



## Online alcohol sales and home delivery: An international policy review and systematic literature review



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### ABSTRACT

**Background:** Online alcohol sales are experiencing rapid growth in many places, accelerated by the COVID-19 pandemic, prompting new laws and regulations. There are no comprehensive and systematic analyses of the laws or their effectiveness.

**Objective:** To summarise international policies governing online alcohol sale and delivery, including changes occurring with COVID-19, and examine available evidence of retailer compliance with such policies.

**Method:** A policy review of 77 jurisdictions in six English-speaking OECD countries: United States, Canada, United Kingdom, Ireland, Australia and New Zealand. We synthesised policies according to ten elements identified as potentially relevant for public health regulation. A systematic literature review of compliance evaluations in Medline, Medline Epub, EMBASE, CINAHL, Web of Science and Google Scholar.

**Results:** 72 of 77 jurisdictions permitted online alcohol sales and home delivery. Few jurisdictions require age verification at the time of purchase ( $n = 7$ ), but most require it at delivery ( $n = 71$ ). Since the COVID-19 pandemic began, most jurisdictions (69%) have either temporarily or permanently relaxed liquor regulations for alcohol home delivery. Three articles examined retailer compliance with age restrictions and found relatively low compliance (0%–46%).

**Conclusion:** Many jurisdictions permit the online sale and delivery of alcohol, but regulation of these sales varies widely. In most, regulations do not meet the same standard as bricks-and-mortar establishments and may be insufficient to prevent youth access.

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### 1. Introduction

While most alcohol sales still occur in bricks-and-mortar retail stores and in on-premises outlets, online sales and home delivery have grown in popularity in recent years [1–3], and this growth has accelerated since the beginning of the COVID-19 pandemic [4–7]. As the availability of alcohol online is relatively recent, there has been limited research in this area. The research that has been conducted has raised potential issues with this mode of supply, in-

cluding the risk of supply to underage youth and intoxicated persons, and a possible association between the use of these services and risky or harmful drinking.

A survey conducted by the Centre for Alcohol Policy Research (CAPR) in Australia in 2019 found that respondents who used a rapid alcohol delivery service (delivery in < two hours) for their last online drinks order were more likely to have participated in a risky drinking occasion (5+ standard drinks) than those who ordered from services with a delay greater than two hours [8]. A more recent survey conducted in New Zealand during the first COVID-19 restrictions in the country in April–May 2020, found that respondents purchasing alcohol online through any type of alcohol delivery service had 75% higher odds of being a heavier drinker in

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the past week (6+ standard drinks on a typical occasion) compared to those who did not [9]. Both studies reported that alcohol delivery services were being used by some participants to facilitate the continuation of drinking sessions that otherwise would have had to end had these services not been available [8, 9].

The potential for underage youth to access alcohol through home delivery services was also raised in both studies. Of participants under 25 years old, 36% and 58% reported not having their identification checked when purchasing alcohol through online delivery services in the Australian [8] and New Zealand [9] studies respectively. Further, a real-world youth access enforcement exercise from the California Department of Alcoholic Beverage Control in the United States of America (USA) conducted in April 2020, reported that minors are ‘routinely able to purchase alcohol through delivery from restaurants’ [10].

There is a well-established association between increased availability of alcohol and increased consumption by youth [11]. The harms associated with the early consumption of alcohol are also well-established, such as an increased risk of developing an alcohol use disorder in adulthood [12].

Given the harms associated with youth access to alcohol, the ubiquitous nature of internet access and ease of purchasing goods online, it would be reasonable to expect that governments tightly regulate the sale and delivery of alcohol online. This is currently not the case in most jurisdictions.

With the shift towards online purchasing and home delivery of retail products accelerating since the beginning of the COVID-19 pandemic, and at least some of the increase expected to remain after pandemic restrictions are lifted [13], the selling of alcohol online is an important area for governments to consider.

Our study aims to document and compare international policies governing the online sale and delivery of alcohol, in particular those that aim to prevent youth access. The policy review is complemented by a systematic literature review exploring retailers’ compliance with age restrictions when selling alcohol online, to investigate whether minors are able to access alcohol through this method.

## 2. Objectives

The objectives of this paper are to:

- 1 Identify and compare international policies governing the online sale and delivery of alcohol, in particular those that aim to prevent youth access.
- 2 Examine retailers’ compliance with age restrictions when selling alcohol online.

