used interchangeably. (d) Drivers without a driving license or whose licenses are suspended or revoked, Or they are subject to the assumption that they are driving under the influence of alcohol or other intoxicating substances in cases where they refuse to be tested without justified reasons. These measures aim to prevent accidents caused by drivers who are under the influence of alcohol or other intoxicating substances.	
64. Has your province enforced the law on controlling drinking and driving during the period from 1 January 2019 to 31 December 2019? [ ] 1. Yes [ ] 0. No	police, mitigation
65. Has your province set up alcohol inspection checkpoints at the provincial, district, or sub-district level during the period from January 1, 2019, to December 31, 2019? If yes, how many times? (For example, in calculating: if checkpoints are set up 5 days per week in each district and there are 5 districts, the total number of checkpoint setups will be 5 days x 52 weeks x 5 districts = 1300 times per year.) [ ] Yes..... times/year [ ] 0. No [ ] No information available	police
66. Has your province conducted training to strengthen capacity of local officials or personnel (e.g., at the district or sub-district level) in enforcing drunk driving laws from January 1, 2019 to December 31, 2019 or not? (Only provinces that organize the training themselves) If yes, how many times? (Example of calculation: number of times x number of participants each time = total number of participants) [ ] a. Yes.....times/year [ ] 0. No [ ] No data [ ] b. If yes, there were.....participants/year [ ] 0. No [ ] No data	police, mitigation
67. How many breath alcohol testing devices are there in your province (during the period from January 1, 2562 - December 31, 2562)? Devices..... units [ ] No data	police

Questions	Organisation*
68. How sufficient do you think the availability of breath alcohol testing devices was in your province during the period from January 1, 2019 to December 31, 2019? **Not sufficient at all** **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **The most sufficient** **[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]**	police, mitigation
69. Has your province implemented public awareness campaigns related to laws controlling drunk driving during the period 1 January 2019 - 31 December 2019? What channels were used? (You can choose more than one channel) [ ] 1. Distributing stickers or factsheets [ ] 2. Posting signs [ ] 3. Posting on social media such as Facebook, Twitter, Instagram [ ] 4. Publicizing at merit-making or traditional events (e.g., New Year, Songkran) [ ] 5. Conducting workshops for alcohol producers and sellers [ ] 6. Conducting workshops for the general public [ ] 7. Conducting workshops for offenders [ ] 8. Broadcasting on the radio [ ] 9. Providing information during inspections and publicity [ ] 10. Local newspapers [ ] 11. Online news agencies [ ] 12. Organisations' websites [ ] 13. Others, please specify ..... [ ] 0. No public awareness campaign [ ] No data available	police, mitigation,cso
70. Has your province utilized the results of law enforcement related to drinking and driving for public campaign to stimulate legal compliance (for example, the promotion of setting up intensive checkpoints in areas, reporting the number of offenders via the media) between January 1, 2019 - December 31, 2019 If yes, how many times? [ ] Yes ..... times/year [ ] 0. No [ ] No information	police, mitigation,cso
Section 7: Supporting Structural Factors for Policy Implementation **The following questions should be answered within the timeframe (January 1, 2019 - December 31, 2019)**	
71. **The presence of policies, systems, and mechanisms to control, prevent, and address problems resulting from alcohol in your province after 2008.**	

Questions						Organisation*
	yes	no	do not know	Please specify topic/issues	Year of establishment	
1) There is a written declaration of provincial policy regarding alcohol control, such as alcohol-free zones, alcohol-free traditional and religious events, as well as Memorandums of Understanding (MOUs) for implementing alcohol control in your province?	[ ]	[ ]	[ ]	…… …… …… ……		moph,cso
2) There is an alcohol control plan for the province.	[ ]	[ ]	[ ]	…… …… ……..……		moph,cso
3) There is an sub-committee of alcohol control in the province with participation from both the civil society members and the government sector, with the appointment of a provincial governor.	[ ]	[ ]	[ ]	…… …… ……..……..		moph,cso
4) There is an order to appoint a committee for the Provincial Road Safety Operations Center in the area of law enforcement.	[ ]	[ ]	[ ]	…… …… …… ……		mitigation
5) Task force or special teams for alcohol consumption control, both formal and informal (in addition to what was mentioned in items 1-4).	[ ]	[ ]	[ ]	…… …… …… ……		moph,cso
6) Other please specify.....	[ ]	[ ]	[ ]	…… ……		moph,cso

