The Effectiveness of Minimum Unit Pricing as a Strategy to Reduce Alcohol Consumption, Related Morbidity and Mortality

A Thesis Presented as Part Fulfilment for the Award of

Master of Science in Food Business Management and Technology

By

Susan Broderick B.Sc. HDip

For Research Carried Out Under the Guidance of

Ms. Rebecca Power BSc. MSc.

Submitted to the Department of Science

Technological University Dublin, Tallaght

August 2022

Declaration

I hereby certify that the material, which I now submit for assessment on the programme of study leading to the award of Master of Science in Food Business Management and Technology, is entirely my own work and has not been taken from the work of others save to the extent that such work has been cited and acknowledged within the text of my own work. No portion of work contained in this thesis has been submitted in support of an application for another degree or qualification to this or any other institution.

Signed: _____ Date: _____

Susan Broderick

Acknowledgements

The completion of this thesis would not have been possible without the help and support of many people.

I would like to begin by thanking my thesis supervisor Rebecca Power for her kindness, positivity, constant encouragement, invaluable advice, and guidance throughout.

To all the lecturers and staff of Innopharma Education for their support, organization, and facilitation of the programme, which I have found immensely beneficial both personally and professionally.

I would also like to acknowledge the support provided by my fellow students throughout the academic year, a constant source of advice, reminders, and good spirits in the midst of deadlines and due dates.

The completion of this thesis would not have been possible without the encouragement, understanding and support from Jim Kelly and my colleagues at Bulmers Ireland, which I am especially appreciative of being new to the business.

Thank you to my friends for their encouragement, for the welcome distractions, advice, and moral support when it was needed most.

Finally, to thank my family. To my parents John and Mary, for their patience, love, and the endless cups of coffee left at the top of the stairs. To my brother Seán for keeping me informed of the latest series, movies, and true crime documentaries I will now have a chance to watch guilt free. An honourable mention to our special pal Bruno who we dearly miss, pawing at our idle feet to keep us all motivated, all the time.

Go raibh maith agaibh go léir.

Abstract

Alcohol is the leading risk factor amongst those aged 15 - 49 globally for premature mortality and disability. The World Health Organisation has urged governments to apply price increases and levies on alcohol in order to reduce harmful consumption of alcohol, which some countries have introduced through minimum unit pricing strategies. Minimum unit pricing is a form of public health policy aimed at reducing harmful levels of alcohol consumption in vulnerable populations. Other public health policies include those aimed at reducing obesity levels, and smoking. Alcohol consumption is linked to short term harms such as domestic violence, crime, and self-harm, while long term consumption is directly attributed to chronic illnesses such as liver disease and cancers. The aim of this research is to evaluate the strategies in place in Ireland, Scotland, Canada, and Northern Territory Australia, and to understand how each policy is applied through price, such as a minimum price per gram of alcohol. Using peer-reviewed research, the effects the implementation of these policies has had on alcohol consumption, alcohol related morbidity and mortality is evaluated to identify if minimum unit pricing is effective at reducing these harms. The level of research that has been conducted in to existing MUP policies and their effects is varied due to the recent implementation of some policies, such as Ireland's in January 2022. There is limited evidence to support minimum unit pricing as a strategy to reduce alcohol consumption amongst heavy drinkers and those at increased risk of alcohol related morbidity and mortality, and the overall effectiveness of minimum unit pricing is not clearly defined, despite the implementation of these policies to reduce harmful levels of drinking. The implication of these findings are of relevance to stakeholders in the alcohol industry, governmental health departments, lobbyists, and policy makers.

List of Abbreviations

(ICD–10)	International Classification of Disease, Tenth Edition
ABV	Alcohol by Volume
ARLD	Alcohol Related Liver Disease
BAC	Blood Alcohol Content
BMI	Body Mass Index
CSO	Central Statistics Office
HSE	Health Service Executive
MESAS	Monitoring and Evaluating Scotland's Alcohol Strategy
MUP	Minimum Unit Pricing
PHS	Public Health Scotland
SARG	Sheffield Action Research Group
SDIL	Soft Drinks Industry Levy
SRP	Social Reference Prices
SSB	Sugar Sweetened Beverage
SSDT	Sugar Sweetened Drinks Tax
SWA	Scotch Whisky Association
TFI	Tobacco Free Ireland
VLNC	Very Low Nicotine Cigarettes
WHO	World Health Organisation

List of Figures

List of Tables

Table of Contents

Chapter 1: Introduction

The introductory chapter of this thesis will outline the relevant background information required to provide a high-level understanding of the topic and the associated research questions. The scope, aims, and objectives of this research will also be stated including relevance and value, limitations, research methodology and a document outline of the following chapters.

1.1 Background

Minimum unit pricing (MUP) sets a legally enforced floor price at which alcohol cannot be sold; at present this is 50p per standard drink in Scotland, and 10c per gram of alcohol in Ireland. MUP differs from a tax; in the case of tax, retailers may decide to absorb the cost themselves and not pass it on to consumers, however this is not possible with MUP as the retailer is legally obliged to sell the product at a defined minimum price (or above) and cannot legally sell below this price.

While countries such as Canada have had pricing strategies similar to MUP in place since the mid 2000's, Scotland became the first country in the world to implement a pricing strategy that did not make reference to beverage type in 2018, with Ireland following suit in 2022. This revolutionary minimum unit pricing strategy differs from pre-existing models, such as the Canadian model, which specifies a minimum price by beverage type, e.g., wine, beer. The Scottish and Irish models focus on the overall alcohol content of the drink, and naturally alcoholic drinks with higher levels of alcohol, such as spirits are subject to a higher minimum unit price compared to beverages with a lower alcohol by volume (ABV) such as beer.

The Sheffield Alcohol Research Group (SARG) conducts research into public health policy around alcohol, particularly for evidence-based debates on alcohol strategy in the UK leading to the introduction of MUP in Scotland. Research conducted by SARG for Irish policy makers, such as '*Model-based appraisal of minimum unit pricing for alcohol in the Republic of Ireland: An adaptation of the Sheffield Alcohol Policy Model version 3* 'was central to the decision to introduce MUP in Ireland.

As alcohol is a public health issue in Ireland, the rationale behind its introduction included that problem drinkers are more sensitive to the price of alcohol and choose cheaper, high ABV beverages and in the instance of alcohol prices rising due to tax increases, this cohort of drinkers will seek cheaper drink with a higher ABV. As MUP

relates to the per gram content of alcohol (in Ireland), stronger alcoholic drinks with higher ABV will be more expensive, therefore problematic drinkers will be forced to reduce their consumption (Health Service Executive, 2021).

While basic economic theory would suggest that while the price of alcohol goes up as a result of MUP, demand i.e., consumption, should reduce, there is no overwhelmingly clear evidence to support that price alone can reduce consumption.

On this basis, The Alcohol (Minimum Pricing) (Scotland) Act 2012 details a "sunset clause" for MUP in Scotland, requiring a thorough review be conducted prior to 2024 to understand the effects MUP has had on alcohol consumption in Scotland, identify any changes to instances of alcohol related illnesses and deaths as a result of MUP, and consider any amendments to improve the strategy; there is no such provision in the Irish Public Health (Alcohol) Act 2018.

1.2 Aims and Objectives

The aim of this research is to investigate the relationship between alcohol consumption, related illnesses, and deaths in countries with a minimum unit pricing strategy currently in place using published secondary data, and to identify if these pricing strategies are effective in reducing alcohol consumption and related harms.

The objectives of this research are as follows:

Objective 1 – Define minimum unit pricing (MUP) and identify the methods and processes in which MUP is implemented across Ireland, Scotland, Australia, and Canada.

Objective 2 – Define and evaluate alcohol consumption in countries with a particular focus on alcohol consumption prior to the implementation of pricing strategies to reduce consumption in countries with pricing strategies in place.

Objective 3 – Identify and define the prevalence of short- and long-term alcohol related illnesses in countries with MUP strategies in place, with a particular focus on data prior to the implementation of a pricing strategy.

Objective 4 – Identify and define the prevalence of alcohol related deaths in countries with MUP strategies in place, with a particular focus on data prior to the implementation of a pricing strategy.

Objective 5 – Using available data outlining consumer information following the implementation of pricing strategies, identify any changes in consumer behaviour, sales, and recorded health information pertaining to alcohol related illnesses and deaths following the implementation of a pricing strategy.

1.3 Research Questions

Based on the aforementioned aims and objectives of this research, a number of research questions are central to the thesis.

Question 1 – What is minimum pricing; how and where is it used?

Question 2 – Why is a reduction in alcohol consumption and related harm required?

Question 3 – Does minimum unit pricing work to reduce instances of alcohol consumption, related illnesses, and deaths?

1.4 Focus and Scope

The research will cover the most up to date, newly published reports, and articles available regarding MUP, alcohol consumption, related harms, illnesses, and deaths, including material such as the World Health Organisation's report *No place for cheap alcohol. The potential value of minimum pricing for protecting lives* and Public Health Scotland's *Evaluating the impact of Minimum Unit Pricing in Scotland on people who are drinking at harmful levels* – both published in 2022 during the writing of this thesis. It will also cover relevant material from the early 2000's to today, with a particular focus on 2018 onwards with the introduction of the policy in Scotland and Ireland in recent years.

The thesis will also examine the use of minimum unit pricing and similar strategies in Canada and Australia. The thesis will not directly compare and contrast each policy; however, examples will be used of each to highlight the differences in policy, and later any direct relation of these policies to reduced instances of alcohol consumption, related deaths, and illnesses in these countries.

Limitations of the research include a lack of specific data for countries such as Ireland, where studies on the effects MUP has had on alcohol consumption across the population are still underway, the affect Covid-19 had on alcohol consumption, particularly with reference to the complete closure of the on-trade in many jurisdictions, and the use of

model-based appraisal and modelling studies for some of the data presented versus actual observed results.

The policies of Ireland, Scotland, Australia, and Canada were identified and chosen to be in scope as the countries have similar legal consumption ages of 18-19 years old and similar cultural attitudes towards alcohol e.g., it is generally freely available and does not typically require special permits to purchase. Countries such as the United States, with a legal drinking age of 21 years, and countries with cultural or religious regulations on the sale and consumption of alcohol such as Saudi Arabia, Kuwait, and the United Arab Emirates are deemed outside of scope and will not be studied.

1.5 Relevance and Value

Minimum unit pricing became legally enforceable in Ireland on January 4th, 2022, following on from a similar implementation by Scotland on May 1st, 2018. While pricing policies are in place in other countries to regulate the sale of cheap and below cost alcohol, such as in Canada or Australia, there are several key differences in these pricing strategies which will be explored in this thesis.

As minimum unit pricing is a relatively new concept in Europe, with strategies now in place in Ireland, Scotland and Wales, research is being published frequently on various elements of policies within these countries. As a result, key findings from newly published research frequently make headlines and form a part of public discourse.

The research outcomes obtained in this thesis may be of use to stakeholders both within the alcohol industry in Ireland, lobby groups such as Alcohol Action Ireland, and within the health promotion sector to establish if minimum unit pricing or any regressive pricing strategy is an effective method of reducing alcohol consumption, related illnesses, and deaths, or if a broader multi-discipline strategy should be considered. Using this information, products and policies could potentially be altered to suit both industry and government, and may involve steps such as product reformulation, limiting sales, further reducing advertising, or creating multi-disciplinary policies to aid those engaged in hazardous drinking.

1.6 Research Methodology

This thesis uses secondary research obtained from PubMed and Google Scholar, as well as studies published by Public Health Scotland; the body charged with reviewing the effects of MUP in Scotland.

On an initial search, using the terms "minimum unit pricing" presented 605 results on PubMed ranging from 1971 to 2022, and 1,950 results on Google Scholar for the same period. The following limits were set for the Pubmed and Google Scholar searches: publication date from 2000 to 2022, articles with abstracts, and articles written in English. A variety of strategies were used to conduct a more detailed search. The most efficient search strategy was: (minimum unit pricing OR alcohol related) AND ("country" OR consumption OR illness OR morbidity OR mortality).

The use of filters to identify articles and studies pertaining to a particular country, e.g., Scotland also allowed for the number of results to be further reduced. Results were eliminated by screening the title and abstract, while the remaining 120 articles were assessed for eligibility and relevance. Of these, 38 were identified as being relevant and are included in the thesis, due to the suitability of content and publication date of works.

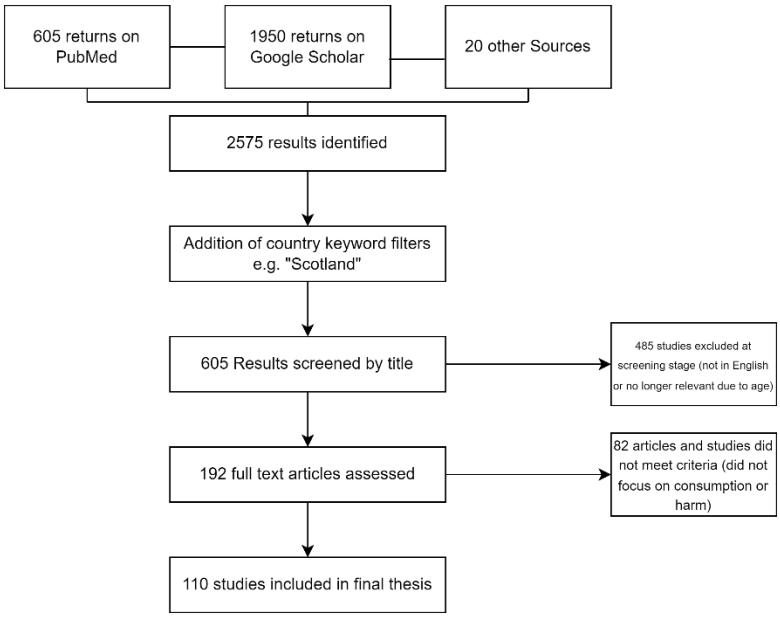

Figure 1 Flowchart depicting search, screening, assessment and selection process of relevant articles and studies under the term "minimum unit pricing" and "alcohol related harm"

1.7 Document Outline

The introductory chapter provides the background information regarding minimum unit pricing, as well as detailing the aims, objectives, scope, and methodology for the research question.

Chapter 2 defines and details minimum unit pricing; what it is, where it is implemented, the variation in the strategy by product and by country and the products it applies to.

Chapter 3 explores the historical use of pricing strategies and other actions as a tool for public health policy and recorded effectiveness of same, such as the Public Health (Tobacco) Act 2002, the Public Health (Tobacco) (Amendment) Act 2004 and the Sugar Sweetened Drinks Tax (SSDT).

Chapter 4 defines alcohol related illness and analyses instances of short- and long-term illness as a result of alcohol by age, gender, demographic, and country with a focus on data prior to the implementation of minimum unit pricing strategies.

Chapter 5 presents the results of implementation of MUP; changes in alcohol consumption and frequency, rate of alcohol related illnesses and deaths, frequency of alcohol related harm, average spend, and sales.

Chapter 6 is a discussion chapter with particular relevance to the detail contained in the previous chapter.

Chapter 7 concludes the analysis and findings and provides avenues for future research.

Chapter 8 contains all references cited throughout the thesis.

Chapter 2: Minimum Unit Pricing

This chapter aims to define minimum unit pricing, outline its purpose for implementation across a number of different countries and to review the system of minimum unit pricing currently in place in Canada, Australia, former Soviet countries, and some European and Nordic states. This chapter will also review pricing strategies implemented on other products, such as tobacco and sweetened drinks.

2.1 Definition

While minimum unit pricing strategies are in place across the world, minimum unit pricing refers to a minimum price, or "floor price" below which alcohol cannot be sold. It differs to a tax, as in some instances price increases as a result of increased taxes can be absorbed by the retailer, not affecting the consumer, however with a defined minimum "floor price" the retailer cannot sell alcohol below this to the consumer (Gilmore, 2015). This applies to both off-trade (off licences, supermarkets etc.) and on-trade (bars, restaurants etc.) however this is predominantly a focus for low-cost alcohol available in the off-trade. MUP generally does not affect price at which alcohol is sold wholesale, if business is conducted in a trade-to-trade manner only (Scottish Wholesale Association, 2018).

Scotland became the first country in the world to implement a minimum unit pricing strategy on alcohol, by alcohol content alone with no regard for product type. Scotland has a minimum unit price of 50p per unit of alcohol (O'Donnell, 2019). Ireland and Wales have since adopted similar strategies i.e., the more alcohol contained within a beverage, the higher the minimum price for that unit of alcohol will be. This differs from policies in other countries such as in the Canadian province of Saskatchewan which applies a minimum unit price to a litre of beverage type, e.g., wine, without any regard for its alcohol content, meaning a wine of 11% ABV and a wine of 14.5% ABV would have the same minimum unit price (SLGA, 2019).

No matter the approach to minimum unit pricing, the result is the same; an alcoholic beverage cannot be sold below a defined price to consumers.

2.2 Purpose

In Ireland, MUP is a public health measure designed to reduce the level of alcohol consumption by making cheap, high ABV alcohol more expensive. In a study conducted by the Health Research Board in 2019, it found that on average adults over the age of 15 in Ireland drank 10.8 litres of pure alcohol per year, equivalent to 113 bottles of wine. The purpose of MUP and similar pricing strategies is ultimately to reduce alcohol consumption, and the appeal of cheap alcohol to younger drinkers, and make purchasing alcohol more expensive for vulnerable drinkers on low incomes.

In Scotland, the implementation of MUP is an active policy subject to a "sunset clause" in which its effectiveness will be reviewed. According to the Scottish Government's Alcohol and Drug Policy, there are a number of key focus areas to determine the impact minimum unit pricing has had on Scotland.

These include:

- Price and product range
- Alcohol sales and consumption
- Alcohol-related harm
- Economic impact on the industry

This review will be considered by Scottish Parliament after its final publication in 2024, and this will then be voted on by members of the Scottish Parliament whether or not to continue with the strategy.

In Australia, the Northern Territory Government's Department of Industry, Tourism and Trade outlines reasons for the introduction of minimum unit pricing including *"the heaviest drinkers of alcohol depend on the cheapest alcohol... at risk and dependent drinkers are more price sensitive than moderate drinkers... minimum unit price will be effective in reducing the harms of excessive drinking... targeting of access and cost of products."* (Northern Territory Government, 2018).

While varying pricing strategies may be in place across different countries, the collective aim is to reduce the consumption of alcohol, particularly by heavy drinkers to minimise harm associated with high alcohol, low-cost beverages.

2.3 Minimum Unit Pricing in Ireland

On January 4, 2022, a minimum unit price of 10c per gramme of alcohol or €1 per standard drink was implemented in Ireland. Examples of a standard drink include a 35.5ml measure of spirits, a small glass of 12.5% ABV wine, or a half pint of beer. With minimum unit pricing in place, a 12.5% ABV bottle of wine cannot be sold for less than €7.40 (HSE, 2021). This pricing was provided for in section 11 of the Public Health (Alcohol) Act 2018, making it illegal for alcohol to be sold below this price to consumers of both the on and off trade.