## 3. Methods

### 3.1. Policy review

#### 3.1.1. Country selection

We limited the search to Organisation for Economic Co-operation and Development (OECD) countries. These countries are similar democracies and market economies, permitting greater comparability. Only countries where English is the primary official or national language were included. This resulted in six countries: Australia, New Zealand, USA, Canada, Ireland and the United Kingdom (UK). Where the responsibility for alcohol regulation lies with the jurisdictional level, we reviewed policy at this level. A total of 77 jurisdictions were searched (see supplementary file 1).

#### 3.1.2. Search strategy

We searched the online legal databases LexisAdvance [6] and JustisOne [7]. Searches were performed for each jurisdiction. We

also searched websites of the official legislative and alcohol regulatory authorities in the respective jurisdictions to capture any relevant guidelines or information not captured in the database search. We defined policies as legislation enacted by a regional or national government or guidelines/policies issued by relevant regulatory authorities for alcohol, for example, the liquor authority for the state of New South Wales (NSW) in Australia is Liquor and Gaming NSW. Industry self-regulation guidelines were excluded as adherence to them is often voluntary.

#### 3.1.3. Data extraction

For all jurisdictions, we recorded information on elements identified as potentially relevant for public health regulation. We focused on policies that aim to prevent youth access to alcohol home deliveries, extracting information on the following five features:

- 1 Age verification requirements at the time of purchase
- 2 Age verification requirements at the time of delivery
- 3 Labelling requirements of packages containing alcohol (i.e. outlining purchase age limits)
- 4 Responsible service of alcohol training requirements for delivery drivers
- 5 Information to be displayed on websites selling alcohol (age warnings and registered liquor license details)

In order to contextualise the above policy features we extracted information on the following further five features that were relevant to how alcohol is delivered:

- 1 Types of alcohol allowed to be delivered (beer, wine, spirits)
- 2 Quantity limits
- 3 The type of premises permitted to deliver – licenses were categorised as either off-premises or on-premises depending on their primary function e.g. a ‘restaurant license’ or ‘tavern license’ was categorised as an on-premises even if this license type also had authority to sell alcohol for take-away
- 4 Delivery trading hours
- 5 Whether third party services are permitted to deliver

These ten features were present in the policies of five or more jurisdictions. In addition to these features, we also collected information on temporary or permanent policy changes that have occurred because of the COVID-19 pandemic.

### 3.2. Systematic review

#### 3.2.1. Search strategy

We searched Medline, Medline Epub ahead of print, EMBASE, CINAHL, Web of Science and Scopus, as well as Google Scholar, searching for English language articles from 1994 (the year the first purchase on the internet was made) [14]. Searches were conducted in November 2020. Search terms included relevant subject heading terms and/or relevant keywords for each of the databases such as alcohol/liquor, internet/online/website, minor/underage/adolescent/teen/young person/age-restriction/age-gate/age-verification and policy/legislation/regulation/compliance/law (see supplementary file 2 for example of search strategy used in Medline). The reference list of included studies were screened for additional papers not captured in the search. Abstracts and titles were screened (SC) using the Covidence software program against the inclusion criteria below. Full-text articles were then independently assessed by SC and a postgraduate student from the School of Population Health at UNSW, with discrepancies discussed and resolved.

#### 3.2.2. Inclusion criteria

Studies were included if they reported on retailer compliance with age restrictions for purchasing alcohol via the internet. Studies that investigated compliance in physical stores or for purchases

made via telephone orders were excluded. All study designs were included as research in this area is limited.

### 3.2.3. Data extraction

Study information (country/location, study design, methods) and outcomes were extracted, with the main outcome measure being the percentage of alcohol orders where retailers complied with age restrictions.

## 4. RESULTS

Of the 77 jurisdictions examined home delivery of alcohol is permitted in most ( $n = 72$ ) (see supplementary file 1 for complete data file for all jurisdictions). Only five jurisdictions prohibited the online sale and delivery of alcohol entirely – Alabama, Delaware, Mississippi and Utah in the USA, and Yukon in Canada. Below we discuss the findings of the ten policy review features individually, and the changes due to the COVID-19 pandemic. Tables are presented for a policy feature where there is significant variation across the 72 jurisdictions. Lastly, we summarise the findings from the systematic literature review evaluating the evidence of retailers' compliance with age restrictions when selling alcohol online.