Questions	Organisation*
……	
72. The Provincial Alcoholic Beverage Control Committee during the period of January 1, 2019, to December 31, 2019, held meetings ..... times/year. [ ] No data available.	moph
73. The Sub-committee of the Provincial Alcoholic Beverage Control Committee during the period of January 1, 2019, to December 31, 2019, held meetings ..... times/year. [ ] No data available.	moph
74. Agenda regarding drinking and driving made in meetings of the Provincial Road Safety Operations Center or the Sub-Committee on Provincial Road Safety Committee on Law Enforcement (e.g., issuing directives from meetings for further action on drunk driving policy) during the period of January 1, 2019, to December 31, 2019. Number of occurrences: ..... times/year [ ] No data available.	mitigation
75. During the period of January 1, 2019, to December 31, 2019, did your province conduct any campaigns or activities related to promoting the reduction, cessation, and impact of alcohol consumption? (You can answer more than one point.) [ ] 1. Distributing stickers or factsheets [ ] 2. Putting up signs [ ] 3. Posting on social media platforms such as Facebook, Twitter, and Instagram [ ] 4. Promoting at traditional ceremonies and various festivals (e.g., New Year, Songkran) [ ] 5. Implementing alcohol-free activities during festivals [ ] 6. Organizing training and workshops for alcohol beverage producers and distributors [ ] 7. Conducting general public awareness campaigns [ ] 8. Holding training sessions for offenders [ ] 9. Radio promotion [ ] 10. Providing information during checkpoint operations and awareness campaigns [ ] 11. Local newspapers [ ] 12. Online news outlets [ ] 13. Government agency websites [ ] 14. Other (please specify): .....[ ] [ ] 0. No alcohol consumption control campaigns [ ] No data available.	all
76. Has your province used research and survey data to drive alcohol policy, including law enforcement, such as using data for planning inspections of shops or establishments, supporting legal proceedings, and promoting awareness campaigns, during the period of January 1, 2019, to December 31, 2019? [ ] Yes	all

Questions	Organisation*
[ ] No [ ] No data available	
77. In your province, was there budget for working across different sectors for the implementation of alcohol control law enforcement during the period of January 1, 2019, to December 31, 2019? If there was, please specify the funding sources. [ ] Yes [ ] 1. Provincial budget in conjunction with the narcotics control program. [ ] 2. Provincial budget in conjunction with other issues from the Department of Disease Control (DDC). [ ] 3. Other (please specify): ..... [ ] No [ ] No data available.	all
78. In your opinion, how much importance and support did the policymakers give to the control, prevention, and resolution of alcohol-related issues during the period of January 1, 2019, to December 31, 2019?	all

	levels of support **Least support ←----------→ most support**										
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1) Provincial governor	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
2) Chief of Provincial Office of Ministry of Public Health	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
3) Provincial Administrative Organization President	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
4) Municipal Mayor (City/Town Mayor)	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**

79. During the period of January 1, 2019, to December 31, 2019, please specify the names of individuals who have the potential to be "policy champions" at the provincial level and organizations (with potential in terms of experience or policy-oriented knowledge). Individuals with the potential to be policy champions are those who are actively engaged at the provincial level to lead policy changes related to alcohol. The criteria for being considered a policy champion are as follows: 1)Being involved in promoting alcohol policy at the provincial level, from policy inception to approval or declaration at the provincial level (consistent commitment). 2)Having a network in the implementation of alcohol control policies or activities at the provincial, regional, or national level (network). They must have worked collaboratively with both provincial and regional/national networks in the past three years.	all