2.3.1 Public Health (Alcohol) Act 2018

The Public Health (Alcohol) Act was signed into Irish law in 2018. This Act contains measures to govern the sale, promotion, price and labelling of alcohol for sale in Ireland with the aim of reducing alcohol misuse and consumption by minors.

The primary objectives of the Public Health (Alcohol) Act 2018 are to:

- Reduce alcohol consumption to 9.1 litres of alcohol per annum by 2020
- Delay the initiation of alcohol consumption by young people
- Reduce alcohol related harm caused by misuse
- Regulate and control the price of alcohol to minimise alcohol related harm (Health Service Executive, 2021).

This Act contains five distinct areas of governance, namely:

- **Minimum Unit Pricing** – sets a minimum price of 10c per gram of alcohol, below which beverages containing alcohol cannot be sold
- **Labelling of Alcohol Products and Notices in Licenced Premises** – outlines warnings and information required on the label of an alcohol product including:
    - A warning regarding alcohol consumption
    - A warning regarding alcohol consumption while pregnant
    - A warning outlining the direct link between alcohol and cancer
    - The quantity of alcohol within the product
    - The energy value contained in the product
    - Details of the Health Service Executive (HSE) website providing information around alcohol consumption and related harms.

- **Prohibitions and Restrictions on Advertising and Sponsorship** – this section of the act governs how alcohol may be promoted in content and advertising which features alcohol products and brands. This includes restrictions such as:
    - Prohibiting the use of alcohol branding, logos, names, or other images relating to alcohol and alcohol products on children's clothing and footwear
    - Prohibiting the advertisement of alcohol brands and products in public spaces including parks, public transport, or within 200 meters of schools or playgrounds.
    - Alcohol can only be promoted in cinemas where the screening has an over 18 certification
    - Prohibits the advertising by a person during a sports event from wearing items of clothing containing the logo, name or branding of an alcohol product.
    - Prohibits the sponsorship of events where the majority of participants are minors, or an event that involves mechanically propelled vehicles.
    - A ban on alcohol advertising on television between the hours of 3am and 9am, and on radio between midnight and 10am, or midnight and 3pm on a weekday will also be enacted in 2022 or beyond following the signing of a Commencement Order by the Minister for Health
- **Separation and Visibility of Alcohol Product and Advertisements for Alcohol Products in Specified Licenced Premises** – this section of the act applies a range of restrictions to mixed retail outlets such as supermarkets to outline how alcohol must be contained, displayed, and advertised. All alcohol must be displayed in a designated area of the store, separated with a physical barrier of a minimum 1.2-meter height.
- **The Regulation of the Sale and Supply of Alcohol Products in Certain Circumstances** – This section of the act includes restrictions on the promotion of alcoholic drinks within retail outlets and prohibits the use or award of loyalty points or similar bonus card schemes in relation to alcohol sales, the sale of alcohol at a reduced price for a period of 3 days or less, and the sale of alcohol at a reduced price, or free of charge, when sold with another product.

2.4 Minimum Unit Pricing in Scotland

On May 1, 2018, Scotland implemented a minimum unit price of 50p per unit of alcohol, meaning a bottle of 12.5% ABV wine has a minimum price of £4.69 – it cannot be sold below this price by the retailer. The formula used to calculate the minimum unit price is as follows:

price per unit x the strength of alcohol (ABV) x volume in litres (Scottish Government, 2018).

2.4.1 The Alcohol (Minimum Pricing) (Scotland) Act 2012

The Alcohol (Minimum Pricing) (Scotland) Act 2012 is a Scottish Parliament Act which introduces a statutory minimum price, initially set at 50p, per unit of alcohol in order to tackle issues associated with alcohol by outlining provisions at the price alcohol may be sold from licenced premises. The Bill for the Act of Scottish Parliament was passed by Parliament on 24th May 2012 and received Royal Assent on 29th June 2012.

The act contains the provisions pertaining the Act as follows:

- **Minimum Unit Pricing** – this area of the act outlines the formula by which the minimum unit price is calculated

$$\text{MPU} \times S \times V \times 100$$

where -

MPU is the minimum price per unit,

S is the strength of the alcohol, and

V is the volume of the alcohol in litres.

- **Duration of Minimum Unit Pricing Provisions** – this section of the act stipulates that the pricing provisions will cease at the end of a 6-year period from its commencement, unless Scottish Ministers make an order after a 5-year period, but before 6 years to continue the pricing provisions. This has been referred to as the "sunset clause" in media.
- **Report on Operation and Effect of Minimum Pricing Provisions** – this section of the act requires that a report fully outlining the operation and effect of the minimum pricing provisions must be presented to the Scottish Parliament containing information on the effect of the provisions to consumers and

businesses and must consult the holders of licenced premises, producers of alcohol and stakeholders in health, prevention of crime, education, social work, youth, and other relevant sectors.

2.4.2 Scotch Whisky Association and Others v The Lord Advocate and The Advocate General for Scotland

The Scotch Whisky Association (SWA) is a trade organization representing the Scottish whisky industry and membership of the SWA includes producers such as Diageo, Chivas Brothers, Drambuie Liqueur Company, Whyte and Mackay, and William Teacher & Sons (Scotch Whisky Association, 2022).

Following the passing of the Alcohol (Minimum Pricing) (Scotland) Act 2012 by Scottish Parliament, the SWA launched a legal challenge against the Scottish Government in 2012 as the SWA believed the practice of minimum unit pricing was a breach of European Law by distorting Single Market rules and limiting trade due to the restrictive measures.

The initial legal challenge failed at the Court of Session; however, this was appealed by the SWA, the Confédération Européenne des Producteurs de Spiritueux and the Comité Européen des Entreprises Vins. This appeal delayed the Act, and the legal challenge by the SWA was referred by the Court of Session to the Court of Justice of the European Union.

In 2015, the Court of Justice of the European Union ruled that minimum unit pricing legislation would only be lawful if policies such as higher taxes would not be effective in protecting public health, and this would require the consideration of Scottish judges.

On 15 November 2017, the SWA's case was unanimously rejected by the Supreme Court of the United Kingdom, concluding that minimum unit pricing was "a proportionate means of achieving a legitimate aim" and was not disproportionate to the stated policy intending to reduce alcohol misuse and consumption which was not contrary to EU law.

While the Act was initially set in 2012, the legal challenges brought forward by the SWA delayed the implementation of MUP in Scotland by 6 years, to 1st May 2018.

2.3 Minimum Unit Pricing in Canada

Alcohol pricing strategies vary within Canadian provinces, however both British Columbia and Saskatchewan have policies on alcohol pricing in place. Unlike Scotland and Ireland, the selling of alcohol in Canada is mostly through government-run outlets, with a small proportion of alcohol available at specially licenced private stores.

Minimum unit pricing in Canada is referred to as social reference prices, or SRPs, and is set by each territorial jurisdiction. Table 1 below, taken from the Canadian National Alcohol Strategy Advisory Committee's Report *Social Reference Prices (SRP) for Alcohol: A Tool for Canadian Governments to Promote a Culture of Moderation* provides an overview on each Canadian province's approach to implementing SRPs as of December 2014. The information contained within Table 1 highlights the variations in the approach to SRPs across Canada, ranging from no SRPs whatsoever in Alberta (Alta.), to beer only SRPs in Manitoba (Man.), to a low level of SRP applied to all beverage types, subject to inflationary adjustments and based on SRP rates applied to per litre of beverage in New Brunswick (N.B.).

Table 1 SRP Provincial Practices as of December 2014, taken from the Canadian National Alcohol Strategy Advisory Committee

Province	SRPs for all beverage types	Overall level of SRPs[1]	SRPs automatically adjusted by inflation	SRPs adjusted by alcohol content[2]	Presence of SRP loopholes
B.C.	Yes	Medium	No	No	Yes (e.g., no enforcement of SRPs in private stores)
Alta.	No	N/A	N/A	N/A	Yes (no SRPs at all)
Sask.	Yes	Medium	No	Partially	Yes (e.g., volume discounts)
Man.	No	Low	No	Yes	Yes (only beer SRPs)
Ont.	Yes	Medium	Yes	Partially	Yes (e.g., delisting)
Que.	No	Low	Yes	Partially	Yes (only beer SRPs)
N.B.	Yes	Low	Yes	No	No
N.S.	Yes	High	Yes	Partially	Yes (e.g., volume discounts)
P.E.I.	No	Medium	No	No	Yes (e.g., volume discounts)
N.L.	Yes	High	No	Partially	Yes (e.g., delisting)

1 Low, medium, and high SRPs defined as follows: lower than $1=Low; $1 to $1.49=Medium; $1.50 or higher=High.

2 Yes, SRP is based on rates per litre of ethanol; Partially, SRP is based on percentage alcohol content for broad ranges of products within a beverage category; No, SRP is based on rates per litre of beverage

Unlike the Irish or Scottish MUP policies, Canadian policy allows for the adjustment of SRPs with inflation.

2.4 Minimum Unit Pricing in Australia

In 2018, the Northern Territory passed a bill to introduce a "minimum floor price" for alcohol, which commenced on 1 October 2018 (Northern Territory Government, 2022). This policy sets a minimum price for a standard drink at $1.30, and this is used to calculate the minimum cost at which the beverage can be sold, dependant on the number of standard drinks the product contains. The policy is subject to review by the Minister of Industry, Tourism and Trade every three years. The minimum floor price is calculated by multiplying the minimum floor price ($1.30) by the number of standard drinks in the product e.g., a 750ml bottle of wine containing 7.7 standard drinks will have a minimum floor price of $10.01. This minimum floor price applies to all alcohol retail sale and supply within the Northern Territory and does not apply to wholesale prices (Taylor et al. 2021).

2.5 Alternative Pricing Strategies

While minimum unit pricing is the focus of this thesis, a number of countries have implemented alternative alcohol pricing strategies outside of taxation. In the World Health Organization's *European Status Report on Alcohol and Health 2014*, this report outlines the measures taken by some European countries to reduce alcohol consumption and related harms. As of 2011, Germany, Sweden and Uzbekistan banned the sale of alcohol below cost i.e., sale of alcohol at a price less than the production cost. This report also highlights the prohibition of volume discounts such as two for one offers in Sweden, Iceland, and Finland. As demonstrated in Table 2, a number of measures affecting the price of alcoholic beverages are taken across a number of Member States with value added tax being the most prevalent.

Table 2 Price and tax measures taken by European Member States, taken from the European Status Report on Alcohol and Health 2014

PRICE AND TAX MEASURES	NO. OF MEMBER STATES (N=53)[a]
Value added tax on alcoholic beverages of 0%	2
Value added tax on alcoholic beverages of 8–12%	2
Value added tax on alcoholic beverages of 15–20%	30
Value added tax on alcoholic beverages of 21–25%	14
Value added tax on alcoholic beverages of 27–30%	3
Level of excise duty adjusted for inflation	13[b,c]
Ban on below-cost selling	3
Ban on volume discounts	3
Additional levy on specific products	5
Requirement to offer non-alcoholic beverages at a lower price	4
Other price measures to discourage underage drinking or high-volume drinking	1

[a] No information provided on value added tax for two Member States.
[b] In the Republic of Moldova, the level of excise duty is adjusted for inflation only for beer and spirits.
[c] In Tajikistan, the level of excise duty is adjusted for inflation only for wine and spirits.

Chapter 3: Public Health Policies

.

Minimum unit pricing is an example of a public health policy aimed at reducing harmful and excess alcohol consumption amongst a country's population. This chapter briefly outlines other well publicised public health policies that are currently, or have been in place, and provides an overview of their structure, implementation, and level of multi-disciplinary actions required to establish each measure. The purpose of this is to demonstrate if these measures, also aimed at reducing a form of chronic illness, are solely based on price or if additional measures are taken in strategic implementation.

3.1 Smoking

Like alcohol, smoking tobacco has a long and varied history across many cultures globally. Despite its popularity and the belief by some that smoking was a healthy practise particularly in the early 20th century, there was limited research into the harm associated with tobacco smoking and any previous links were deemed circumstantial. In 1950, Richard Doll published a paper in the British Medical Journal detailing a close link between tobacco smoking and lung cancer (Doll and Hill, 1950), and in 1954 this link was confirmed by the British Doctors Study of 40,000 doctors across 20 years (Doll and Hill, 1954). Following from this landmark study, the 1964 United States Surgeon General's Report on Smoking and Health demonstrated a clear relationship between lung cancer and smoking. This period across the 1950's and 1960's led to governments issuing advisories regarding this link and has shaped many of the public health policies around smoking still present today.

In 2008, the World Health Organization published a policy package aimed to assist in the implementation of measures and interventions to reduce the demand for tobacco, known as MPOWER tobacco control strategy. This mnemonic summarizes the essential components of an effective tobacco control policy across six key areas:

- Monitor tobacco use and prevention policies
- Protect people from tobacco smoke
- Offer help to quit tobacco use
- Warn about the dangers of tobacco
- Enforce bans on tobacco advertising, promotion, and sponsorship
- Raise taxes on tobacco (WHO, 2008)

3.1.1 Ireland

On March 29th 2004, Ireland became the first country to implement comprehensive legislation banning smoking in the workplace (including work vehicles), enclosed public spaces, bars, restaurants, healthcare facilities and public transport under the Public Health Act 2004. There are a number of exceptions to this Act, and smoking remains permitted in prisons, residential care centres, designated hotel rooms and outdoor areas. The implementation of this Act followed other measures previously implemented, including restrictions on advertising in 1979 and a ban on smoking in buses and in public buildings in 1988.

In 2009, Ireland was the first country in the European Union to implement additional measures under the Public Health (tobacco) Act to include prohibiting the advertising of tobacco products in-store, a ban on the sale of 10 pack cigarettes, and the requirement that tobacco products were required to be stored out of sight with access only to retail staff. This was followed in 2013 with the requirement that tobacco products must contain graphic warnings, which was further advanced in 2014 with the implementation of plain packaging requirements. As of 2017 all branding, logos and imagery pertaining to the brand are not permitted on pack. The use of plain packaging is deemed less attractive and less favourable by young people, while the use of graphic imagery such as damaged organs, teeth, gums, and post-surgery imagery delivers a shock factor requiring smokers to consider the risks associated with smoking. The use of plain packaging with standardised colour also removes the misconception that lighter coloured packs are less harmful to the user (Wakefield et al, 2013).

In 2013, Tobacco Free Ireland (TFI) was launched under the Healthy Ireland framework, setting a target for Ireland have a smoking prevalence of less than 5%. TFI's scheme sets out a series of 60 recommendations, all of which are intended to contribute to the reduction and denormalisation of tobacco use in Ireland (Tobacco Free Ireland Action Plan, 2013). These recommendations include:

- Denormalisation of tobacco use as a central theme to all recommendations
- Promotion of tobacco free educational and healthcare campuses
- Promote tobacco free outdoor spaces in conjunction with local byelaws

- The prohibition of self-service vending machines
- The development of a licencing system for tobacco retailers

In conjunction with the multi-disciplinary approach to encouraging the reduction of tobacco consumption across a broad spectrum of society, the HSE National Standard for Tobacco Cessation Support Programme provides a wide range of evidence based resources to individuals wishing to quit smoking, including www.quit.ie, HSEQuit on social media, the National Smoker's QUITline (a telephone support service), as well as HSE clinics, courses, and supports provided at a primary care level, such as general practitioners and pharmacists. These programmes are advertised across television, radio, and print media with a particular focus across December and January, where smokers may be more likely to want to quit as a resolution for the New Year.

Ireland's approach to reducing the prevalence of smoking across the entire population has not solely been a price led approach, however the average price of a 20 pack of filtered cigarettes has increased from €6.14 in 2004 to €13.44 in 2020, an increase of 119% (Central Statistics Office, 2021).

3.1.2 New Zealand

On June 26th 2022, New Zealand announced the Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Bill which limits the number of retailers selling tobacco products, and aims to prevent initiation of tobacco smoking in young people by prohibiting the sale of tobacco products to anyone born on or after 1st January 2009. This Bill was subject to its first reading on 26th July 2022 and will be presented to the Health Select Committee for review where it may be returned to the New Zealand Parliament in late 2022 to be passed into law.

The proposed legislation identifies three key areas of focus:

1. reducing the nicotine content in tobacco i.e., denicotinisation through the use of very low nicotine cigarettes (VLNC)
2. A 95% reduction in the number of outlets that can sell tobacco
3. The creation of a "smokefree generation" by prohibiting the sale of tobacco to those born in 2009 or later.

In figure 2, it can be noted that smoking amongst adults and year 10 students has been decreasing overall since 1983. A number of non-price related policies were introduced

including plain packaging in 2018, as well as the introduction of an annual tax increase on tobacco in 2010.

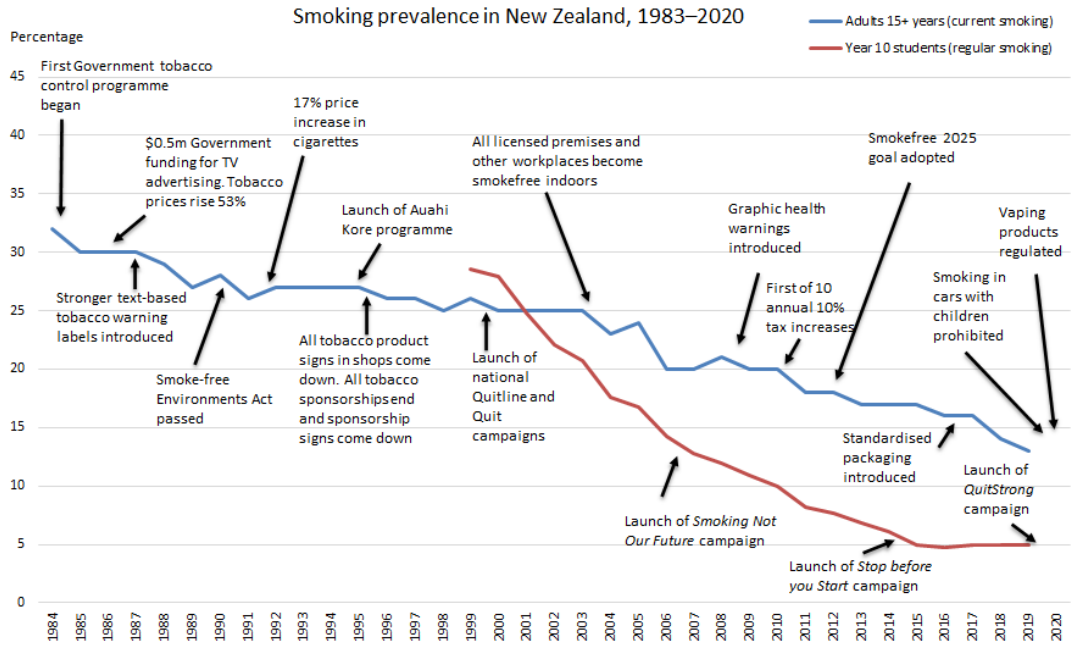

Figure 2 Smoking prevalence in New Zealand, 1983 – 2020 with key tobacco prevention measures highlighted, taken from the New Zealand Ministry of Health, 2022.

The Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Bill originates from the Smokefree Aotearoa 2025 Action Plan launched in 2021. This action plan developed from an inquiry into tobacco use of Māori people by the Māori Affairs Committee, which concluded that, while tobacco use was steadily declining in New Zealand, the prevalence of smoking was higher for Māori, Pacific peoples, and those living in disadvantaged socioeconomic backgrounds who were disproportionately affected by tobacco related harm. In 2020, the smoking rate of New Zealand adults was 13.4% compared to 31.4% Māori across the same period (New Zealand Ministry of Health, 2022).

The approach within New Zealand, and particularly the Māori effort in meeting the smokefree 2025 targets has been driven by the socioeconomic inequalities within Aotearoa New Zealand and the desire to remove tobacco which had been introduced through the colonisation of the country from the islands entirely (Gaiser, 1984). Since the introduction of New Zealand's first tobacco control programme in 1984 the country has steadily reduced overall tobacco use through a combination of retailer controls and

the introduction of cessation schemes; price is not a sole factor in driving the reduction however as of August 2022, a pack of 20 retails for approximately $38 (€23 approx.).

3.2 Obesity

Another issue with focused public health policies is obesity, which according to the WHO has tripled in prevalence since 1975, and as of 2016 more than 650 million adults over the age of 18 were considered obese, having a body mass index (BMI) of 30 or greater (World Health Organisation, 2022).

The prevalence of obesity has grown to epidemic levels as 4 million people a year die due to being overweight or obese, which increases pressure faced by healthcare systems globally. In 2016, the aggregate direct medical cost of obesity to the United States was $260.6 billion (Cawley et al. 2021) while this cost was estimated at €1.16 billion in Ireland in 2015 (Dee et al. 2015). The prevalence of individuals with a BMI of greater than 30 in Britain has increased since the 1950s, as illustrated in figure 3.

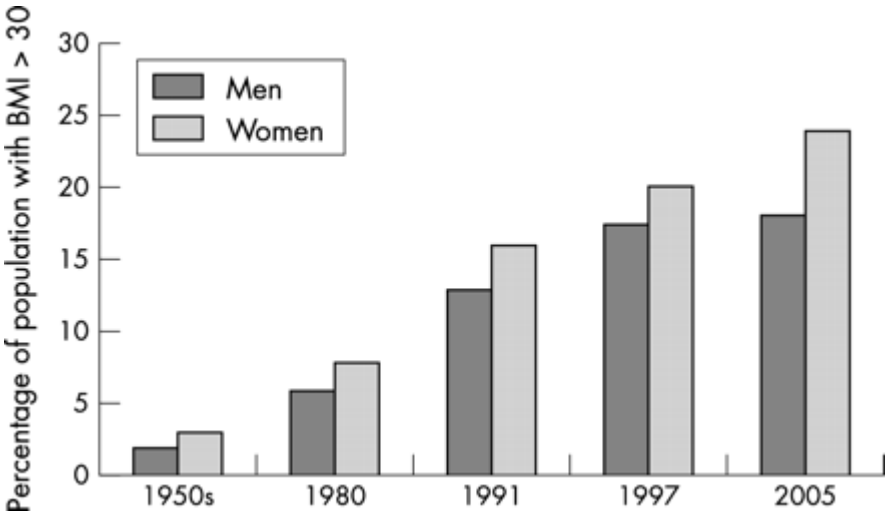

Figure 3 Percentage of the British population with a BMI of > 30. Taken from the British Journal of Sports Medicine, Davey 2004.

The rise in obesity is attributed to the increased intake of high fat and sugar foods, combined with an increase in sedentary lifestyles. As observed in figure 4, between 1901 and 1981 a decrease was recorded in the percentage of British workforce associated with employment in building, mining, agriculture, and transport. These roles would traditionally have been physical and taxing on the body. This is in contrast to a rise in the percentage of those working in office-based roles, a trend which continues today

resulting in decreased physical activity during working hours. Raised BMI associated with obesity is a major risk factor for non-communicable diseases such as heart disease, disorders of the musculoskeletal system e.g., osteoarthritis, and cancers including colon, breast, and liver cancer (World Health Organization, 2022).

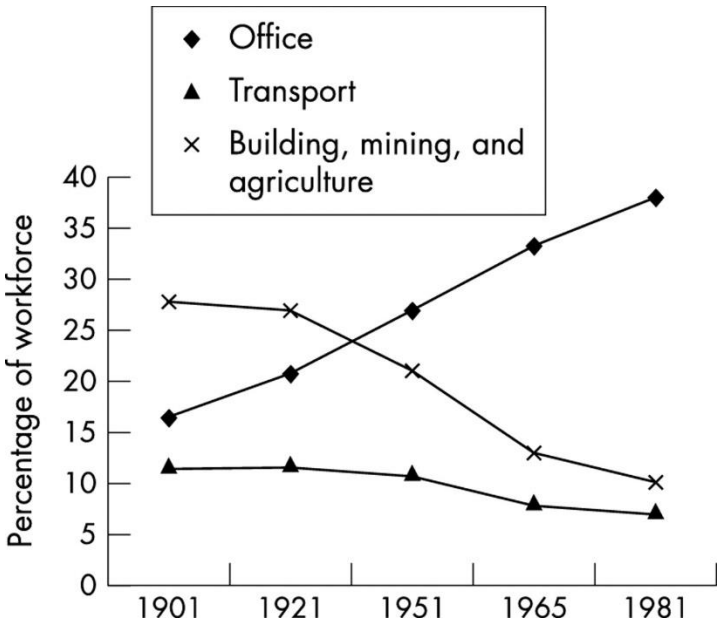

Figure 4 Percentage of the British workforce by occupational activity. Taken from the British Journal of Sports Medicine, Davey 2004.

Obesity is largely preventable through the consumption of healthier foods and engaging in physical activity, where at an individual level people can reduce their energy intake from total fats and sugars, consume fruit and vegetables, and engage in 150 active minutes across the week for adults. The burden on individuals to achieve a healthy lifestyle in the effort to reduce obesity is only effective if the wider environment supports healthy and active choices, particularly amongst socioeconomically deprived areas. To ensure that evidence-based policies are available to all, these policies must be easily accessible and affordable, and include input from the food industry to reduce the fat and sugar content of processed foods, maintain an affordable provision of healthy and nutritious food, and to restrict advertising of heavily processed foods to young people (World Health Organization, 2022).

Due to the prevalence of obesity globally, strategies have been implemented by governments across the world in order to drive a specific target such as the reduced consumption of fats and sugars. This chapter explores two such strategies, the

implementation of a tax on sugar sweetened beverages and a levy on foods containing more than 2.3% fat.

3.2.1 Sugar Sweetened Beverage Tax

In May 2017, the Catalonia region of Spain introduced a sugar sweetened beverage (SSB) tax, or "sugar tax" as it may be referred to colloquially, which established a tax dependant on the sugar content of the beverage. An €0.08 tax per litre was applied to SSBs containing between 5 and 8 grams of sugar per 100ml, and €0.12 per litre to beverages containing more than 8 grams per 100ml (Fichera et al. 2021). The World Health Organization has urged countries to introduce specific levies on SSBs in order to prevent and reduce the prevalence of obesity and associated risks.

The result of this taxation measure in Catalonia meant that the price of a typical one litre bottle Fanta, Sprite etc. which cost on average €1.02 prior to the implementation of the tax rose to €1.18. Following research on consumer data obtained from loyalty card information in the Catalonia region by Fichera et al. it was observed that following the introduction of the tax, households reduced purchases of high sugar beverages most affected by the tax, and purchases of low sugar, untaxed beverages increased. Overall, the reduction in consumption was modest and averaged a reduction in consumption of SSBs of only 3.7 calories per person per month in the region.

This tax was ceased in April 2018. In January 2021, Spain (including Catalonia) introduced a VAT increase for SSBs from 10% to 21%. As a result of a worldwide shift against SSBs, manufacturers are developing new products to avoid taxes and levies on SSB e.g., Coke Zero. In 2020, Coca-Cola launched 14 new products within the Spanish market, of which 12 were sugar-free beverages (Euromonitor, 2021).

Similar taxation policies are also in place in Ireland and the UK.

Ireland

In Ireland, the Sugar Sweetened Drinks Tax (SSDT) came into effect on May 1st 2018, applying to water and juice based drinks with added sugar content at a rate of €0.20 per litre to beverages containing between 5 and 8 grams of sugar per 100ml, and a rate of

€0.30 per litre to beverages containing more than 8 grams of sugar per 100ml. Ireland became the 36th country in the world and the 9th in Europe to implement a tax on SSBs. This tax excludes beverages with 5 grams or less of sugar per 100ml, fruit juices, and alcoholic beverages (Revenue, 2022).

While comprehensive research investigating the effect SSDT has had on consumption in Ireland is not readily available, a study published in the European Journal of Nutrition in 2022 found that the consumption of sugary beverages amongst adolescents in 21 countries including Ireland from 2002 to 2018 had been steadily decreasing across this period, with Ireland experiencing the sharpest decline (Chatelan et al. 2022). This data however does not take into account the introduction of SSDT in 2018 as a potential factor for a further decrease in consumption.

Figure 5 outlines a slight increase in the volume of soft drinks sold from 2018 to 2019, however a decrease is observed in 2020. The 2020/2021 period coincides with the emergence of Covid-19, and the volume demonstrated in figure5 for 2020 may reflect the reduced consumption of soft drinks in out of home environments such as bars and restaurants due to restrictions in place at the time. Conversely, the increased volume in 2021 may coincide with the easing of restrictions on hospitality.

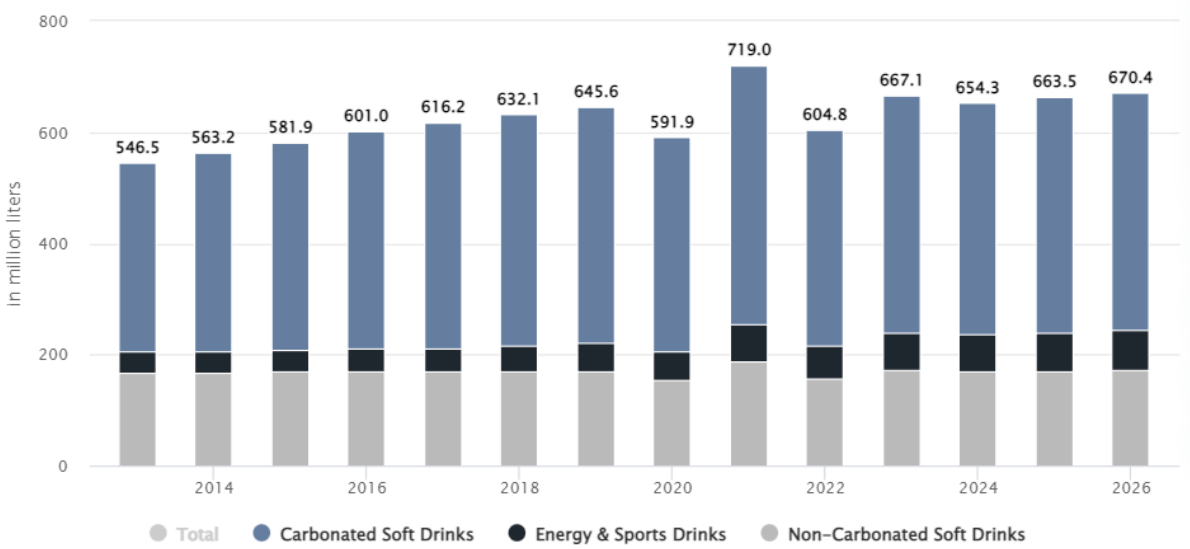

Figure 5 Volume of soft drinks sold in Ireland (in million litres), with predictions for 2022 and beyond. Taken from Statista Consumer Markets Ireland report 2022.

Revenue generated from SSDT totalled €16.5 million in 2018 (May – December), €33.04 million in 2019 and €31.3 million in 2020 (Department of Finance, 2022). The revenue generated from SSDT in Ireland is not ringfenced for use in targeted public health activity, but instead goes to the Exchequer, a move which has been heavily criticised by health groups such as the Irish Heart Foundation.

United Kingdom

The UK introduced the Soft Drinks Industry Levy (SDIL) in April 2018 with the aim of encouraging manufacturers to reduce the sugar content of beverages through reformulation. Prior to the introduction of the SDIL, 50% of manufacturers serving UK markets had already reformulated beverages to reduce sugar content in a two-year period prior to its implementation (HM Treasury, 2018). Rates applied to manufacturers are at £0.18 per litre for beverages containing between 5 and 8 grams of sugar per 100ml, and £0.24 per litre for beverages containing more than 8 grams of sugar per 100ml. Unlike the SSDT revenue in Ireland, the SDIL revenue is ringfenced for use in providing sports equipment to children and schools. The SDIL generated £240 million in 2019, £337 million in 2020, and £301 million in 2021 (HM Revenue & Customs, 2021).

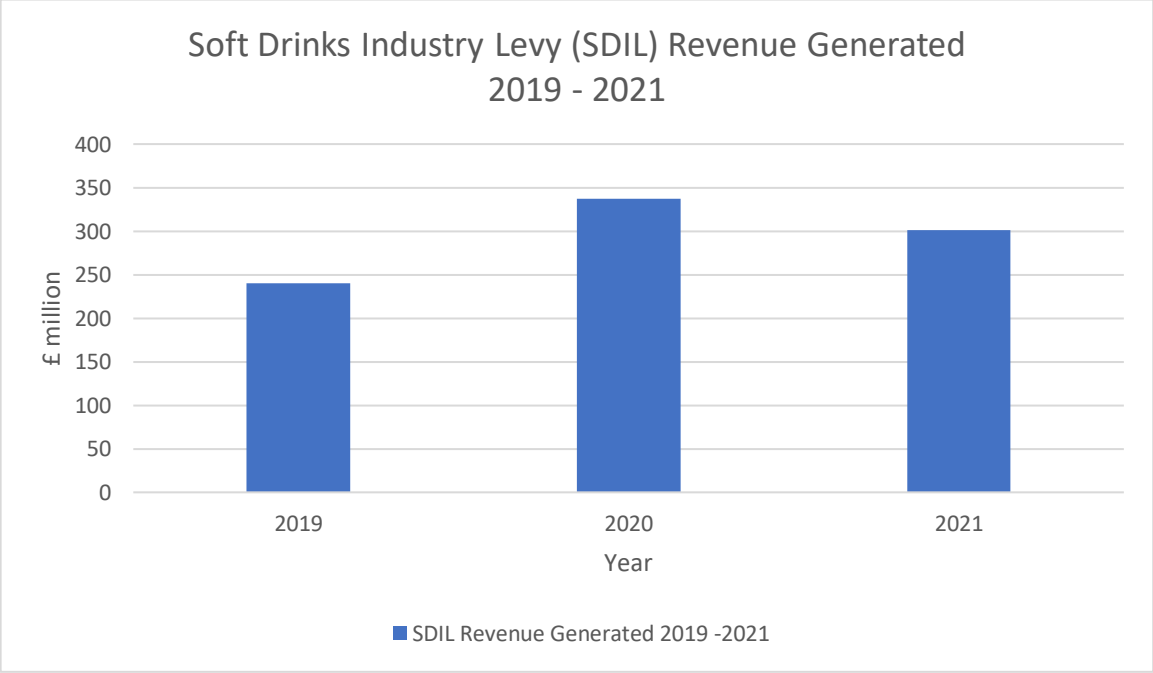

Figure 6 SDIL revenue generated 2019 – 2021, adapted from HM Revenue & Customs.

In the year following the introduction of SDIL, research concluded from purchasing data found that the volume of soft drinks purchased remained the same compared to volumes prior to SDIL, however the sugar content within that volume fell by 29.5 grams, the equivalent of 10% per household per week, or 6,500 calories per person per year (Pell et al. 2021).

3.2.2 Saturated Fat Tax

In October 2011, Denmark introduced a tax on saturated fat, known as the "fat tax" to foods containing more than 2.3% saturated fat, including dairy products, meat, and processed foods. The tax applied 16 kroner per kilogram of saturated fats contained in a product e.g., a 250-gram pack of butter increased by 2.20 kroner (€0.22 approx.) as a result. Implementation of the tax had been heavily opposed by farmers and food companies fearing that the tax posed a risk to jobs (Stafford, 2012).

The tax was subject to intense negative media coverage and raised questions regarding its legality within Europe, due to its inadequacies and seemingly illogical rationale; the tax was to be paid on the total amount of fat used throughout the entire production process, and not the fat content of the final product. This proved problematic for producers of fried goods such as chips and crisps, where up to 75% of the fat used in production would not be included as part of the product's final form (Bødker et al., 2015).

Following intense lobbying from food producers, industry representatives and trade associations, a bill presented on abolishing the fat tax in November 2012 was passed with 66% of votes in December 2012 (Bødker et al., 2015). This bill also included an extension abolishing the proposed implementation of a sugar tax on January 1st 2013.

While the fat tax was in place between October 2011 and January 2013, research conducted into changes made by Danish consumers found that there was a 4% overall decrease in the amount of saturated fat purchased, with a noted increase in the purchase of fruits, vegetables and salty foods and provided a "small but positive impact" on the country's overall health (Smed et al., 2016), however food industry outlined that there had been 1,300 job losses, a cost of DKK 200 million in administrative activities, and a 10% increase in border trade from Denmark to Germany as a result of the tax, ultimately harming the Danish economy. Social media activity also highlighted perceived price

gouging by retailers, highlighting price increases on products that were not proportional to the fat tax (Bødker et al., 2015).

The Danish fat tax was perceived to be good for health, but bad for business. If a new, similar policy were to be introduced, it would require support from industry and politicians to ensure job security and economic stability is not at risk.

Chapter 4: Alcohol Related Harm

According to the World Health Organization (WHO), alcohol consumption is a casual factor in over 200 health conditions, diseases, and injuries, while the consumption of alcohol is associated with a risk of developing health problems including mental and behavioural disorders, alcohol dependence, and contracting non communicable diseases such as cardiovascular disease and liver cirrhosis (World Health Organization, 2022).

The term “alcohol related harm” includes a wide range of harms associated with the consumption of alcohol, ranging from poor sleep quality, unintentional injuries, violence, road traffic incidents, foetal alcohol syndrome and birth complications in expectant mothers consuming alcohol, depression, suicide, and short- and long-term illnesses as a result of hazardous and harmful alcohol consumption.

Hazardous and harmful alcohol consumption have two separate definitions. Hazardous drinking is defined as a “quantity or pattern of alcohol consumption that places patients at risk for adverse health events,” while harmful drinking is defined as “alcohol consumption that results in adverse events” (Reid, Fiellin and O’Connor, 1999).

This chapter explores the prevalence of alcohol consumption across Ireland, Scotland, Canada, and Australia with particular emphasis on consumption prior to the implementation of pricing strategies to reduce alcohol consumption and outlines the short- and long-term effects of alcohol consumption.