### 4.1. International policy review

#### 4.1.1. Age verification at the time of purchase

Of the 72 jurisdictions that allow online purchase and home delivery of alcohol, only seven require age to be verified at the time of purchase for some or all online alcohol sales. These jurisdictions are all located in the USA: Alaska, Indiana, Kansas, Michigan, Nebraska, Pennsylvania and South Dakota. Kansas and South Dakota only permit delivery of wine from wineries; before the wine is shipped the licensee must verify the customer's age either by examination of a copy of an approved form of photo identification, which could be scanned and sent electronically to the licensee, or by using an age verification service, which usually involves checking the consumer's personal information (e.g. name, address and date of birth) against existing data sources. Indiana and Michigan allow the delivery of all categories of alcohol but only require age verification at the time of purchase for wine shipments from wineries, with the same age verification requirements as Kansas and South Dakota.

Alaska has similar age verification requirements for all alcohol sales in the state, but additionally requires that photo identification include a signature and that the purchaser sign and date their order. The signature on the order must be 'reasonably determined by the licensee to match that on the proof-of-age document' [15].

In the states of Nebraska and Pennsylvania the guidance is far less clear. Title 237 of the Nebraska Administrative Code states that a licensee 'may deliver or cause to be delivered by its agent, delivery service or common carrier to a consumer alcoholic beverages provided that...the licensee has verified that the sale has not been made to a minor, nor that delivery will be made to a minor' [16]. This clause seems to imply that age should be verified online at the point of sale if the delivery is being made by a third-party, however this is not further elaborated upon and no clear instructions for how age should be verified are given. Similarly, Title 47 of the Pennsylvania Statutes implies that some manufacturers (wineries located in-state plus out-of-state wineries and breweries) must 'require proof of age of the recipient, in a manner or format approved by the board, before wine/beer is shipped to a resident' [17]. Again, this is not elaborated on further and no directions for how this should be carried out are given.

In the remaining 65 jurisdictions age verification at the time of purchase is not mandated, however some jurisdictions do require a date of birth to be entered or a box to be ticked by the purchaser

confirming that they are over the legal drinking age. For example, in New Zealand the Sale and Supply of Alcohol Act 2012 requires that remote sellers (those selling alcohol over the internet, or by phone or mail order) take reasonable steps to verify that both the buyer and the receiver of any alcohol sold online for home delivery are over the legal purchase age [18]. According to the National Guidance on Remote Sales of Alcohol [19] – a document developed by the Health Promotion Agency (a government entity) in conjunction with the liquor regulatory authorities – the following two steps 'are reasonable procedures for complying with the Act' for the purpose of age verification for online sales: '1) Ask the buyer to tick an on screen box declaring that they are 18 years of age or over when they first enter the internet site; and 2) Ask the buyer to tick an on-screen box declaring that they are 18 years of age or over immediately before the sale of any alcohol is completed'. The guidance contains no mention of a mandatory requirement to verify age on delivery.

In England and Wales there is some confusion around the legal requirement for age verification at the time of purchase for online alcohol sales [20]. Guidance issued under the Licensing Act 2003 seems to imply that age verification at the time of purchase is optional provided age is verified at the point of delivery [21]. However, a recent report has highlighted that the guidance is unclear and could be open to interpretation as requiring age verification both on purchase and delivery [20]. Most online alcohol retailers are currently interpreting the guidance as age verification on delivery being sufficient [20].

#### 4.1.2. Age verification at the time of delivery

Almost all jurisdictions (71 out of 72 where alcohol delivery is permitted) either explicitly state in their jurisdictional legislation or guidance on the regulatory authority's website, or it is implied in the text of these materials, that age must be verified when delivering alcohol if there is doubt that the recipient is over the legal purchase age. In some jurisdictions the guidance is extremely clear. For example, the Washington state liquor regulations (Title 314 of the Washington Administrative Code) state that 'a delivery person must verify the age of the person accepting delivery before handing over liquor' and 'if no person twenty-one years of age or older is present to accept a liquor order at the time of delivery, the liquor shall be returned to the licensee' [22]. This makes the obligations of the delivery person clear and gives instructions for what must be done if a person over the legal age is not present to accept a delivery. The liquor authority in the Canadian province of Saskatchewan gives similar instructions in its Commercial Liquor Permittee Policy Manual which states that 'identification and a signature are required from all home delivery customers, regardless of apparent age' and if a customer is unable or refuses to comply the alcohol 'must be returned by the permittee to the place of purchase or disposed of in a manner satisfactory to SLGA' (the liquor authority) [23]. Similarly, the US state of Tennessee makes obligations abundantly clear in guidance issued on the regulatory authority's website that 'the retail package store must check the ID of the purchaser at the time of the delivery of the alcoholic beverages in a face-to-face transaction, unless the purchaser reasonably appears to be over 50 years of age' [24].