3)Having been responsible for or participated in provincial-level projects aimed at addressing alcohol-related issues in the province over the past 10 years (leadership). Or, individuals who are policy makers that support the implementation of alcohol control policies at the provincial level. …… …… …… …… …… …… …… …….	
Section 8 : Support received from alcohol businesses Following questions, asking in the period between January 1, 2019 and December 31, 2019	
80. Are you aware if any government agencies or local organizations in your province have received a support from the alcohol industry (producers, wholesalers, retailers, and bars selling alcoholic beverages) through various activities, such as supporting traditional ceremonies, providing financial support to the Football Association of Thailand, establishing football training camps, volunteering activities, or participating in alcohol industry's corporate social responsibility (CSR) events, during the period of January 1, 2019, to December 31, 2019? [ ] 0. Not at all. [ ] 1. Very rarely (less than 10% of events organized by the government/local organizations). [ ] 2. Occasionally (10-40% of events organized by the government/local organizations). [ ] 3. Frequently (41-75% of events organized by the government/local organizations). [ ] 4. Regularly (more than 75% of events organized by the government/local organizations). [ ] Not sure.	all
81. Are you aware if high-level provincial administrators (head of provincial agencies) have established relationships or participated in activities organized by the alcohol industry (producers, wholesalers, retailers, and bars selling alcoholic beverages), such as joining various social events or events supported or organized by alcohol companies, during the period of January 1, 2019, to December 31, 2019? [ ] Yes [ ] No [ ] Not sure	all
82. Do you have any suggestions for improving the work of alcohol control at the provincial level, including the enforcement of laws related to alcohol control?	all

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.....	
.....	
.....	

***The Chief of Provincial Office of Ministry of Public Health or representative=moph
The Chief of Provincial Office of Royal Thai Police or representative =police
The Director of Provincial Office of Disaster Prevention and Mitigation or representative =mitigation
The Director of Provincial Office of Excise Department in the area or representative =excise
Civil society members or representative of StopDrink network =cso

**********Thank you for completing the survey**********

Interview Questions

Interview with relevant agencies at national level

Project: Evaluation of Alcohol Policy Implementation at the Provincial Level

Introduction/Objectives

The project aims to evaluate the implementation of alcohol policies at the provincial level, focusing on: taxation and pricing policies, physical control measures (e.g., regulations on days, times, and locations of sales, sales to individuals under 20, and licensing), marketing, and advertising controls, and drink-driving control. The study is conducted by Ms. Jintana Jankhotkaew through document reviews, interviews with key stakeholders, expert meetings to develop evaluation tools, questionnaires targeting provincial-level agencies, and secondary data analysis. The project aims to create an index to evaluate alcohol policy implementation at the provincial level. This study is supported by the Project for Developing Systems and Public Policies and Laws for the Prevention and Control of Non-Communicable Diseases in Thailand, funded by the Office of the Science Promotion, Research, and Innovation Board.

This interview is with key informants (KIs) representing organisations involved in supporting provincial-level alcohol control policy implementation. The interview with a representative of the organisation will take approximately one hour regarding the structure of the questions below. With permission, the interview will be recorded for reporting purposes. Follow-up interviews may be requested to ensure data completeness.

Interview Questions

1. How does your organisation contribute to supporting the implementation of alcohol control policies at the provincial level?
2. What mechanisms does your organisation use to support the implementation of alcohol control policies at the provincial level? For example:
    - Training
    - Budget allocation
    - Manpower support
    - Other mechanisms
3. What roles does your organisation play in supporting the process of implementing alcohol control policies, particularly law enforcement, at the provincial level? (e.g., providing consultation, conducting inspections, evaluations for improvement)
4. Based on your experience working with provincial agencies, what are the common challenges and obstacles in implementing alcohol control policies, particularly in law enforcement, at the provincial level?
    - Legal content-related factors
    - Internal organisational factors (e.g., staff skills, staff numbers, resources, budgets, organizational support and incentives, organisational structure, alignment between enforcement duties and organisational roles)
    - External factors (e.g., conflicts of interest, societal beliefs, and values)
    - Others
5. Based on your experience, what are the common facilitators for successful policy implementation, particularly in law enforcement, at the provincial level?
6. Are there any provinces that stand out for their successful law enforcement, robust operational mechanisms, or notable progress in implementing provincial alcohol control policies? Conversely, are there provinces with less progress?

7. What recommendations would you provide for improving the implementation of alcohol control policies at the provincial level?
8. Are there any additional documents you recommend for studying law enforcement practices at the provincial level?