4.1 Alcohol Consumption

The use of alcohol and fermented beverages has occurred for thousands of years, with one of the oldest verified brewery sites discovered in Iran found to be over 13,000 years old, while remains of a mixed fermented drink containing found in China was found to be produced around 7000BC, around the same time beer and wine were becoming commonly produced in the Middle East (Chrzan, 2013). The use of alcohol as part of cultural and social rituals has a long-documented history, particularly through the medieval period and into the modern era.

As of 2016, according to the World Health Organization’s Global Status Report on Alcohol and Health 2018, Moldova, Lithuania, Czech Republic, Seychelles, and Germany have the highest recorded per capita consumption of pure alcohol as observed in figure 7, with all countries (with the exception of Seychelles) increasing consumption compared to 1997 figures as reported in the World Health Organization’s Global Status

Report on Alcohol and Health 2018. All countries observed in figure 7 are projected to experience a decrease in consumption in 2020 (WHO report yet to be published) however this projected trend does not follow through for all countries in 2025, with some countries such as Czech Republic and Seychelles projected to have increased consumption once again.

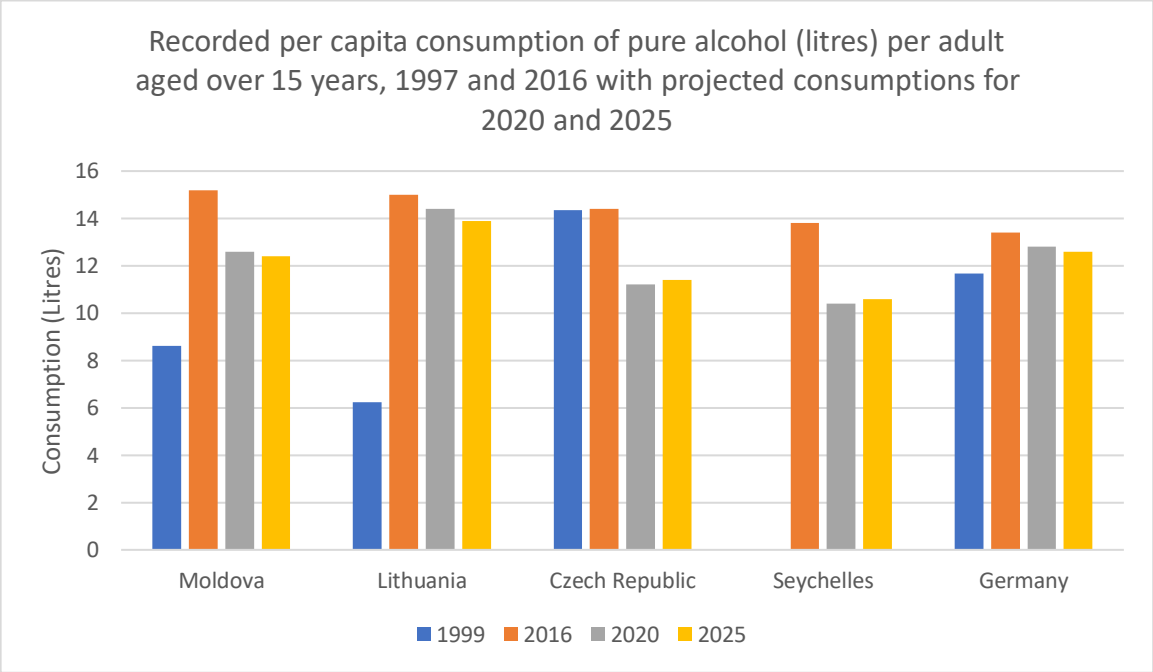

Figure 7 Recorded per capita consumption of pure alcohol (litres) per adult aged over 15 years, 1999 and 2016 with projected consumptions for 2020 and 2025. Adapted from the World Health Organization's Global Status Report on Alcohol and Health 1999 and 2016.

Globally, the percentage of adult drinkers is continuing to decrease, from 47.6% in 2000 to 43% in 2016 (World Health Organization, 2018). The decline is due to a combination of factors including health-conscious consumers, public health policies, changes in taxes, an increased awareness in the risks associated with alcohol consumption and the increased availability of low and no alcohol beverages.

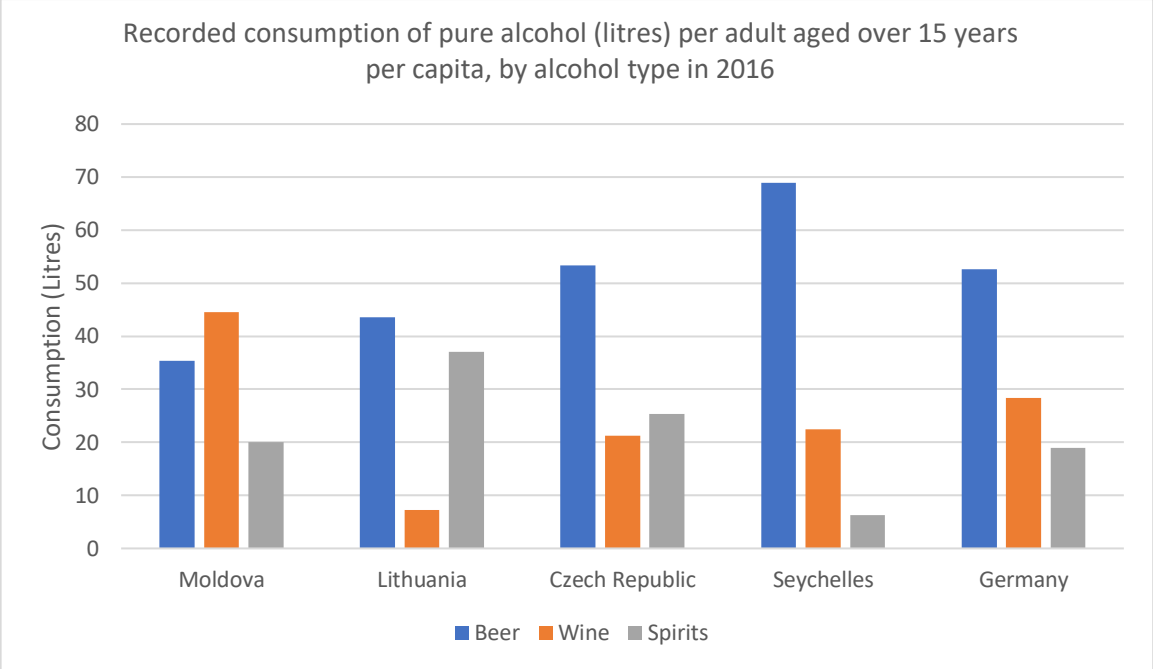

Figure 8 Recorded per capita consumption of pure alcohol (litres) per adult aged over 15 years, 1999 and 2016 with projected consumptions for 2020 and 2025. Adapted from the World Health Organization's Global Status Report on Alcohol and Health 1999 and 2016.

There are a number of factors associated with influencing the amount, frequency and type of alcohol consumed. Societal factors affecting entire populations include culture, religion, societal norms, alcohol policies and levels of economic development, while individual factors include age, gender, and socio-economic status (World Health Organization, 2022).

Alcohol consumption in Ireland, Scotland, Canada, and Australia will be explored in further detail in this chapter.

4.1.1 Ireland

The consumption of alcohol is deeply embedded in almost all acts of social activity in Ireland, including sports (e.g., Guinness' sponsorship of Six Nations rugby), music (the Cork Jazz festival, also sponsored by Guinness) and the arts, while also having a significant presence at many social activities such as weddings, events, and celebrations.

Alcohol consumption in Ireland has fluctuated from 1961 – 2016, as observed in figure 9 however overall consumption has generally trended upwards in that period. In the so-called Celtic Tiger years, alcohol consumption increased from 9.8 to 13.4 litres of pure alcohol per capita, however this began to decrease following the financial crash in 2008

(O'Dwyer et al. 2021). Changes in consumption and influence also altered the type of alcohol being consumed; an increase in the litres of wine consumed is also highlighted in figure 9, as a result of changing trends, increased movement of Irish people abroad, and an increased presence of affordable wine in off-licences and supermarkets. This changed the perception of wine as being a special occasion drink, to one that could accompany any meal, at any time of year. The availability and variety of other types of alcoholic beverages, such as sake has also increased since 1961.

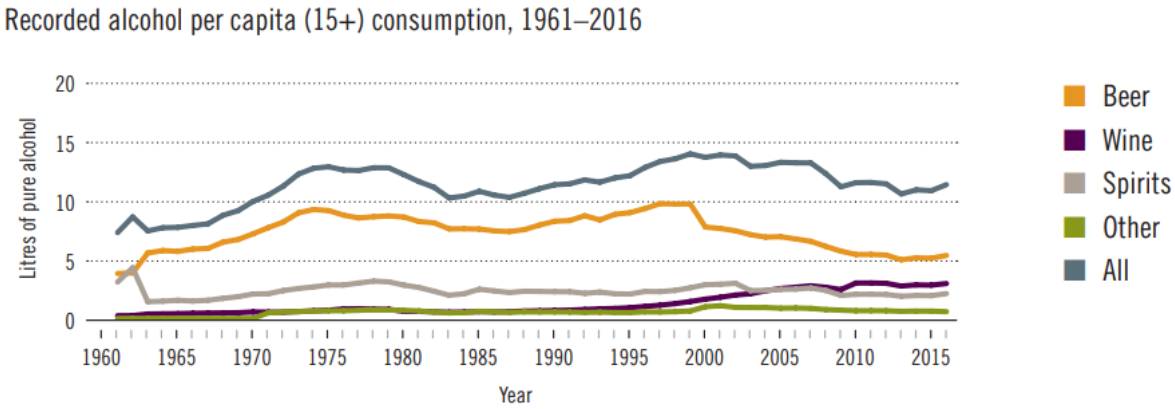

Figure 9 Recorded alcohol consumption per capita in Ireland in litres of pure alcohol, 1961 – 2016. Taken from the World Health Organization's Global Status Report on Alcohol and Health 2018.

The total alcohol consumption per capita in Ireland in both 2010 and 2016 was higher than the average consumption within the WHO European region for both years, as observed in figure 8.

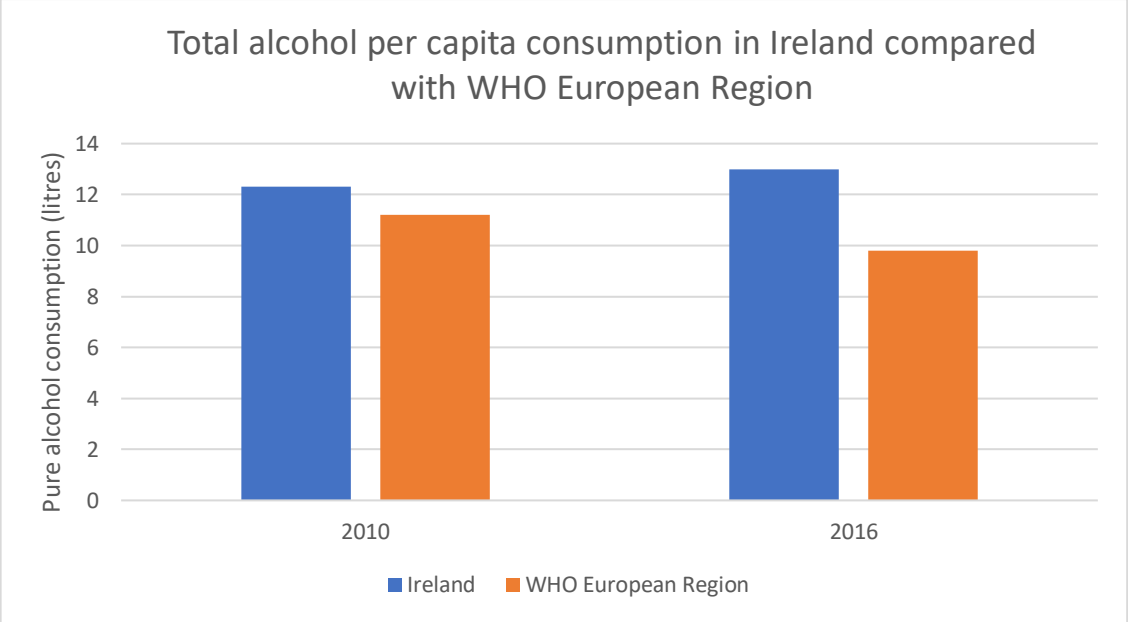

Figure 10 Total alcohol consumption per capita in Ireland in litres of pure alcohol compared with the average total consumption within the WHO European region. Adapted from the World Health Organization's Global Status Report on Alcohol and Health 2018.

The prevalence of heavy episodic drinking (i.e., the consumption of more than 60 grams of alcohol in at least one occasion within the last 7 days) was found to be highest at 71.8% amongst male drinkers aged 15 – 19, compared to 55.7% of the same age profile across the entire population (drinkers and non-drinkers). This data indicates that drinkers aged 15 - 19, both male and female, engage with heavy episodic drinking at a higher rate than the adult population aged 15 and over, as demonstrated in figure 10. The WHO defines adult drinkers as those aged over 15, however this data set also examines young adults aged 15 – 19.

The total average of alcohol consumed by adult drinkers aged 15 and over in 2016 in Ireland was 16 litres for both sexes. This composed of 22.7 litres for males, and 7.9 litres for female, indicating a clear disparity between the consumption of alcohol between men and women in Ireland.

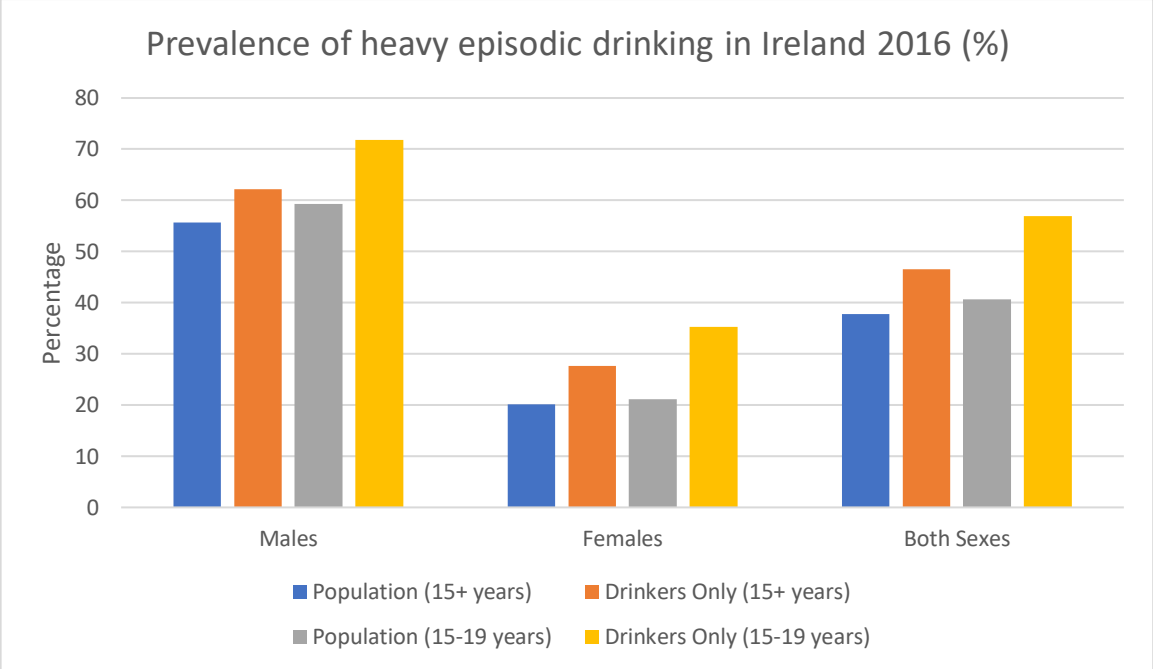

Figure 11 Prevalence of heavy episodic drinking by category in Ireland in litres of pure alcohol in 2016. Adapted from the World Health Organization's Global Status Report on Alcohol and Health 2018.

The percentage of individuals abstaining from alcohol entirely (for a period of at least 12 months) in 2016 accounted for 18.7% of the adult population.

4.1.2 Scotland

Like Ireland, Scotland also has a deep-rooted association with alcohol, with a whisky export market worth £4.5 billion in 2021.

The cultural use of alcohol in Scotland is similar to that of Ireland, where alcohol is consumed socially. Prior to the implementation of minimum unit pricing in Scotland in 2018, alcohol consumption had fallen from 16.1 units consumed per week on average in 2003, to 12.2 units in 2013, and had slightly risen to 12.5 units in 2017 (Scottish Health Survey, 2017), although there is an overall linear downward trend in the volume of alcohol sold per adult per capita in the period of 2001 – 2021 as seen in figure 11.

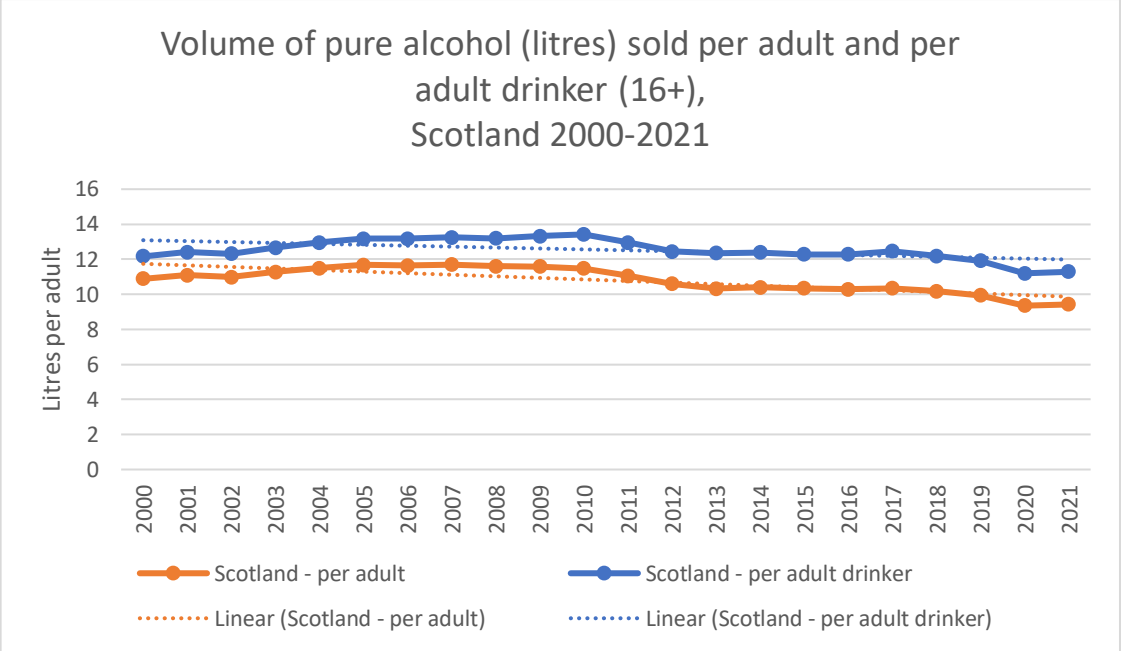

Figure 12 Volume of pure alcohol (litres) sold per adult, and per adult drinker aged 16 and over in Scotland 2000 – 2021. Adapted from the Scottish Health Survey 2017.