In other jurisdictions the requirement for age verification on delivery is implied in less prescriptive statements. For example, in the US state of New Jersey the Retail Licensee Handbook issued by the regulatory authority states that 'in making a permissible home delivery, a licensee must be sure that the alcoholic beverage is not delivered into the hands of a person under the age of 21 years' [25]. Other jurisdictions are even less straightforward, but it could be interpreted that the requirement for age verification is implied. For example, in Scotland the section of the Liquor Act that regulates age verification does not apply to 'remote sales' (online sales

and home delivery) of alcohol, but it could be assumed that a requirement to verify age is implied in the following statement prohibiting delivery to a minor: ‘any responsible person who delivers the alcohol or allows it to be delivered to a child or young person commits an offence’ [26].

In other jurisdictions the legislation makes explicit allowances for deliveries to be left unattended. For example, in the Australian state of South Australia the Liquor Licensing Act requires that a delivery must be made to an adult person or ‘in accordance with the instructions of the purchaser’ [27]. Guidance on the regulatory authority’s website clarifies that this means that ‘deliveries of alcohol may be left unattended if the buyer has directly instructed the licensed seller to do so’ [28]. Similar clauses are also contained in the legislation for the Australian states of NSW and Tasmania. None of these jurisdictions currently require age verification at the time purchase (however from June 2022 this will be required for ‘same-day’ deliveries in NSW).

In 44 of the 72 jurisdictions a delivery person is required to obtain the recipient’s signature for some or all deliveries of alcohol. In 21 of these jurisdictions, this requirement only relates to wine shipments from wineries. In South Australia it only applies to persons ‘clearly over the age of 18’ who are required to ‘sign a declaration that states their name and that they are of or above 18 years of age’ (in any other case the customer must produce identification as evidence of age) [30]. For the remaining 22 jurisdictions, all but one located in the US, the requirement to obtain a signature is for all deliveries of alcohol (however, many jurisdictions have waived this requirement during the COVID pandemic).

#### 4.1.3. Third party delivery services

In 47 of the 64 jurisdictions that permit the delivery of alcohol from establishments other than wineries, all deliveries can be made by third-party delivery services, common carriers or couriers (hereafter ‘third-party services’) (Table 1). In the eight jurisdictions that restrict online sales and delivery to wine shipments only, all these jurisdictions also permit deliveries by third-party services.

Some jurisdictions ( $n = 14$ ) permit third-party services only for shipments from wineries or other manufacturers while mandating that all other deliveries, such as those from general off-premises, are made by the licensee or their employee. A small minority of jurisdictions ( $n = 3$ ) require all deliveries to be made the licensee or their employee.

Of the 69 jurisdictions that allow some or all alcohol deliveries to be completed by third-party services, 25 require the third-party service to obtain an authorisation, permit or license of some kind by the liquor authority. For example, in the Canadian province of Saskatchewan services must obtain a ‘home delivery special use permit’ to be able to deliver. Only permit holders and their direct employees are able to deliver, with the liquor authority stipulating that the responsibilities cannot be contracted out [31].

#### 4.1.4. Delivery driver requirement to complete responsible service of alcohol training

The requirement for staff in on-premises and off-premises establishments to complete a course in the responsible service of alcohol varies widely across the jurisdictions. In some countries, such as the US, the completion of responsible service of alcohol training for all staff is mandatory only in a minority of jurisdictions [32]. Whereas in Australia, the completion of a responsible service of alcohol course is mandatory in all jurisdictions for anyone involved in the service of alcohol in both on-premises and off-premises establishments [33–40].