Interview with relevant agencies at provincial level

Project: Evaluation of Alcohol Policy Implementation at the Provincial Level

Explanation/Objectives:

The project aims to evaluate the implementation of alcohol policies at the provincial level, focusing on: taxation and pricing policies, physical control measures (e.g., regulations on days, times, and locations of sales, sales to individuals under 20, and licensing), marketing, and advertising controls, and drink-driving control. The study is conducted by Ms. Jintana Jankhotkaew through document reviews, interviews with key stakeholders, expert meetings to develop evaluation tools, questionnaires targeting provincial-level agencies, and secondary data analysis. The project aims to create an index to evaluate alcohol policy implementation at the provincial level. This study is supported by the Project for Developing Systems and Public Policies and Laws for the Prevention and Control of Non-Communicable Diseases in Thailand, funded by the Office of the Science Promotion, Research, and Innovation Board.

This interview is with key informants (KIs) representing organisations involved in supporting provincial-level alcohol control policy implementation. The interview with a representative of the organisation will take approximately one hour regarding the structure of the questions below. With permission, the interview will be recorded for reporting purposes. Follow-up interviews may be requested to ensure data completeness.

Interview Questions:

1. How do you and your agency contribute to supporting the implementation of alcohol policies at the provincial level?

2. What mechanisms does your agency use to support the implementation of alcohol policies at the provincial level, such as training sessions, budget allocation, manpower support, or others?
3. Based on your experience, what mechanisms and key activities are in place for implementing alcohol policies in your province at the provincial level?
4. From your experience working with provincial-level agencies, what are the common challenges and obstacles in implementing policies, especially in law enforcement?
    - Content-related factors in the law
    - Internal factors within the implementing agency (e.g., personnel skills, workforce size, resources, budget, internal motivation and support, organizational structure, role alignment)
    - Other factors
5. From your experience working with provincial-level agencies, what are the common facilitators for successful policy implementation, particularly in law enforcement?
6. What are your recommendations for improving policy implementation at the provincial level?
7. Are there any additional documents you recommend for studying law enforcement practices at the provincial level?

Participant Information Sheet (For Interviews)

Participant Information Sheet (For Interviews) (for key informants at national level)

(For Respondents Aged 18 and Above)

Dear Respondent,

I am Miss Jintana Jankhotkaew from the International Health Policy Program Foundation. I am conducting a research study titled: *"Evaluation of Alcohol Policy Implementation at the Provincial Level"*. The purpose of this research is to evaluate the implementation of alcohol control policies at the provincial level. This includes assessing policies related to taxation and pricing, physical controls (such as regulations on sales days, hours, locations, sales to individuals under 20 years old, and licensing), marketing and advertising control, and drink-driving prevention measures.

Your participation may not provide you with direct benefits; however, the data you provide will be valuable for evaluating alcohol control policies at the provincial level. This will contribute to the creation of a provincial alcohol control policy index and the development of guidelines for improving such evaluations in the future.

If you decide to participate, I will conduct an interview with you to discuss how your organisation is involved in supporting the implementation of alcohol control policies at the provincial level. This will include the following topics:

1. Support for implementing alcohol control policies at the provincial level
2. Mechanisms for supporting policy implementation
3. Roles in facilitating the policy implementation process
4. Challenges and obstacles faced
5. Factors that facilitate policy implementation
6. Successful law enforcement practices
7. Recommendations

The interview will take approximately one hour and will be conducted online via the Zoom platform.

With your consent, I will record the interview, including audio, photos, and relevant data, to support the research report. All data will be securely destroyed after the completion of the study.

If you feel uncomfortable with any questions, you have the right to skip those questions. You may also withdraw from the study at any time without providing prior notice. Your decision not to participate or to withdraw will not affect your daily life in any way.

All data collected during the interview will be kept confidential and will not be disclosed to the public as individual data. Only aggregate results will be reported, and all related information will be destroyed after the study concludes.

Participants in this research will receive a souvenir worth 500 THB as a token of appreciation.

If you have any questions about the research, please contact:
Miss Jintana Jankhotkaew
International Health Policy Program Foundation
Phone: 02-590-2366-7
Email: jintana@ihpp.thaigov.net

If you feel that you have been treated unfairly or wish to know more about your rights as a participant, you can contact the *Human Research Ethics Committee, Mahasarakham University, Office of Research Promotion and Academic Services, Mahasarakham University* at Phone: 043-754416 (Extension: 1755).

Thank you very much for your kind cooperation.

(Signature)
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(.....)
Researcher

Participant Information Sheet (For Interviews) (for key informants at provincial level)

(For Respondents Aged 18 and Above)

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Researcher