In 2017, 19.6 units of alcohol were sold per adult per week – enough for each adult to exceed the low-risk weekly guideline of 14 units by 40% (Giles and Robinson, 2018), however the percentage of adults drinking at harmful or hazardous levels in 2017 was 24%, down from 34% in 2003.

Following general global trends experienced during the Covid-19 pandemic, the on-trade experienced 95% lower sales between January and May 2021, compared to the average for the same period between 2017 – 2019. Off-trade sales increased from 73% to 98% of all alcohol sold in the same period (Public Health Scotland, 2022). While lockdowns changed how and where alcohol was consumed, the general trend in alcohol consumption in Scotland has been favouring off-trade alcohol purchases, with on-trade alcohol sales in steady decline since 2000 (figure 13).

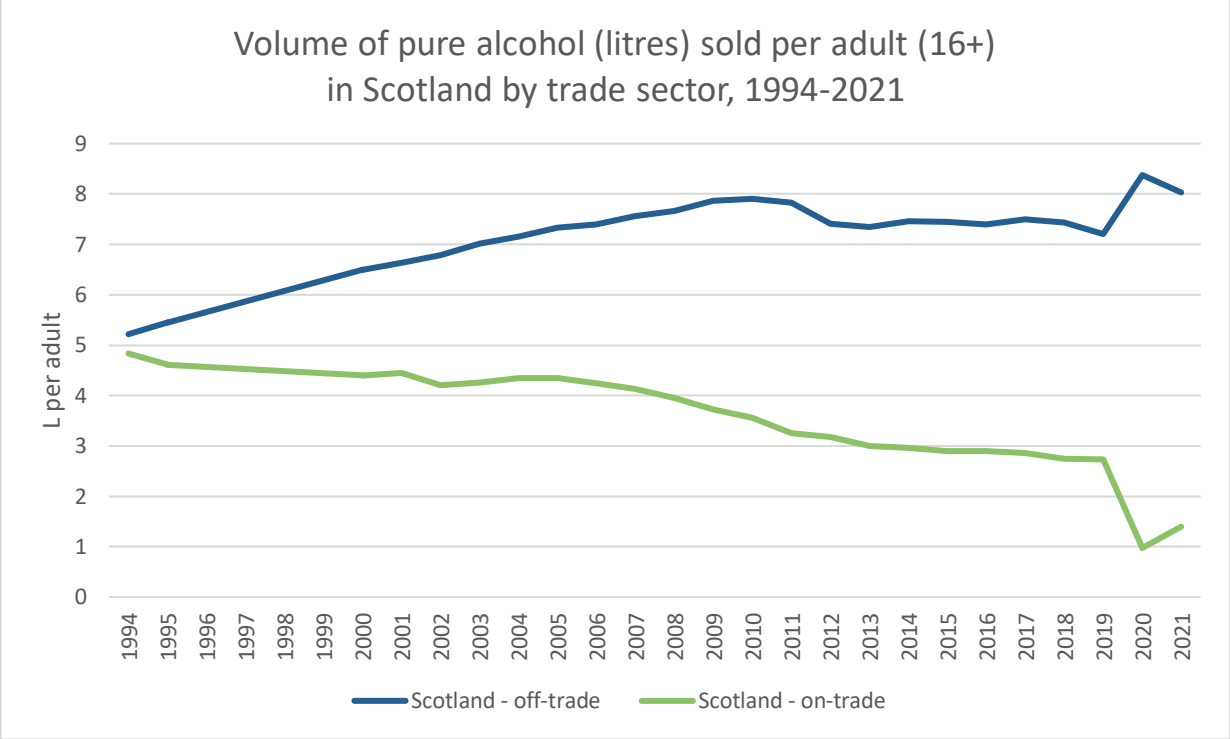

Figure 13 Volume of pure alcohol (litres) sold per adult, and per adult drinker aged 16 and over in Scotland by trade, 1994 – 2021. Adapted from the Scottish Health Survey 2017.

4.1.3 Canada

Alcohol consumption in Canada has remained relatively stable from 1961 – 2016, with overall consumption generally trending downward. In figure 14, a decrease in spirits consumption from 1980 – 1993 is observed, while an increase in wine consumption is also observed. The consumption of beer remains relatively stable throughout, while there has been little to no change in the consumption of other beverages in this period.

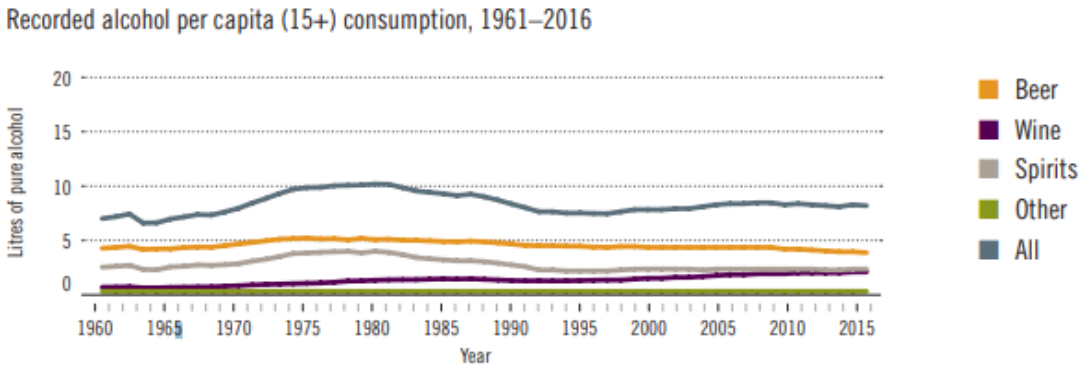

Figure 14 Recorded alcohol consumption per capita in Canada in litres of pure alcohol, 1961 – 2016. Taken from the World Health Organization's Global Status Report on Alcohol and Health 2018.

The total alcohol consumption per capita in Canada in both 2010 and 2016 was higher than the average consumption within the WHO Americas region for both years, as observed in figure 15.

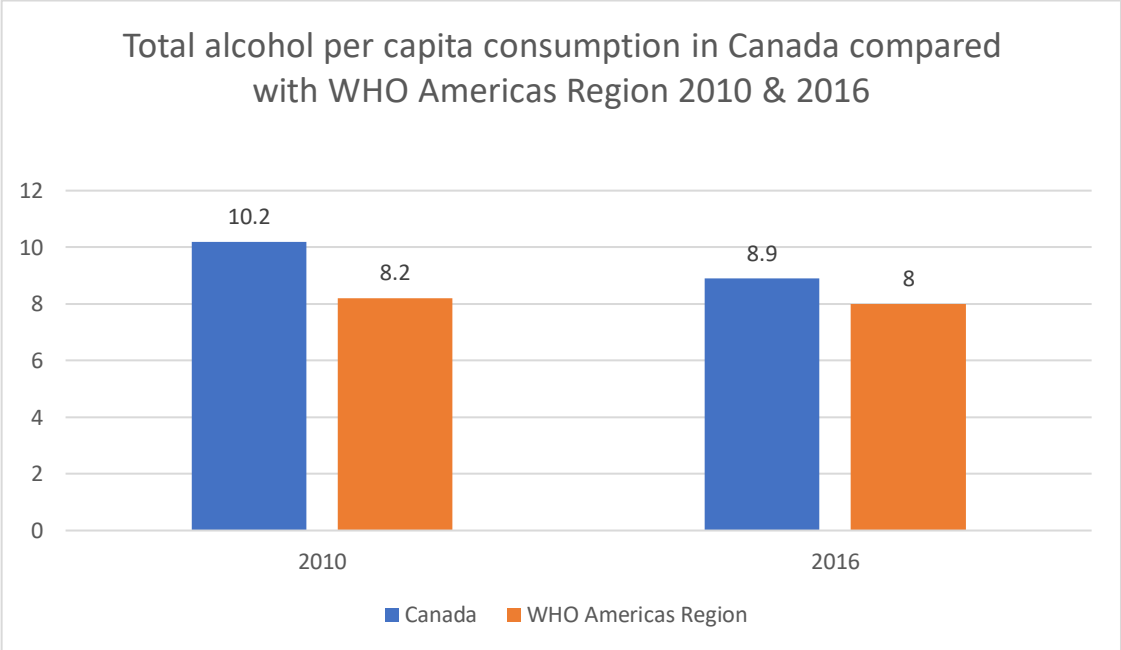

Figure 15 Total alcohol consumption per capita in Canada in litres of pure alcohol compared with the average total consumption within the WHO Americas region. Adapted from the World Health Organization's Global Status Report on Alcohol and Health 2018.

The prevalence of heavy episodic drinking was found to be highest at 55.5% amongst male drinkers aged 15 – 19, compared to 34.8% of the same age profile across the entire population. Across the total adult population between both sexes, the percentage of people engaging in heavy episodic drinking in 2016 was 21.2% (WHO, 2018).

The total average of alcohol consumed by adult drinkers aged 15 and over in 2016 in Canada was 13.8 litres for both sexes. This composed of 18.9 litres for males, and 6.6 litres for females. The percentage of individuals abstaining from alcohol in 2016 was 22.7% across the entire population, with females composing the highest percentage of lifetime abstinence from alcohol at 18.2%, compared to 6% of males (World Health Organisation, 2018).

4.1.4 Australia

Overall alcohol consumption in Australia has been relatively stable since the mid 1990's, following a period of decline between 1975 and 1990. In figure 16, a continuous decline in beer consumption is observed from 1975, continuing through to 2016, with a notable increase in wine from 1975 onwards, coinciding with technological advancements in wine production during that time in the country, resulting in increased production and consumption. As of 2022, Australia is the fifth largest wine producing country globally, producing 14.2 million hectolitres per year, with Italy the largest producer at 44.5 million hectolitres per year (Food and Agriculture Organization, 2022).

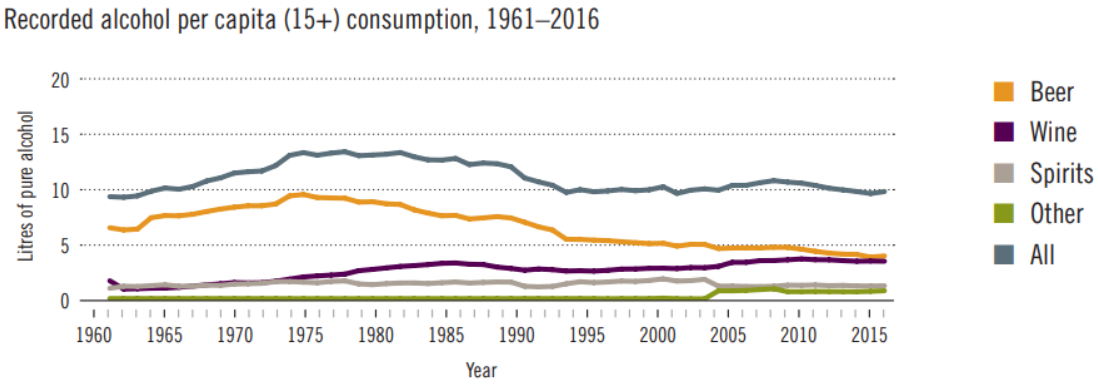

Figure 16 Recorded alcohol consumption per capita in Australia in litres of pure alcohol, 1961 – 2016. Taken from the World Health Organization's Global Status Report on Alcohol and Health 2018.

The prevalence of heavy episodic drinking was found to be highest at 70.8% amongst male drinkers aged 15 – 19, compared to 53.6% of the same age profile across the entire population. Across the total adult population between both sexes, the percentage of people engaging in heavy episodic drinking in 2016 was 36% (WHO, 2018).

The total average of alcohol consumed by adult drinkers aged 15 and over in 2016 in Australia was 13.4 litres for both sexes. This composed of 18.8 litres for males, and 6.6

litres for females. The percentage of individuals abstaining from alcohol in 2016 was 20.6% across the entire population, with females composing the highest percentage of lifetime abstinence from alcohol at 12.9%, compared to 4.1% of males (World Health Organisation, 2018).

4.2 Short Term Harm

There are a number of short-term harms related to alcohol consumption, and the consumption of alcohol to harmful and hazardous excess. These include intoxication, blackouts, injuries, violence, accidents, aggression, suicide, alcohol overdose and death (Rehm, 2011). Short term effects of alcohol consumption are related to blood alcohol content (BAC) levels; lower BAC levels (0.02 approx.) are associated with decreased social inhibitions and mild euphoria, while BAC levels in excess of 0.50 are associated with a high possibility of death due to respiratory failure and cerebral nervous system depression. The BAC levels within this range include behaviour such as extraversion, disinhibition, vomiting and stupor (Cederbaum, 2012). BAC can vary by individual despite drinking the same amount as another, due to age, sex, and other lifestyle factors.

4.2.1 Alcohol Related Injury

The link between alcohol consumption and injury has been well established. The consumption of alcohol causes injury in a dose response manner, where the most common mode of sustaining an injury attributed to alcohol is from one single occasion of acute alcohol consumption (Taylor et al., 2010).

The types of injuries obtained as a result of alcohol consumption are varied and have been studied using real world emergency department admissions, driving simulation, studies linking per capita alcohol consumption and per capita injury rates, and time series studies on the influence of public health alcohol policies and rate of injury (Chikritzhs and Livingston, 2021).

Injuries sustained as a result of alcohol consumption are generally categorized in to unintentional (e.g., falls and burns.) and intentional injuries (e.g., violence, self-harm, suicide). In 2019, 4.5 million people died globally as a result of injury, with 7% of these deaths directly attributable to alcohol (Chikritzhs and Livingston, 2021).

In Ireland, 28% of injury presentations to emergency departments in acute hospitals were related to alcohol in 2008, with hospital related discharges increased by 92% between 1995 and 2002 (Mongan, 2008).

4.2.1.1 Self Harm

Self-harm describes a range of behaviours and intentions considered to be an intentional injury. Alcohol use and misuse are associated with self-harm and increased risk of future suicide. In a study conducted using patient data from multiple centres across the UK specializing in self harm and suicide, alcohol involvement in acts of self-harm was found to be 58.4%, with involvement most frequent in men, white ethnicities and those aged between 35-54 years (Ness et al., 2015).

In a qualitative study commissioned in Wales by Alcohol Change UK on patients that had experienced alcohol misuse and self-harm, a number of issues were highlighted around the provisions made to those receiving treatment.

These included:

- the issue separating mental health and alcohol services caused as patients felt the issues were related, however services provided were not equipped to deal with both issues.
- A focus on diagnosis-led service provision as opposed to needs-led
- Inaccessible and inflexible services
- Dismissive behaviours from service providers when patients sought help
- Cruel treatment from practitioners when receiving assistance, such as receiving stitches without anaesthetic, being told the issues they had were “invented” and that scars as a result of their actions were “ugly” (Chandler and Taylor, 2021).

In 2008, a study conducted in the Health Service Executive (HSE) Southern region using an anonymous self-report questionnaire was administered in 39 schools to adolescents aged 15 – 17 years, of which 3,881 participated. It found that deliberate self-harm was reported by 9.1% of respondents, and the practice was more common amongst females (13.9%) than males (4.3%). Only 15.3% of those that had engaged in deliberate self-harm had sought medical treatment (Morey et al., 2008).

The link between alcohol and self-harm has been clearly established, however the prevalence of self-harming instances amongst adolescents, particularly those not engaging with medical services is of cause for concern.

4.2.2.2 Suicide

The link between completed and attempted suicide and alcohol consumption, particularly alcoholism is also well established. Alcohol is a significant risk factor to suicidal behaviour, due to increased levels of impulsivity in intoxicated individuals. These individuals are characterised by major depressive episodes, life changing stressful events, relationship difficulties and prior suicidal behaviours (Sher, 2006).

According to the WHO, the risk of suicide when a person is abusing alcohol is eight times higher than those who do not abuse alcohol. The research around suicide and alcohol abuse tends to focus on ideation and attempted suicide, due to the challenges investigating a complete suicide provides, and while some traits overlap, there is a difference between attempters and completers in clinical differences, personality, and demographic (Conner and Duberstein, 2004).

Research suggests that alcoholics account for between 20-40% of all suicides in Scotland, while 45% of Swedish, 40% of Finnish, 48% of Estonian and 29% of American suicide victims had alcohol present in the blood during post-mortem investigations (Pompili et al., 2010).

The complexity of the issue, combined with the emotive nature of the subject particularly if it appears to purport blame on the victim due to their alcohol consumption, adds to the challenge in researching and screening for potential suicidality as a direct result of an individual's relationship with alcohol. The availability of suitable resources, as well as a reluctance to present also compound the difficulties in providing appropriate preventive care.

4.2.3 Crime

Alcohol plays a role in many crimes including public order offenses, robberies, assaults, murder, as well as sexual assault and rape. The range of crimes associated with alcohol

consumption is varied in its severity, from causing disturbances through to serious assault.

In Ireland, the cost of alcohol related crime is estimated to be €1.2 billion, almost a third of the overall cost of alcohol related harm (€3.7 billion). These costs include the direct cost of crime including policing, the courts, and prisons, as well as costs to businesses through theft, damage to property, and trauma related costs for victims of crime.

Alcohol has been identified as a contributory factor in 97% of all public order offences logged within the Garda PULSE system, while almost half of the perpetrators of homicide were intoxicated at the time of the crime being committed (O'Dwyer et al. 2011).

4.2.3.1 Antisocial Behavior

Antisocial behaviour includes activities which are deemed problematic, nuisance, and inconsiderate of others such as graffiti, loitering, public and underage drinking, and deliberate destruction of public amenities.

The prevalence of antisocial behaviour decreases with age in most populations, however excessive alcohol use amongst youths and adolescents can delay the process, and children who participate in and engage with antisocial behaviourisms are more likely to develop alcoholism in adulthood (Robins, 1998). Parental alcohol abuse can also influence causation of antisocial behaviour within children due to an unstable home life, a lack of disciplined parenting and financial struggles within the family, therefore it is possible that the link between alcohol and antisocial behaviour is cyclical and intergenerational (Renda, Vassallo and Edwards, 2011).

4.2.3.2 Underage Drinking

In Europe, consumption of alcohol amongst youths and adolescents is common, with 66% of European 15-year-olds having tried alcohol at least once in their lives in 2018, and over 20% of this cohort have reported being drunk at least once in their lifetime. Young adults with reported exposure to alcohol from an early age are more likely to develop alcohol dependence later in life (Spear, 2015). The minimum age to consume alcohol is generally 18 years across Europe, although some exceptions apply.

In the United States, 25% of 14–15-year-olds have reported having at least one drink in 2019, while 7 million young people aged 12-20 reported that alcohol was consumed beyond “a few sips” within the same month. The minimum age to consume alcohol in the United States is generally 21 years with few exceptions.