Of the 72 jurisdictions that permit the delivery of alcohol, only 15 require delivery drivers of some or all alcohol deliveries to have completed training in the responsible service of alcohol (see

Table 2). Of these 15 jurisdictions, 12 require drivers to have completed the same training as staff at physical liquor outlets, while three jurisdictions require drivers to complete training specifically tailored for alcohol delivery. For example, in the US state of Georgia, delivery drivers are required to complete an approved ‘Alcoholic Beverage Delivery Training’ course [41]. The training, which is offered online by several providers, includes information about relevant laws, driver safety, best practice for customer age verification, refusal criteria, and violations and penalties [42].

#### 4.1.5. Type of premises permitted to deliver

Of the 72 jurisdictions that allow delivery of alcohol, most ( $n = 44$ ) permit delivery only by off-premises in usual circumstances i.e. not including the temporary legislation brought in during the COVID-19 pandemic. There are 20 jurisdictions that permit delivery from both off-premises and on-premises establishments, including 14 states in the USA and six provinces in Canada. The remaining eight jurisdictions, all states in the USA, only allow deliveries from wineries (Table 3).

#### 4.1.6. Alcohol types permitted for home delivery

In some US states there is greater separation of alcohol type (beer, wine, spirits) in the liquor regulation than there is in the other jurisdictions analysed. In these states, the availability of types of alcoholic beverages decreases with strength. For example, in North Carolina, beer and wine can be bought in grocery stores, but spirits can only be purchased in state-run liquor stores. This is also reflected in the availability of delivery, with North Carolina allowing the delivery of beer and wine to customers’ homes but prohibiting the delivery of spirits. Idaho, Vermont and Virginia similarly only allow beer and wine to be delivered. In California, Georgia, Louisiana, Oklahoma and Pennsylvania, and the Canadian province of Quebec, off-premises are permitted to deliver all types of alcohol but on-premises outlets are limited to deliver beer and wine only. This is the same for the Canadian province of Nova Scotia except on-premises can also deliver cider. Aside from the eight US states that restrict delivery to wine shipments from wineries, in all other jurisdictions that permit delivery, any alcohol type can be delivered (53 jurisdictions in total, including all jurisdictions in Australia, the UK and in NZ and Ireland).

#### 4.1.7. Maximum quantities of alcohol permitted for delivery

Some jurisdictions in the USA and Canada place limits on the quantity of alcohol permitted to be delivered to households, either per transaction or per month/year from the same licensee. No jurisdictions in other countries have this requirement.

There are 36 states in the USA and three jurisdictions in Canada that place some kind of limitation on quantities for home deliveries, this includes the eight US states that restrict delivery to wine from wineries. Additionally, for 12 states in the US that permit the delivery of all categories of alcohol (and one state that permits the delivery of beer and wine only), a quantity limit exists only for shipments from wineries but there is no specification of a limit for other alcohol deliveries from general on- or off-premises. The quantity limits for wineries vary widely between states ranging from 18 L (2 cases) of wine per year for residents in Minnesota to 324 L (36 cases) per year for residents in New York.

In only 14 US states and three Canadian jurisdictions does a limit exist for alcohol other than wine. Regulatory guidance in some of these jurisdictions is very detailed on the quantity and type of alcohol that can be delivered per day to a consumer, while other states restrict deliveries with a monthly limit irrespective of beverage type. For example, Chapter 845 of the Oregon Administrative Rules stipulates licensees can deliver a maximum of five gallons (approximately 19 L) of beer per day to a consumer, a maximum of two nine-litre cases of wine or cider per day (up to a