4.2.3.3 Domestic Violence

Domestic or intimate partner violence is characterized by the deliberate causation of emotional, physical, sexual, psychological, or financial harm to an individual, generally a partner or someone else within the home setting.

According to the World Health Organization’s 2005 Alcohol and Interpersonal Violence policy briefing, alcohol consumption by both perpetrators and victims of interpersonal violence is a factor instances of domestic violence. National survey data from assaults in England and Wales between 2003 – 2004 revealed that alcohol had been consumed by perpetrators of interpersonal violence in more than half of instances, equating to 1.3 million alcohol related violence incidences per year (World Health Organization, 2005).

In the United States, it is estimated that 30 – 40% of men, and 27 – 34% of women who perpetrated violence against their partner were drinking at the time. The role of alcohol within violent assaults is often used as the excuse for the behavior, or associated alcohol with the act of violence (Caetano, Schafer and Cunradi, 2001).

Intimate partner violence continues to be a problem globally, with the WHO estimating that 1 in 3 women are subjected to domestic violence at some stage in their life, with some victims suffering from chronic illnesses such as arthritis, migraines, and ulcers as a result. Women who are pregnant during a relationship experiencing domestic violence experience a greater risk of miscarriage, birth complications and fetal death (Jones and Horan, 1997).

4.3 Long Term Harm

The prolonged, heavy consumption of alcohol over time is detrimental to health and is associated with a wide range of chronic illnesses including the development of an alcohol use disorder, heart failure, alcoholic liver disease, and cancers (Müller et al., 1985). Long term alcohol use is capable of damaging almost every system and organ

within the body, as well as affecting the development of a healthy foetus through sustained alcohol consumption during pregnancy (Caan, 2002).

Heavy drinking long term is also known to increase blood pressure and blood cholesterol levels, increasing the risk of heart attacks and stroke as well as weakening the immune system and lowering bone density (Puddey and Beilin, 2006).

4.3.1 Alcoholism

Alcoholism is a broad term for alcohol use disorder or alcohol dependence and is considered both a mental and physical illness.

Prolonged, excessive consumption of alcohol is damaging to all organs within the body; however, the brain, heart, liver, pancreas, and immune system are particularly susceptible to damage from alcohol (Caan, 2002). Alcoholism may result in an increased risk of cancer, mental illness, irregular heartbeat, weakened immune response, liver cirrhosis and delirium tremens (Romeo et al., 2007). Excessive alcohol use may also result in cognitive impairment and dementia in some individuals.

The development of alcoholism is attributed to both environmental and genetic factors, with half of risk attributed to each factor (American Psychiatric Association, 2013). Stress and anxiety are factors in the development of alcoholism, as the consumption of alcohol may temporarily reduce associated dysphoria, creating a negative cycle of alcohol consumption and reduced mood. Other environmental factors include social, cultural, and behavioural influences, as well as general accessibility and affordability of alcohol increase the risk of alcoholism (Agarwal-Kozlowski and Agarwal, 2000).

As of 2016, the World Health Organization estimated that there were 380 million people globally with alcohol use disorder or alcohol dependences and is most common amongst males and young adults (American Psychiatric Association, 2013).

Treatment for alcoholism is varied and may include medication to manage the physical effects of alcohol dependency, particularly withdrawal and therapy to manage the mental effects and to prevent consumption and discourage relapse (Testino, Leone, and Borro, 2014).

4.3.2 Liver Disease

Alcohol related liver disease (ARLD) refers to the resultant stages of liver damage caused by excessive alcohol consumption.

ARLD typically presents with symptoms once the liver has been severely damaged. Symptoms may include nausea, weight loss, loss of appetite, jaundice, swollen ankles, lethargy, and vomiting blood. Excessive alcohol consumption prevents the liver from effectively regenerating cells, which in turn limits the liver's capability for filtering toxins in the blood, aiding in food digestion, regulating blood sugar and cholesterol levels, and fighting infection and disease within the body (Yadav et al., 2020).

ARLD is generally experienced across three stages, with some overlap between stages.

Stage 1 – Alcoholic Fatty Liver Disease

Consumption of a large amount of alcohol even over a brief period of time can lead to a buildup of fats in the liver, which rarely presents symptoms. This stage of ARLD is reversible, and complete abstinence of alcohol for approximately 2 weeks will restore the liver to normal through cellular regeneration (Singh, Osna and Kharbanda, 2017).

Stage 2 – Alcoholic Hepatitis

This stage presents itself as inflammation of the liver and cellular death. This is normally achieved through a longer period of heavy alcohol consumption; however, this may also present as a result of binge drinking. Depending on the severity of alcoholic hepatitis, it may be reversible through permanent abstinence of alcohol, however severe cases may result in death (Hosseini, Shor, and Szabo, 2019).

Stage 3 – Cirrhosis

This stage of ARLD presents as liver scarring, however in some cases individuals may not be aware that this is occurring due to a lack of symptoms. Cirrhosis is generally not reversible, however an individual with cirrhosis that does not completely cease drinking alcohol has a less than 50% chance of survival beyond five years following the diagnosis (Schuppan and Afdhal, 2008).

Complications that may arise as a result of ARLD include internal bleeding, encephalopathy, ascites and kidney failure, liver cancer, and increased vulnerabilities to infection.

There is no specific treatment for ARLD, however complete cessation of alcohol consumption is preferred in order to reduce the risk of further damage to the liver. In the event of liver malfunction with no improvement in function despite the individual no longer consuming alcohol, a liver transplant may be required. Generally, patients are only considered for transplant if the individual has not been drinking and agrees to maintain abstinence from alcohol forever (Yadav et al., 2020).

4.3.3 Cancer

Alcohol consumption is strongly associated with the following seven cancers (Brown, 2006):

- Breast
- Colon
- Esophagus
- Larynx
- Liver
- Mouth and throat
- Rectum

Those that consume alcohol in any amount are more likely to get cancer than those who do not drink; however, this is also dependent on genetic, lifestyle and environmental factors.

Alcohol is associated with the causation of cancer in a number of ways. These include:

Damage to cells:

Most ethanol in the body is metabolized by alcohol dehydrogenase, which produces acetaldehyde, a known carcinogen. Acetaldehyde can damage cells, and prevent cellular repair (McKillop and Schrum, 2005).

Changes to hormones:

Some hormones in the body such as oestrogen and insulin may increase as a result of alcohol consumption, increasing the level of cellular division. This increases the likelihood of the development of cancer cells (Lew et al., 2009).

Cellular changes in the throat and mouth:

Ethanol is a solvent, and consuming alcohol allows for carcinogens that may enter the mouth, such as cigarette smoke through a filter, to enter the bloodstream. The chemicals found in cigarettes may also be broken down differently in the presence of alcohol, increasing the risk of mouth and throat cancers (Maier et al., 1992).

Reducing or eliminating alcohol consumption and quitting smoking aid in reducing the risk of cancers associated with alcohol.

4.3.4 Depression

Depression, or major depressive disorder is an extremely common, and in some cases, serious medical condition that affects how a person feels, thinks, and acts over a sustained period of time, typically longer than two weeks. Symptoms can manifest as feelings of sadness, lack of interest in hobbies and other activities that the individual had previously enjoyed, changes in appetite, difficulty concentrating, increased fatigue and a change in sleeping patterns (Altar, 1999).

Risk factors for depression include genetics, illness, life changes, medication, socio-economic status, and the use of alcohol and/or drugs (Mazure, 1998).

Depressive triggers include trauma, stressful lifestyle, or relationship changes such as divorce, bereavement, or unemployment. Depression can also be caused by alcohol consumption, and if an individual is drinking alcohol and already depressed, symptoms may worsen (Wiegert and Oertner, 2013).

Depression may present physical symptoms, such as disturbed sleep, lethargy, and changes in appetite, while psychological symptoms of depression include low mood, helplessness, a lack of motivation and suicidal ideation (Schuch et al., 2016).

Alcohol alters the chemical balance in the brain and acts as a depressant. Despite an initial sense of inhibition and relaxation when consuming alcohol, these are short lived and wear off quickly (Weiss, 1958). Frequent drinking increases alcohol tolerance, therefore, a larger amount of alcohol needs to be consumed over time to experience the same sense of relaxation.

4.3.5 Other Alcohol Attributable Chronic Illnesses

The *International Classification of Disease, Tenth Edition* (ICD–10) highlights alcohol dependence and harmful use of alcohol, as disorders indicating alcohol as a necessary cause, and include a number of other illnesses that are entirely attributable to alcohol consumption, as seen in table 3.

Table 3 Alcohol Attributable Chronic Diseases and Conditions as outlined in the International Classification of Disease, Tenth Edition. Adapted from Chronic Diseases and Conditions Related to Alcohol Use, Shield et al. 2014

ICD–10 Code	Disease
F10	Mental and behavioural disorders attributed to the use of alcohol
F10.0	Acute intoxication
F10.1	Harmful use
F10.2	Dependence syndrome
F10.3	Withdrawal state
F10.4	Withdrawal state with delirium
F10.5	Psychotic disorder
F10.6	Amnesic syndrome
F10.7	Residual and late-onset psychotic disorder
F10.8	Other mental and behavioural disorders
F10.9	Unspecified mental and behavioural disorder
G31.2	Degeneration of nervous system attributed to alcohol
G62.1	Alcoholic polyneuropathy
G72.1	Alcoholic myopathy
I42.6	Alcoholic cardiomyopathy
K29.2	Alcoholic gastritis
K70	Alcoholic liver disease
K70.0	Alcoholic fatty liver
K70.1	Alcoholic hepatitis
K70.2	Alcoholic fibrosis and sclerosis of liver
K70.3	Alcoholic cirrhosis of liver
K70.4	Alcoholic hepatic failure
K70.9	Alcoholic liver disease, unspecified
K85.2	Alcohol-induced acute pancreatitis
K86.0	Alcohol-induced chronic pancreatitis
P04.3	Foetus and new-born affected by maternal use of alcohol
Q86.0	Foetal alcohol syndrome (dysmorphic)

These illnesses are directly attributed to alcohol and contain alcohol within the illness title.

Alcohol consumption carries an increased risk of cardiovascular diseases, such as coronary artery disease, stroke, atrial fibrillation, hypertension, and heart failure due to increased cholesterol and blood pressure levels (Zhou et al., 2016).

4.4 Mortality

The World Health Organization estimates that 3 million deaths, or 5.3% of all global deaths occurring yearly, occur as a result of harmful alcohol consumption, with 13.5% of total deaths amongst 20 – 39-year-olds (World Health Organization, 2022).

Cancer attributable to alcohol, liver cirrhosis and injuries account for the majority of the burden of alcohol related mortality and were responsible for 91% of Europe's net mortality associated with alcohol consumption in 2005, and 80% in 2004 (Rehm and Shield, 2013).

While alcohol disorders are more prevalent in men, a rapid increase in the prevalence of alcohol use disorders amongst women has been recorded in recent years. One reason outlined for the existence of differences in risks for alcoholism between the sexes is due to the varying degrees of risk factors experienced by males and females e.g., females may experience more trauma, while males may have been exposed to more underage drinking – both underage drinking and trauma are risk factors in alcohol dependency (White, 2020). The burden of disease attributed to alcohol is lower in females.

Socioeconomic factors also contribute to the risk of alcohol related mortality, men in more deprived areas are 3 to 10 times more likely to die due to alcohol related mortality, while women were 2 to 6 times more likely (Collins, 2016).

No studies involving alcohol consumption post minimum unit pricing implementation focusing solely on the effects that MUP has had on morbidity have been published to date.

Chapter 5: Results

This chapter will identify any effects a minimum unit pricing strategy for alcohol in Ireland, Scotland, Canada, and Australia has had on general alcohol consumption, morbidity, and mortality.

5.1 Ireland

As minimum unit pricing (MUP) was implemented earlier this year (2022), there is a limited range of data available to provide insight into any changes MUP may have influenced on consumption, morbidity, and mortality in Ireland.

Year to date (YTD) data provided by NielsenIQ, using data collected from supermarkets, off licenses and discount stores for the period of January to April found that off trade alcohol sales increased by 11%, compared to the same period in 2019 (Nielsen, 2022)

Overall volume for both on and off trade alcohol sales across the period compared to the previous year (2021) was down, as observed in figure 17, however lockdown and other Covid-19 related restrictions must be considered when evaluating 2020 and 2021 data.

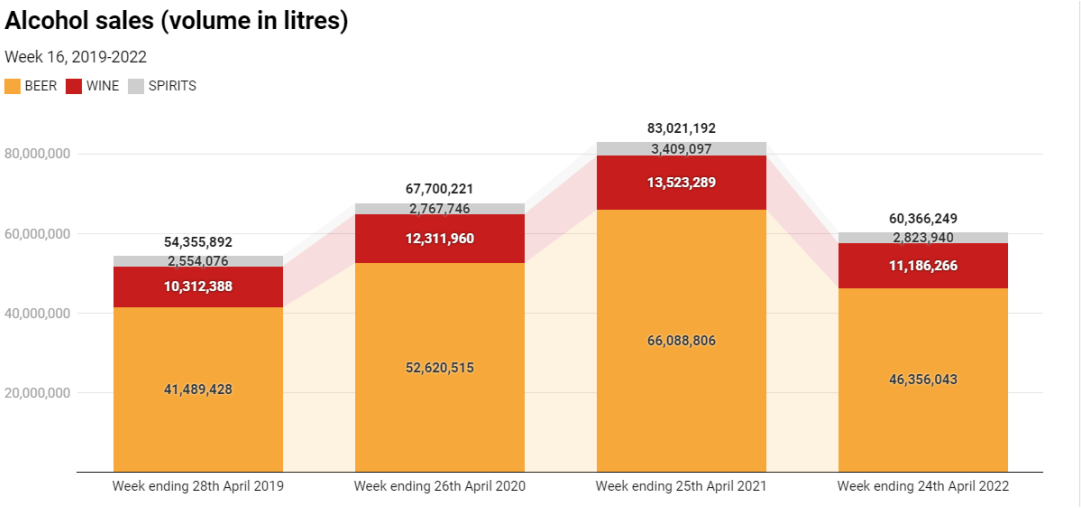

Figure 17 Week 16 alcohol sales by volume, taken from Nielsen's Week 16 Alcohol Sales Report, 2022.

5.2 Scotland

As minimum unit pricing has been in place in Scotland since 2018, this has allowed for a variety of studies and research to be conducted following its implementation.

An initial report published by Public Health Scotland in June 2021 found that the proportion of individuals drinking alcohol at less than 50p per unit had reduced from 6 in 10 people prior to MUP, to 1 in 10 following MUP. This report also indicated that

individuals may have decreased expenditure in other areas, such as food and fuel, in order to maintain expenditure on alcohol.

In June 2022, the final report evaluating the impact of MUP on people drinking at harmful levels was published by Public Health Scotland. This report concluded that no clear evidence was found to indicate that a change in consumption, or a change in severity of dependence amongst heavy drinkers had taken place as a result of MUP. There was a clear indication that heavy drinkers were spending more money on alcohol, which in turn created issues around maintaining adequate heat, fuel, and utilities. Those with alcohol dependence were also found to have a limited understanding or awareness of MUP and reported receiving limited supports prior to its introduction.

The MESAS (Monitoring and Evaluating Scotland's Alcohol Strategy) report also published in June 2022 found that population level alcohol consumption was similar to consumption in 2020 – the lowest levels recorded in Scotland since records began in 1994. It reported that 9.4 litres of pure alcohol were sold per adult per week, equivalent to 18.1 units per adult. This is well below the recommended guidelines of 14 units.

Covid-19 restrictions in 2021 also affected alcohol sales, as 85% of pure alcohol sold was obtained through the off trade. This was marginally lower than 2020 figures of 90%, however it is significantly higher than 2019 (72%) (Public Health Scotland, 2022).

The rate of alcohol specific deaths also increased between 2019-2020 in Scotland, with an average of 23 people per week dying due to alcohol, the highest rate recorded since records began. This rate was highest amongst men aged 45 and over.

5.3 Canada

The approach to minimum unit pricing in Canada is varied and has been in place for a number of years, with variances observed in each region's approach to implementation.

In British Columbia, increases in minimum prices was found to substantially reduce alcohol consumption. A 10% increase in minimum price reduced its consumption relative to other beverages by 16.1%, identified using longitudinal estimates (Stockwell et al., 2012).

A 10% increase in minimum pricing in British Columbia is also associated with a 9% reduction in acute alcohol related hospital admissions and identifies a delayed reduction

in hospital admissions for alcohol related disease (Stockwell et al. 2013). This increase is also associated with a 31.72% reduction in deaths wholly attributable to alcohol consumption (Zhao et al., 2013)

In Saskatchewan, minimum pricing was introduced in 2010, with the rate applied dependent on the ABV of the beverage. For each 10% increase in minimum price, an 8.4% reduction in consumption was observed (Stockwell et al. 2012).

5.4 Australia

Minimum unit pricing is also a relatively new concept in Australia, with the Northern Territory introducing a MUP of $1.30 per standard drink in 2018. Empirical data suggests that a 10% increase in excise rates for off trade alcohol consumption was estimated to reduce overall consumption within the entire population by 1%, in harmful drinkers by 2%, and less than 1% for moderate drinkers (Jiang et al., 2020).

These results were in contrast to what modelling data suggested; that a 14% reduction would occur in harmful drinkers, compared to 3% for moderate drinkers (Jiang et al., 2020).

Chapter 6: Discussion

This chapter will explore the implications of MUP, and the effect it has had on the alcohol landscape within each respective country, to focus on overall consumption, illness, and deaths.

Ireland

The introduction of MUP in Ireland as a strategy, while similar to the policy in Scotland differs, as it is not subject to review regarding effectiveness. Its introduction came at a time when Covid-19 was still resulting in restrictions, and hospitality remained limited due to restrictions on indoor dining, opening hours etc.

To date, there has been no research published in to understanding the effects MUP has had in Ireland since its introduction – and any potential impacts are inferred from sales data, such as the Nielsen data outlining that off trade alcohol sales had increased by 11% for the 16 weeks up to April of 2022 when compared with the same period in 2021.

Some producers of alcoholic beverages have amended pack size, ABV or both in an effort to give consumers a sense of value when purchasing alcohol. This does not contravene the Public Health (Alcohol) Act. For example, Harp Lager produced by Diageo prior to MUP retailed at approximately €11 for 6 x 500ml cans, in recent weeks, Diageo have reformulated the pack size to 6 x 440ml cans, retailing at approximately €9. ABV remained unchanged. Linden Village, a value cider produced by Bulmers Ireland had an ABV of 6% prior to MUP and was sold in both 2-liter bottle and 500ml can formats, with the 2-litre bottle retailing for approximately €5 during promotional periods. Since the introduction of MUP, the 2-litre bottle has been discontinued and a new 1 litre format introduced. ABV has been reduced to 5% for both can and bottle format, and now a 1 litre retails at approximately €4, while 4 x 500ml cans retail for €8. Similarly, slabs of 24x500ml cans which would often be on promotion at €20 approximately during Christmas, bank holidays etc. have almost all been removed from retail sale.

At the time of its introduction, it is possible that consumers may not have fully appreciated the implications of MUP due to the distraction of Covid-19 at the time, however they may begin to notice the impact reformulation has had on pack sizes. The issue of MUP remains topical, with many retailers, particularly those closer to the border

with Northern Ireland concerned that they may see reduced sales due to an increase in cross border shopping.

Scotland

MUP in Scotland remains highly topical, as final reports regarding the effectiveness of the strategy have been published in advance of a review to determine the course of the strategy into the future.

Many studies conducted previously on MUP in Scotland and elsewhere used overall alcohol sales, or household expenditure data to determine any increase or decrease in alcohol consumption. Further detail was required to determine changes in consumption by sex, age, and socio-economic status, in order to identify changes in consumption amongst young people, people in deprived circumstances or heaviest drinking men, the groups of people the policy was designed to help most. It was found that there was no association between reduced consumption in these cohorts, in fact consumption of the 5% of heaviest drinking men increased by 10% overall (Rehm et al., 2022).

This finding indicates that there may be an issue with MUP, and the effective targeting of those at the most risk from alcohol consumption, and anecdotal evidence has indicated that there may be an increase in illicit drug use as a result of the policy. Heavy drinkers have been said to “heat less and eat less” in order to maintain their alcohol consumption, to the detriment of other areas of their lives. In a time with global rises in inflation and general cost of living, problematic drinkers appear to be at an increased risk of suffering as a result of the price increases.

While MUP had been well advertised in print media, radio and television, many heavy drinkers were not aware of its implementation as they are less likely to consume these types of media. Similarly, there was no increase in provisions for services relating to reducing alcohol related harm by the Scottish government (Buykx et al. 2021).

The review clause within the MUP policy in Scotland will be exercised between May 2023 and April 2024 to fully identify how MUP has contributed to reducing alcohol related health issues, and to understand if people or businesses are being affected in a positive or negative manner by MUP.

Canada

Some areas of Canada, such as British Columbia, had a strategy of minimum pricing in place as early as 2002, so any research conducted thereafter does not measure changes in consumption in first time implementation of MUP, rather correlation between changes within the preexisting pricing environment.

Canada's policies are focused on a minimum price per litre of alcohol, unlike Ireland and Scotland's policy which focus on MUP per gram of alcohol.

The majority of alcohol in Canada is distributed by government owned and run off licenses, which unlike private enterprises, does not have the same profit motives that privately owned stores do, and therefore do not have an incentive to maximize alcohol sales like stores in Ireland or Scotland do.

Alcohol related deaths and hospital admissions in British Columbia had risen in the period of 2002 – 2009, when a MUP strategy was in place (figure 18).

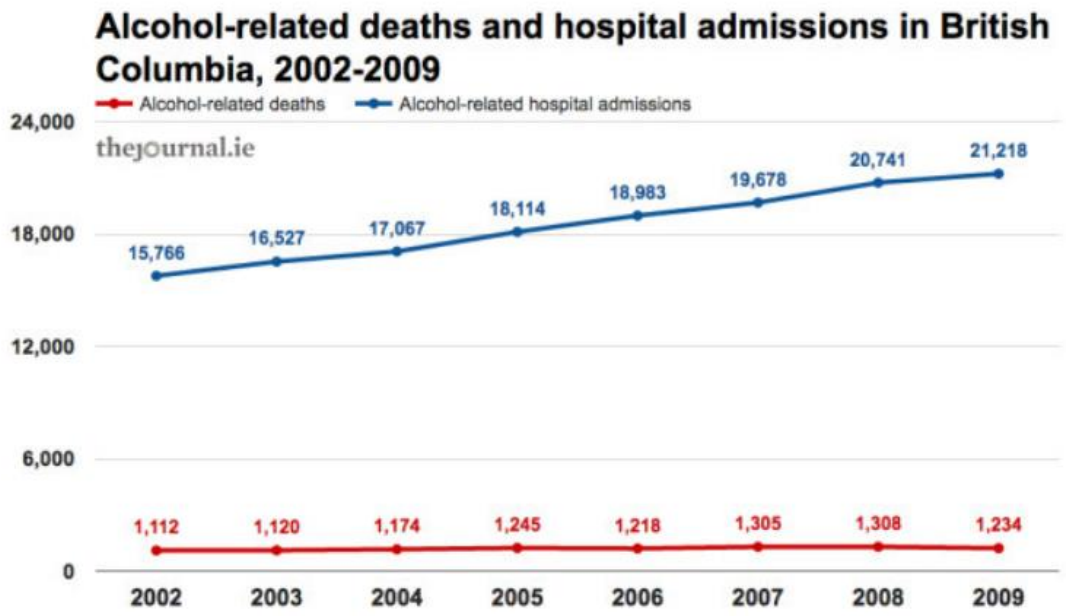

Figure 18 Alcohol related deaths and hospital admissions in British Columbia, 2002-2009. Taken from the Canadian Institute for Substance Use Research, 2022.

The introduction of MUP in Canada used statistical models to estimate potential changes in consumption amongst the population, which use assumptions regarding consumer behavior to model. These assumptions, such as when price goes up, demand goes down, do not fully represent the inelastic demand that alcohol has on some within the population. The Canadian approach as led to evidence showing that an increase in

alcohol price reduces consumption, however this does not allow for differentiation from drinkers at most risk.

Australia

The Northern Territory introduced minimum unit pricing in October 2018, and extensive research is yet to be published to identify the impact it may have had on alcohol consumption overall, however some limited investigations have been conducted into the impact of MUP on wholesale trade. One study conducted on estimated per capita alcohol consumption for cask wine, total wine, and total alcohol in the Northern Territory and in Darwin found that cask wine consumption decreased by 50.6% in the Northern Territory in 2021, and by 48.8% in Darwin compared to 2020, and total wine consumption was also reduced. No significant reduction was noted for other beverages such as beer and spirits however (Taylor et al., 2021).

The empirical data provided in a study conducted by Jiang et al., 2020 show a reduction of 2% in heavy drinkers, less than 1% in moderate drinkers and 1% overall. When compared with estimates provided by modelling data, these had previously estimated that alcohol consumption in heavy drinkers would reduce by 14%.

Alcohol, Addiction, and Mental Health

From reviewing the policies implemented by Ireland, Scotland, Australia and Canada, a core concept shared by all is the aim to reduce alcohol consumption in heavy drinkers using the basic economic principle of increased price will lead to reduced demand, however how this affects the pattern of drinking amongst heavy drinkers has not been fully understood prior to implementing MUP policies. Alcohol dependence, as a result of or combined with mental health issues is a key factor in the prevalence of harmful drinking. The lack of advertised supports, increased promotion of health awareness campaigns around alcohol consumption, or targeted supports for those that would be most affected by MUP were not implemented by any of the aforementioned countries during MUP adaptation.

In contrast, Ireland’s extremely successful smoking ban introduced in 2004 was heavily advertised, and promotion for quitting services continue to be heavily advertised to this day, particularly in December and January where people may want to quit for the new year ahead.

The increased stigmatization and social isolation of smokers does not apply to those who drink, and advertisement for alcohol often involve images portraying cheerful groups consuming alcohol, such as Guinness' current summer campaign "Lovely day for a Guinness."

Effectiveness of MUP

From evaluating available data surrounding consumption, morbidity and mortality in Ireland, Scotland, Canada, and Australia, it can be concluded that these policies are too new to come to a conclusion on their effectiveness overall.

In Ireland, an 11% increase in 2022 in off trade sales for the first 16 weeks of the year compared to the same period in 2019 (not including 2020 and 2021 data due to Covid-19) may indicate that trends within alcohol consumption in Ireland have changed as a result of Covid-19, or that consumers may not have the same amount of disposable income to spend in the on trade due to the current increased cost of living. Research is required to identify changes in consumption by demographic to fully understand the effect MUP has had.

The reviews of MUP currently being undertaken in Scotland have highlighted that while it may reduce overall consumption, the strategy may not be meeting the needs of harmful drinkers, whose consumption has increased since the implementation of MUP.

In Canada, MUP policies in place there have been used to model MUP policies in place in Ireland, Scotland, and other countries, however their effectiveness is not clearly defined due to their use of modelling data compared to actual data from consumption, hospital admissions etc.

The effects of MUP in the Northern Territory in Australia has not been studied in great detail since its implementation, however empirical data suggests that heavy drinkers have reduced consumption by 2%, much less than what the statistical modelling had suggested (14%).

Chapter 7: Conclusion and Future Work

In conclusion, minimum unit pricing strategies were evaluated in Ireland, Scotland, Canada, and Northern Territory Australia. The format and structure of each pricing strategy was found to be similar; all strategies set out a minimum floor price. Differences included how the minimum price was applied to the product, whether by litre or by gram of alcohol contained.

The importance of minimum unit pricing strategies is linked to the dangers associated with alcohol consumption, with all alcohol consumption posing the risk of short- and long-term harms. The World Health Organization actively encourages governments to implement strategies that increase the price of alcohol in order to reduce consumption.

For policies currently in place in Ireland, Scotland, Canada and Australia, the levels of research conducted into their effectiveness varies, in some cases such as Irelands' due to how new the policy is. Each of the aforementioned countries have the same aim with minimum unit pricing, to reduce the instances of harmful alcohol consumption, particularly amongst heavy drinkers. Despite this, no country implemented additional supports to heavy drinkers prior to the implementation of minimum unit pricing. Other public health policies, such as Ireland's smoking ban, included a multi-disciplinary approach to reduce smoking, through awareness campaigns, quitting support, and advertising the benefits of quitting.

From information available on new minimum unit pricing strategies such as Scotland's, initial research indicates that MUP is not as effective as modelling statistics suggest, and in some cases have caused heavy drinkers to increase their consumption by 10%, to the detriment of food, fuel, and other necessary purchases.

At present, it is not possible to conclude that minimum unit pricing is an effective strategy in reducing alcohol consumption, morbidity, and mortality, mainly due to the lack of sustained evidence following implementation. Some minor indicators suggest that alcohol consumption across an entire population may reduce, however this avoids the target of the policy: heavy drinkers. A key similarity across countries with MUP policies in place is the lack of adequate supports provisioned for heavy drinkers in advance of implementation, many of whom suffer with mental health issues.

For moderate, infrequent drinkers, minimum unit pricing has had a minimal effect on their alcohol spend. These consumers may be more aware of price as a result of inflation and the general cost of living, not as a direct result of MUP.

This area requires immediate further study, particularly in Ireland where no initial study on the immediate effects of MUP is currently available. Covid-19 has significantly disrupted how alcohol is consumed globally, with the on-trade suffering dramatically due to restrictions imposed on closure, opening hours etc. Recovery is still underway as a result of these measures. Future work may require specific focus on heavy drinkers and their drinking patterns, as opposed to overall consumption which features heavily in research. Similarly, adapting a multi-disciplinary strategy to include easily accessible alcohol supports for problem drinkers is also required. These supports may include those similar to Ireland's QUIT Campaign, such as advice lines, information packs, professional advice, support, and in the case of problem drinkers with mental health issues, adequate support from professionals that is immediately accessible without long wait times.

Chapter 8: References

Agarwal-Kozlowski, K., Agarwal, D.P., 2000. [Genetic predisposition for alcoholism]. Ther Umsch 57, 179–184. https://doi.org/10.1024/0040-5930.57.4.179

Albors-Llorens, A., 2017. THE ALCOHOL (MINIMUM PRICING) (SCOTLAND) ACT 2012 AND THE COLLISION BETWEEN SINGLE-MARKET OBJECTIVES AND PUBLIC-INTEREST REQUIREMENTS. C.L.J. 76, 25–29. https://doi.org/10.1017/S0008197317000204

Altar, C.A., 1999. Neurotrophins and depression. Trends in Pharmacological Sciences 20, 59–62. https://doi.org/10.1016/S0165-6147(99)01309-7

American Psychiatric Association, American Psychiatric Association (Eds.), 2013. Diagnostic and statistical manual of mental disorders: DSM-5, 5th ed. ed. American Psychiatric Association, Washington, D.C.

Anderson, P., O'Donnell, A., Kaner, E., Llopis, E.J., Manthey, J., Rehm, J., 2021. Impact of minimum unit pricing on alcohol purchases in Scotland and Wales: controlled interrupted time series analyses. The Lancet Public Health 6, e557–e565. https://doi.org/10.1016/S2468-2667(21)00052-9

Bardsley, D., McLean, J., Scotland, Scottish Government, APS Group Scotland, 2018. The Scottish health survey. Volume 1 Main report Volume 1 Main report.

Bødker, M., Pisinger, C., Toft, U., Jørgensen, T., 2015. The rise and fall of the world's first fat tax. Health Policy 119, 737–742. https://doi.org/10.1016/j.healthpol.2015.03.003

Boles, S.M., & Miotto, K. (2003). Substance abuse and violence: A review of the literature. Aggression and Violent Behavior, 155– 174

Boniface, S., Scannell, J.W., Marlow, S., 2017. Evidence for the effectiveness of minimum pricing of alcohol: a systematic review and assessment using the Bradford Hill criteria for causality. BMJ Open 7, e013497. https://doi.org/10.1136/bmjopen-2016-013497

Brown, L.M., 2006. Epidemiology of Alcohol-Associated Cancers, in: Cho, C.H., Purohit, V. (Eds.), Alcohol, Tobacco and Cancer. KARGER, Basel, pp. 13–28. https://doi.org/10.1159/000095011

Caan, W. (Ed.), 2002. Drink, drugs and dependence: from science to clinical practice, 1. publ. ed. Routledge, London.

Caetano, R., Schafer, J., Cunradi, C.B., 2001. Alcohol-related intimate partner violence among white, black, and Hispanic couples in the United States. Alcohol Res Health 25, 58–65.

Cawley, J., Biener, A., Meyerhoefer, C., Ding, Y., Zvenyach, T., Smolarz, B.G., Ramasamy, A., 2021. Direct medical costs of obesity in the United States and the most populous states. JMCP 27, 354–366. https://doi.org/10.18553/jmcp.2021.20410

Cederbaum, A.I., 2012. Alcohol Metabolism. Clinics in Liver Disease 16, 667–685. https://doi.org/10.1016/j.cld.2012.08.002

Charalambous, M.P., 2002. ALCOHOL AND THE ACCIDENT AND EMERGENCY DEPARTMENT: A CURRENT REVIEW. Alcohol and Alcoholism 37, 307–312. https://doi.org/10.1093/alcalc/37.4.307

Chatelan, A., Lebacq, T., Rouche, M., Kelly, C., Fismen, A.-S., Kalman, M., Dzielska, A., Castetbon, K., 2022. Long-term trends in the consumption of sugary and diet soft drinks among adolescents: a cross-national survey in 21 European countries. Eur J Nutr 61, 2799–2813. https://doi.org/10.1007/s00394-022-02851-w

Chikritzhs, T., Livingston, M., 2021. Alcohol and the Risk of Injury. Nutrients 13, 2777. https://doi.org/10.3390/nu13082777

Christie, B., 2020. Alcohol: WHO tells Europe to raise prices to reduce harm. BMJ m2649. https://doi.org/10.1136/bmj.m2649

Chrzan, J., 2013. Alcohol: social drinking in cultural context, The Routledge series for creative teaching and learning in anthropology. Routledge, New York.

Conner, K.R., Duberstein, P.R., 2004. Predisposing and Precipitating Factors for Suicide Among Alcoholics: Empirical Review and Conceptual Integration. Alcoholism: Clinical and Experimental Research 28, 6S-17S. https://doi.org/10.1097/01.ALC.0000127410.84505.2A

Davey, R.C., 2004. The obesity epidemic: too much food for thought? British Journal of Sports Medicine 38, 360–363. https://doi.org/10.1136/bjsm.2003.007443

Dee, A., Callinan, A., Doherty, E., O'Neill, C., McVeigh, T., Sweeney, M.R., Staines, A., Kearns, K., Fitzgerald, S., Sharp, L., Kee, F., Hughes, J., Balanda, K., Perry, I.J., 2015. Overweight and obesity on the island of Ireland: an estimation of costs. BMJ Open 5, e006189–e006189. https://doi.org/10.1136/bmjopen-2014-006189

Doll, R., Hill, A.B., 1950. Smoking and Carcinoma of the Lung. BMJ 2, 739–748. https://doi.org/10.1136/bmj.2.4682.739

Doyle, A., 2021. Alcohol consumption, alcohol-related harm, and alcohol policy in Ireland. *Drugnet Ireland*, pp.1-8.

Engs, R.C., Aldo-Benson, M., 1995. The Association of Alcohol Consumption with Self-Reported Illness in University Students. Psychol Rep 76, 727–736. https://doi.org/10.2466/pr0.1995.76.3.727

European Observatory on Health Systems and Policies, 2019. Eurohealth: a healthy dose of disruption? Transformative change for health and societal well-being, Eurohealth. World Health Organization. Regional Office for Europe, Copenhagen.

European Observatory on Health Systems and Policies, Melsom, R., Payne, C., 2019. Transforming financial markets for the good of all. Eurohealth 25, 26–29.

Fichera, E., Mora, T., Lopez-Valcarcel, B.G., Roche, D., 2021. How do consumers respond to “sin taxes”? New evidence from a tax on sugary drinks. Social Science & Medicine 274, 113799. https://doi.org/10.1016/j.socscimed.2021.113799

Foran, H.M., & O'Leary, K.D. (2008). Alcohol and intimate partner violence: A meta-analytic review. Clinical Psychology Review, 28(7), 1222–1234.

Gaiser, J., 1984. Smoking among Maoris and other minorities in New Zealand. World Smoking Health 9, 7–9, 18.

Giles L, Robinson M. Monitoring and Evaluating Scotland’s Alcohol Strategy: Monitoring Report 2018. Edinburgh: NHS Health Scotland; 2018.

Gilmore, I., 2015. A minimum unit price: the ‘holy grail’ of alcohol policy. Clin Med 15, 5–6. https://doi.org/10.7861/clinmedicine.15-1-5

Guariguata, L., Unwin, N., Garcia, L., Woodcock, J., Samuels, T.A., Guell, C., 2021. Systems science for developing policy to improve physical activity, the Caribbean. Bulletin of the World Health Organization 99, 722–729. https://doi.org/10.2471/BLT.20.285297

Hawkins, B., McCambridge, J., 2020. ‘Tied up in a legal mess’: The alcohol industry’s use of litigation to oppose minimum alcohol pricing in Scotland. Scottish Affairs 29, 3–23. https://doi.org/10.3366/scot.2020.0304

Horn, G., 2017. Justifying Alcohol Minimum Unit Pricing, in: Justifying Alcohol Minimum Unit Pricing, Strathclyde Law Review. University of Strathclyde, Glasgow, pp. 102–117.