**Table 1**  
Delivery by third-party services ( $n = 72$ ).

Delivery by third-party services permitted for all deliveries ( $n = 47$ )	Delivery by third-party services only permitted for shipments from wineries or other manufacturers <sup>a</sup> ( $n = 22$ )	Third-party delivery prohibited, must be made by licensee or their employee ( $n = 3$ )
<p><b>USA: <math>n = 25</math></b> Alaska [15, 70], Arizona [71, 72], California [73], District of Columbia [74], Florida [75, 76], Georgia [41, 77, 78], Idaho [79], Illinois [80], Kentucky <sup>b</sup> [81, 82], Louisiana <sup>b</sup> [83], Massachusetts <sup>b</sup> [84], Michigan <sup>b</sup> [57, 85], Minnesota [86, 87], Nebraska [16, 44], Nevada [88, 89], New Jersey <sup>b</sup> [25, 90, 91], New York <sup>b</sup> [92, 93], North Carolina <sup>b</sup> [94], North Dakota [95], Ohio <sup>b</sup> [96, 97], Oregon <sup>b</sup> [43, 98, 99], Pennsylvania <sup>b</sup> [17, 100], Tennessee <sup>b</sup> [101, 102], Texas <sup>b</sup> [103], Virginia [104]</p> <p><b>Canada: <math>n = 10</math></b> Alberta <sup>b</sup> [52, 105], British Columbia [106–108], Manitoba [109], New Brunswick [110], Newfoundland and Labrador <sup>b</sup> [111–113], Nova Scotia <sup>g</sup> [48, 114, 115], Nunavut <sup>d</sup> [116], Ontario <sup>b</sup> [117], Prince Edward Island [118–121], Saskatchewan <sup>b</sup> [23, 31, 122]</p> <p><b>Australia: <math>n = 7</math></b> Australian Capital Territory [36, 123], New South Wales [29, 33], Queensland [34, 124, 125], South Australia [27, 28, 30], Tasmania [38, 126, 127], Victoria [35, 128], Western Australia [39, 129]</p> <p><b>New Zealand</b> [18, 130]</p> <p><b>United Kingdom: <math>n = 3</math></b> England and Wales [21, 45], Scotland [26], Northern Ireland [54]</p> <p><b>Ireland</b> [131–133]</p>	<p><b>USA: <math>n = 22</math></b> Colorado [51], Connecticut [134], Hawaii [135], Indiana [46, 136], Iowa <sup>b</sup> [137, 138], Maine [139], Maryland <sup>b</sup> [140], Missouri <sup>b</sup> [141–143], Montana [144], New Hampshire <sup>b</sup> [145, 146], Oklahoma <sup>b</sup> [147, 148], Rhode Island <sup>c</sup> [149, 150], Vermont [47, 151], Washington [22, 152]</p> <p>In 8 states online purchasing and delivery is only permitted for wineries, which can be done by third-party common carrier: Arkansas [153], Kansas [154], New Mexico <sup>b</sup> [155, 156], South Carolina [157, 158], South Dakota <sup>b</sup> [159], West Virginia <sup>b</sup> [160], Wisconsin [161], Wyoming <sup>b</sup> [162, 163]</p>	<p><b>Canada: <math>n = 2</math></b> Quebec <sup>e</sup> [164–166], Northwest Territories <sup>f</sup> [49, 167]</p> <p><b>Australia: <math>n = 1</math></b> Northern Territory <sup>h</sup> [40, 168, 169]</p>

<sup>a</sup> Deliveries of alcohol from other licensees (e.g. general off-premises) in these states must be made by the licensee or their employee.

<sup>b</sup> Third-party delivery services / common carriers/ couriers delivering alcohol must obtain a permit or license from the liquor authority in that state to do so.

<sup>c</sup> Only shipments from wineries can be made by common carrier but the delivery can only occur following a face-to-face purchase at the winery in question. Off-premises can sell online and offer delivery but deliveries can only be made by the licensee or their employee.

<sup>d</sup> Deliveries can be made by common carriers only.

<sup>e</sup> Third-party delivery prohibited except for state-run liquor stores who can deliver by common carrier/ shipping company.

<sup>f</sup> Third-party delivery prohibited except for liquor store shipments sent via common carrier to a community outside where the store is located i.e. all local deliveries by liquor stores must be made by licensees or their employee, as must all deliveries from on-premises.

<sup>g</sup> Third-party delivery permitted for off-premises, prohibited for on-premises (must be completed by licensee/employee).

<sup>h</sup> Except interstate shipments which are permitted and presumably can be made by common carrier.

limit of two nine-litre cases per month), and a Distillery Retail Outlet Agent (the only licensees permitted to sell spirits online for home delivery) can deliver a maximum of six individual containers of spirits with no more than two bottles of the same distilled spirits product in a single order [43]. In contrast, in Nebraska also has limitations on the quantity of alcohol that can be delivered to customers, but the guidance is simply that licensees can deliver a maximum of nine litres of alcohol per customer in one month [44].