Hosseini, N., Shor, J., Szabo, G., 2019. Alcoholic Hepatitis: A Review. Alcohol and Alcoholism 54, 408–416. https://doi.org/10.1093/alcalc/agz036

Jané-Llopis, E., Kokole, D., Neufeld, M., Hasan, O.S., Rehm, J., 2020. What is the current alcohol labelling practice in the WHO European Region and what are barriers and facilitators to development and implementation of alcohol labelling policy?, Health Evidence Network synthesis report, No. 68. World Health Organization. Regional Office for Europe, Copenhagen.

Jiang, H., Livingston, M., Room, R., Callinan, S., Marzan, M., Brennan, A., Doran, C., 2020. Modelling the effects of alcohol pricing policies on alcohol consumption in subpopulations in Australia. Addiction 115, 1038–1049. https://doi.org/10.1111/add.14898

Jones, R.F., Horan, D.L., 1997. The American College of Obstetricians and Gynecologists: a decade of responding to violence against women. International Journal of Gynecology & Obstetrics 58, 43–50. https://doi.org/10.1016/S0020-7292(97)02863-4

Lang, J.J., Wolfe Phillips, E., Orpana, H.M., Tremblay, M.S., Ross, R., Ortega, F.B., Silva, D.A.S., Tomkinson, G.R., 2018. Field-based measurement of cardiorespiratory

fitness to evaluate physical activity interventions. Bulletin of the World Health Organization 96, 794–796. https://doi.org/10.2471/BLT.18.213728

Lesch, M., McCambridge, J., 2022. A long-brewing crisis: The historical antecedents of major alcohol policy change in Ireland. Drug and Alcohol Review 41, 135–143. https://doi.org/10.1111/dar.13331

Lew, J.Q., Freedman, N.D., Leitzmann, M.F., Brinton, L.A., Hoover, R.N., Hollenbeck, A.R., Schatzkin, A., Park, Y., 2009. Alcohol and Risk of Breast Cancer by Histologic Type and Hormone Receptor Status in Postmenopausal Women: The NIH-AARP Diet and Health Study. American Journal of Epidemiology 170, 308–317. https://doi.org/10.1093/aje/kwp120

Maier, H., Dietz, A., Gewelke, U., Heller, W.D., Weidauer, H., 1992. Tobacco and alcohol and the risk of head and neck cancer. Clin Investig 70–70. https://doi.org/10.1007/BF00184668

Mann, L.B., Folts, J.D., 2004. Effects of ethanol and other constituents of alcoholic beverages on coronary heart disease: a review. Pathophysiology 10, 105–112. https://doi.org/10.1016/j.pathophys.2003.10.011

Marais, J.F., Kazakova, O., Krupchanka, D., Suvalo, O., Thomas, F., 2020. Understanding and building resilience to early life trauma in Belarus and Ukraine, Cultural Contexts of Health and Well-being; Stakeholder narratives; 1. World Health Organization. Regional Office for Europe, Copenhagen.

Marten, R., Kadandale, S., Nordström, A., Smith, R.D., 2018. Shifting global health governance towards the sustainable development goals. Bulletin of the World Health Organization 96, 798-798A. https://doi.org/10.2471/BLT.18.209668

Mazure, C.M., 1998. Life stressors as risk factors in depression. Clinical Psychology: Science and Practice 5, 291–313. https://doi.org/10.1111/j.1468-2850.1998.tb00151.x

McKillop, I.H., Schrum, L.W., 2005. Alcohol and liver cancer. Alcohol 35, 195–203. https://doi.org/10.1016/j.alcohol.2005.04.004

McLean, J., Wilson, V., Scotland, Scottish Government, APS Group Scotland, 2020. The Scottish health survey. Volume 1 Main report Volume 1 Main report.

Millwood, I.Y., Walters, R.G., Mei, X.W., Guo, Y., Yang, L., Bian, Z., Bennett, D.A., Chen, Y., Dong, C., Hu, R., Zhou, G., Yu, B., Jia, W., Parish, S., Clarke, R., Davey Smith, G., Collins, R., Holmes, M.V., Li, L., Peto, R., Chen, Z., 2019. Conventional and genetic evidence on alcohol and vascular disease aetiology: a prospective study of 500 000 men and women in China. The Lancet 393, 1831–1842. https://doi.org/10.1016/S0140-6736(18)31772-0

Mongan, Deirdre (2008) Alcohol-related harm in Ireland. Drugnet Ireland, Issue 26, Summer 2008, pp. 9-10.

Morey, C., Corcoran, P., Arensman, E., Perry, I.J., 2008. The prevalence of self-reported deliberate self harm in Irish adolescents. BMC Public Health 8, 79. https://doi.org/10.1186/1471-2458-8-79

Müller, D., Koch, R.D., von Specht, H., Völker, W., Münch, E.M., 1985. [Neurophysiologic findings in chronic alcohol abuse]. Psychiatr Neurol Med Psychol (Leipz) 37, 129–132.

Nau, T., Smith, B.J., Bauman, A., Bellew, B., 2021. Legal strategies to improve physical activity in populations. Bulletin of the World Health Organization 99, 593–602. https://doi.org/10.2471/BLT.20.273987

Ness, J., Hawton, K., Bergen, H., Cooper, J., Steeg, S., Kapur, N., Clarke, M., Waters, K., 2015. Alcohol use and misuse, self-harm and subsequent mortality: an epidemiological and longitudinal study from the multicentre study of self-harm in England. Emerg Med J 32, 793–799. https://doi.org/10.1136/emermed-2013-202753

New Zealand, Ministry of Health, 2021. Smokefree Aotearoa: 2025 action plan.

O'Donnell, A., Anderson, P., Jané-Llopis, E., Manthey, J., Kaner, E., Rehm, J., 2019. Immediate impact of minimum unit pricing on alcohol purchases in Scotland: controlled interrupted time series analysis for 2015-18. BMJ l5274. https://doi.org/10.1136/bmj.l5274

O'Dwyer C, Mongan D, Doyle A and Galvin B (2021) Alcohol consumption, alcohol-related harm and alcohol policy in Ireland. HRB Overview Series 11. Dublin: Health Research Board.

Obaid, H.A., Hassan, M.A., Mahdy, N.H., El Disouky, M.I., Alzarba, F.E., Alnayeemi, S.R., Rillera, M.C., Al Mazrooei, B.S., 2014. Tobacco use and associated factors among school students in Dubai, 2010: intervention study. EMHJ-Eastern Mediterranean Health Journal 20, 765–773.

Pell, D., Mytton, O., Penney, T.L., Briggs, A., Cummins, S., Penn-Jones, C., Rayner, M., Rutter, H., Scarborough, P., Sharp, S.J., Smith, R.D., White, M., Adams, J., 2021. Changes in soft drinks purchased by British households associated with the UK soft drinks industry levy: controlled interrupted time series analysis. BMJ n254. https://doi.org/10.1136/bmj.n254

Pompili, M., Serafini, G., Innamorati, M., Dominici, G., Ferracuti, S., Kotzalidis, G.D., Serra, G., Girardi, P., Janiri, L., Tatarelli, R., Sher, L., Lester, D., 2010. Suicidal Behavior and Alcohol Abuse. IJERPH 7, 1392–1431. https://doi.org/10.3390/ijerph7041392

Puddey, I.B., Beilin, L.J., 2006. ALCOHOL IS BAD FOR BLOOD PRESSURE. Clin Exp Pharmacol Physiol 33, 847–852. https://doi.org/10.1111/j.1440-1681.2006.04452.x

Regional Committee for Africa, 70, 2020. Framework for the implementation of the global action plan on physical activity 2018–2030 in the WHO African Region: report of the Secretariat. World Health Organization. Regional Office for Africa, Brazzaville.

Rehm, J., 2011. The risks associated with alcohol use and alcoholism. Alcohol Res Health 34, 135–143.

Rehm, J., O'Donnell, A., Kaner, E.F.S., Jane LLopis, E., Manthey, J., Anderson, P., 2022. Differential impact of minimum unit pricing on alcohol consumption between Scottish men and women: controlled interrupted time series analysis. BMJ Open 12, e054161. https://doi.org/10.1136/bmjopen-2021-054161

Reid, M.C., Fiellin, D.A., O'Connor, P.G., 1999. Hazardous and Harmful Alcohol Consumption in Primary Care. Arch Intern Med 159, 1681. https://doi.org/10.1001/archinte.159.15.1681

Renda, J., Vassallo, S., Edwards, B., 2011. Bullying in early adolescence and its association with anti-social behaviour, criminality and violence 6 and 10 years later. Criminal Behav. Ment. Health 21, 117–127. https://doi.org/10.1002/cbm.805

Richardson, E.A., Hill, S.E., Mitchell, R., Pearce, J., Shortt, N.K., 2015. Is local alcohol outlet density related to alcohol-related morbidity and mortality in Scottish cities? Health & Place 33, 172–180. https://doi.org/10.1016/j.healthplace.2015.02.014

Robins, L.N., 1998. The intimate connection between antisocial personality and substance abuse. Social Psychiatry and Psychiatric Epidemiology 33, 393–399. https://doi.org/10.1007/s001270050071

Robinson, M., Mackay, D., Giles, L., Lewsey, J., Richardson, E., Beeston, C., 2021. Evaluating the impact of minimum unit pricing (MUP) on off-trade alcohol sales in Scotland: an interrupted time–series study. Addiction 116, 2697–2707. https://doi.org/10.1111/add.15478

Rodgers, A., Woodward, A., Swinburn, B., Dietz, W.H., 2018. Prevalence trends tell us what did not precipitate the US obesity epidemic. The Lancet Public Health 3, e162–e163. https://doi.org/10.1016/S2468-2667(18)30021-5

Romeo, J., Wärnberg, J., Nova, E., Díaz, L.E., Gómez-Martinez, S., Marcos, A., 2007. Moderate alcohol consumption and the immune system: A review. Br J Nutr 98, S111–S115. https://doi.org/10.1017/S0007114507838049

Ronksley, P.E., Brien, S.E., Turner, B.J., Mukamal, K.J., Ghali, W.A., 2011. Association of alcohol consumption with selected cardiovascular disease outcomes: a systematic review and meta-analysis. BMJ 342, d671–d671. https://doi.org/10.1136/bmj.d671

Rutter, H., Cavill, N., Bauman, A., Bull, F., 2019. Systems approaches to global and national physical activity plans. Bulletin of the World Health Organization 97, 162–165. https://doi.org/10.2471/BLT.18.220533

Rutter, H., Cavill, N., Bauman, A., Bull, F., 2020. Systems approaches to support action on physical activity. Bulletin of the World Health Organization 98, 226–227. https://doi.org/10.2471/BLT.20.250936

Schuch, F.B., Vancampfort, D., Rosenbaum, S., Richards, J., Ward, P.B., Stubbs, B., 2016. Exercise improves physical and psychological quality of life in people with

depression: A meta-analysis including the evaluation of control group response. Psychiatry Research 241, 47–54. https://doi.org/10.1016/j.psychres.2016.04.054

Schuppan, D., Afdhal, N.H., 2008. Liver cirrhosis. The Lancet 371, 838–851. https://doi.org/10.1016/S0140-6736(08)60383-9

Scotch Whisky Association and Others v The Lord Advocate and The Advocate General for Scotland., n.d.

Scotland, Scottish Government, 2008. Changing Scotland's relationship with alcohol: a discussion paper on our strategic approach. Scottish Government, Edinburgh.

Scotland, Scottish Government, APS Group Scotland, 2019. Scottish schools adolescent lifestyle and substance use survey (SALSUS): national overview (2018).

Scotland, Social Research, 2010. The societal cost of alcohol misuse in Scotland for 2007. Scottish Government, Edinburgh.

Sher, L., 2006. Alcoholism and suicidal behavior: a clinical overview. Acta Psychiatry 113, 13–22. https://doi.org/10.1111/j.1600-0447.2005.00643.x

Shield, K.D., Parry, C., Rehm, J., 2013. Chronic diseases and conditions related to alcohol use. Alcohol Res 35, 155–173.

Singh, S., Osna, N.A., Kharbanda, K.K., 2017. Treatment options for alcoholic and non-alcoholic fatty liver disease: A review. WJG 23, 6549–6570. https://doi.org/10.3748/wjg.v23.i36.6549

Smed, S., Scarborough, P., Rayner, M., Jensen, J.D., 2016. The effects of the Danish saturated fat tax on food and nutrient intake and modelled health outcomes: an econometric and comparative risk assessment evaluation. Eur J Clin Nutr 70, 681–686. https://doi.org/10.1038/ejcn.2016.6

Spear, L.P., 2015. Adolescent alcohol exposure: Are there separable vulnerable periods within adolescence? Physiology & Behavior 148, 122–130. https://doi.org/10.1016/j.physbeh.2015.01.027

Stafford, N., 2012. Denmark cancels "fat tax" and shelves "sugar tax" because of threat of job losses. BMJ 345, e7889–e7889. https://doi.org/10.1136/bmj.e7889

Stockwell, T. and Thomas, G., 2013. Is alcohol too cheap in the UK? The case for setting a Minimum Unit Price for alcohol. *Institute of Alcohol Studies http://www. ias. org. uk/uploads/pdf/News% 20stories/iasreport-thomas-stockwell-april2013. pdf*.

Stockwell, T., Auld, M.C., Zhao, J., Martin, G., 2012. Does minimum pricing reduce alcohol consumption? The experience of a Canadian province: Does minimum pricing reduce alcohol consumption? Addiction 107, 912–920. https://doi.org/10.1111/j.1360-0443.2011.03763.x

Stockwell, T., Harford, L., Paszkowski, D., National Alcohol Strategy Advisory Committee (Canada), Working Group, Canadian Centre on Substance Abuse, 2015.

Social reference prices for alcohol: a tool for Canadian governments to promote a culture of moderation.

Stockwell, T., Zhao, J., Giesbrecht, N., Macdonald, S., Thomas, G. and Wettlaufer, A., 2012. The raising of minimum alcohol prices in Saskatchewan, Canada: impacts on consumption and implications for public health. *American journal of public health*, *102*(12), pp.e103-e110.

Tasnim, S., Tang, C., Musini, V.M., Wright, J.M., 2020. Effect of alcohol on blood pressure. Cochrane Database of Systematic Reviews 2020. https://doi.org/10.1002/14651858.CD012787.pub2

Taylor, B., Irving, H.M., Kanteres, F., Room, R., Borges, G., Cherpitel, C., Greenfield, T., Rehm, J., 2010. The more you drink, the harder you fall: A systematic review and meta-analysis of how acute alcohol consumption and injury or collision risk increase together. Drug and Alcohol Dependence 110, 108–116. https://doi.org/10.1016/j.drugalcdep.2010.02.011

Taylor, N., Miller, P., Coomber, K., Livingston, M., Scott, D., Buykx, P., Chikritzhs, T., 2021. The impact of a minimum unit price on wholesale alcohol supply trends in the Northern Territory, Australia. Australian and New Zealand Journal of Public Health 45, 26–33. https://doi.org/10.1111/1753-6405.13055

Testino, G., Leone, S., Borro, P., 2014. Treatment of alcohol dependence: recent progress and reduction of consumption. Minerva Med 105, 447–466.

Tuangratananon, T., Wangmo, S., Widanapathirana, N., Pongutta, S., Viriyathorn, S., Patcharanarumol, W., Thin, K., Nagpal, S., Nuevo, C.E.L., Padmawati, R.S., Puyat-Murga, M.E., Trisnantoro, L., Wangmo, K., Wellappuli, N., Thi, P.H., Anh, T.K., Zangmo, T., Tangcharoensathien, V., 2019a. Implementation of national action plans on noncommunicable diseases, Bhutan, Cambodia, Indonesia, Philippines, Sri Lanka, Thailand and Viet Nam. Bulletin of the World Health Organization 97, 129–141. https://doi.org/10.2471/BLT.18.220483

Tuangratananon, T., Wangmo, S., Widanapathirana, N., Pongutta, S., Viriyathorn, S., Patcharanarumol, W., Thin, K., Nagpal, S., Nuevo, C.E.L., Padmawati, R.S., Puyat-Murga, M.E., Trisnantoro, L., Wangmo, K., Wellappuli, N., Thi, P.H., Anh, T.K., Zangmo, T., Tangcharoensathien, V., 2019b. Implementation of national action plans on noncommunicable diseases, Bhutan, Cambodia, Indonesia, Philippines, Sri Lanka, Thailand and Viet Nam. Bulletin of the World Health Organization 97, 129–141. https://doi.org/10.2471/BLT.18.220483

UN-Habitat, World Health Organization, 2020. Integrating health in urban and territorial planning: a sourcebook. World Health Organization, Geneva.

Wakefield, M.A., Hayes, L., Durkin, S., Borland, R., 2013. Introduction effects of the Australian plain packaging policy on adult smokers: a cross-sectional study. BMJ Open 3, e003175. https://doi.org/10.1136/bmjopen-2013-003175

Weiss, M., 1958. Alcohol as a Depressant in Psychological Conflict in Rats. Q. J. Stud. Alcohol 19, 226–237. https://doi.org/10.15288/qjsa.1958.19.226

White, A., 2020. Gender Differences in the Epidemiology of Alcohol Use and Related Harms in the United States. ARCR 40, 01. https://doi.org/10.35946/arcr.v40.2.01

Wiegert, J.S., Oertner, T.G., 2013. Long-term depression triggers the selective elimination of weakly integrated synapses. Proc. Natl. Acad. Sci. U.S.A. 110. https://doi.org/10.1073/pnas.1315926110

World Health Organization, 2008. WHO Report on the Global Tobacco Epidemic, 2008: the MPOWER package. Rapport de l'OMS sur l'épidémie mondiale de tabagisme, 2008 : le programme MPOWER 329.

World Health Organization, 2018a. Global action plan on physical activity 2018–2030: more active people for a healthier world. World Health Organization, Geneva.

World Health Organization, 2018b. Global status report on alcohol and health 2018. World Health Organization, Geneva.

World Health Organization. Regional Office for the Eastern Mediterranean, 2019. Regional strategy and action plan for tobacco control 2019–2023. World Health Organization. Regional Office for the Eastern Mediterranean, Cairo.

Yadav, D.K., Zhang, Q., Bai, X., Li, E., Liang, T., 2020. Liver Transplantation for Alcohol-Related Liver Disease (ARLD): An Update on Controversies and Considerations. Canadian Journal of Gastroenterology and Hepatology 2020, 1–6. https://doi.org/10.1155/2020/8862152

Zhao, J., Stockwell, T., Martin, G., Macdonald, S., Vallance, K., Treno, A., Ponicki, W.R., Tu, A., Buxton, J., 2013. The relationship between minimum alcohol prices, outlet densities and alcohol-attributable deaths in British Columbia, 2002-09: Minimum alcohol price and alcohol-attributable death. Addiction 108, 1059–1069. https://doi.org/10.1111/add.12139

Zhou, Y., Zheng, J., Li, S., Zhou, T., Zhang, P., Li, H.-B., 2016. Alcoholic Beverage Consumption and Chronic Diseases. IJERPH 13, 522. https://doi.org/10.3390/ijerph13060522