#### 4.1.8. Delivery trading hours

Most jurisdictions ( $n = 60$ ) that permit the delivery of alcohol in some form do not stipulate a time frame for home deliveries that differ from standard licensing hours. Of the remaining 12 jurisdictions, five restrict the delivery of alcohol to fewer hours than the maximum trading hours for standard licensed premises; in Vermont and Iowa, the restriction applies to all alcohol deliveries, while in the District of Columbia, Nova Scotia and Quebec delivery hours are only more restrictive than standard trading hours for on-premises establishments.

Surprisingly, seven jurisdictions explicitly permit deliveries to occur outside the maximum trading hours for licensed premises. In the Canadian provinces of Alberta, British Columbia and Manitoba, deliveries can occur up to 30 min after the licensed premises has closed. A similar rule exists in Ontario, but it is a one-hour grace period for deliveries. In New Zealand, deliveries are permitted to commence at 6am compared to 7am for off-premises establishments. Similarly, in South Australia, an off-premises can be licensed for a maximum of 13 h between 8am and 10pm but is

permitted to deliver anytime within this period (so could theoretically deliver for an hour longer than they could be open for). In Scotland, the hours for delivery are significantly extended beyond maximum trading hours, with the maximum off-premises trading period being 10am and 10pm but deliveries can be made between 6am and midnight.

#### 4.1.9. Mandatory information to be displayed on websites selling alcohol

Of the 72 jurisdictions that permit the purchase of alcohol online for home delivery, only seven require licensees to display their liquor license number and/or registered business name on their website – four states in Australia, one province in Canada, one state in the USA, and in New Zealand. This is in contrast to sales in physical stores, where jurisdictions often require licensees to display at least the liquor license name or number on the physical premises e.g. [18, 26, 33, 45–50].

Similarly, in many jurisdictions across the USA [44, 51], Canada [52], Australia [29, 53] and the UK [26, 54] it is mandatory to display age warnings at licensed premises advising of the minimum legal purchase age for alcoholic beverages. However, of the 72 jurisdictions that permit the purchase of alcohol online only four of them, all in Australia, require a similar warning to be displayed on websites selling alcohol.

#### 4.1.10. Labelling of packages

The USA is the only country in which any jurisdictions stipulate labelling requirements for packages containing alcohol. The standard wording for the label is ‘Contains alcohol. Signature of person

**Table 2**  
Delivery driver <sup>a</sup> requirement to complete responsible service of alcohol training ( $n = 72$ ).

Standard responsible service of alcohol training required ( $n = 12$ )	Tailored responsible service of alcohol training required ( $n = 3$ )	No responsible service of alcohol training required for delivery drivers ( $n = 57$ )
<p><b>USA: <math>n = 4</math></b> Indiana <sup>b</sup> [46, 136], Louisiana [83], Montana <sup>b</sup> [144], Rhode Island <sup>b</sup> [149, 150]</p> <p><b>Canada: <math>n = 7</math></b> Alberta [52, 105], Manitoba [109], Newfoundland and Labrador [111–113], Nova Scotia <sup>c</sup> [48, 114, 115], Ontario [117], Prince Edward Island <sup>d</sup> [118–121], Saskatchewan [23, 31, 122]</p> <p><b>Australia: <math>n = 1</math></b> Northern Territory <sup>e</sup> [40, 168, 169]</p>	<p><b>USA: <math>n = 3</math></b> Georgia [41, 77, 78], North Carolina <sup>f</sup> [94], Vermont <sup>g</sup> [47, 151]</p>	<p><b>USA: <math>n = 40</math></b> Alaska [15, 70], Arizona [71, 72], Arkansas [153], California [73], Colorado [51], Connecticut [134], District of Columbia [74], Florida [75, 76], Hawaii [135], Idaho [79], Illinois [80], Iowa [137, 138], Kansas [154], Kentucky [81, 82], Maine [139], Maryland [140], Massachusetts [84], Michigan [57, 85], Minnesota [86, 87], Missouri [141–143], Nebraska [16, 44], Nevada [88, 89], New Hampshire [145, 146], New Jersey [25, 90, 91], New Mexico [155, 156], New York [92, 93], North Dakota [95], Ohio [96, 97], Oklahoma [147, 148], Oregon [43, 98, 99], Pennsylvania [17, 100], South Carolina [157, 158], South Dakota [159], Tennessee [101, 102], Texas [103], Virginia [104], Washington, West Virginia [160], Wisconsin [161], Wyoming [162, 163]</p> <p><b>Canada: <math>n = 5</math></b> British Columbia [106–108], New Brunswick [110], Quebec [164–166], Northwest Territories [49, 167], Nunavut [116],</p> <p><b>Australia: <math>n = 7</math></b> Australian Capital Territory [36, 123], New South Wales [29, 33], Queensland [34, 124, 125], South Australia [27, 28, 30], Tasmania [38, 126, 127], Victoria [35, 128], Western Australia [39, 129]</p> <p><b>New Zealand [18, 130]</b></p> <p><b>United Kingdom: <math>n = 3</math></b> England and Wales [21, 45], Scotland [26], Northern Ireland [54]</p> <p><b>Ireland [131–133]</b></p>

<sup>a</sup> 'Delivery driver' refers to the person physically making a delivery to customer's residence, not the person/company taking an order from a customer.

<sup>b</sup> All deliveries except shipments from wineries which can be sent via common carriers who may not have completed training.

<sup>c</sup> Off-premises delivery is permitted to be completed by a common carrier who may not have completed training, however, delivery from on-premises must be made by licensee or their employee who has completed training.

<sup>d</sup> Delivery from off-premises can be completed by a third-party who may not have completed training. Delivery from on-premises (who must also hold a 'Package Sales License' to be allowed to deliver) can also be delivered by a third-party but the 'delivery person must have Responsible Beverage Certificate' [120].

<sup>e</sup> Except interstate shipments which are permitted and presumably can be made by a common carrier who has not completed training.

<sup>f</sup> Delivery drivers are required to 'complete a course approved by the Commission related to the delivery of alcoholic beverages' [94].

<sup>g</sup> Delivery from off-premises must be made by a licensee or their employee who has completed responsible server training, however, wineries and breweries are permitted to deliver via common carrier. Carriers must be 'certified' by the liquor authority and all employees delivering must complete responsible delivery of alcohol training, designed especially for common carriers and provided on the liquor authority's website at a cost of \$10 USD [170].

over 21 years of age required on delivery' or something similar. Forty-three states in the USA require at least some alcohol packages to be labelled with such a message. Of these, eight are states that only permit wine shipping from wineries, and a further 21 only require the labelling on shipments from wineries and/or other manufacturers, with all other alcohol deliveries able to be transported label-free. There are 14 states which require a label with similar wording to be placed on all alcohol being delivered (see Table 4).

#### 4.1.11. Changes due to the COVID-19 pandemic

Of the 77 jurisdictions, at the time of writing 53 had relaxed their liquor regulations to enable increased availability of alcohol home delivery during the COVID-19 pandemic (see Table 5). Most of the regulatory relaxations centre around allowing on-premises licensees the ability to offer home delivery of alcohol in an effort to reduce the economic consequences of lockdowns and social distancing measures on these businesses. For example, in the US state of Colorado, the legislature passed a bill (Senate Bill 20–213) that allows on-premises establishments, such as restaurants and bars, to deliver alcohol until 1 July 2021 [55]. The Colorado Liquor Enforcement Division has issued emergency regulations outlining the requirements for delivery, including that the alcohol must be in

sealed containers and can only be delivered with an order of food, as well as mandating that all alcohol containers hold a warning label advising customers of the 'open container laws' in Colorado [56].

The changes in the vast majority of these jurisdictions are temporary, however 13 jurisdictions have implemented permanent changes. In addition, the expiry date for the regulatory changes in the US state of Michigan is 31 December 2025, essentially making them semi-permanent [57]. Similarly, pending legislation in New York (Senate Bill S8392) would extend the regulatory relaxations for two years after the expiration of the COVID-19 state disaster emergency [58].

#### 4.2. Systematic review of compliance with age restrictions

We identified three research articles evaluating retailers' compliance with online age restriction policies (Fig. 1). Two were from the Netherlands [59, 60] and one was from the USA [61] (see supplementary file 3 for article summaries). All were mystery shopping studies, a method where underage study participants pretend to be of-age to test compliance. In all three studies, participants were instructed they could lie about their age, but should present their real age identification (ID) if requested. Compliance across the

**Table 3**  
Type of premises permitted to conduct online sales and home delivery <sup>a</sup> (n = 72).

Off-premises only (n = 44)	Off-premises and some/all on-premises (n = 20)	Wine shipments from wineries only (n = 8)
<p><b>USA: n = 25</b> Alaska [15, 70], Colorado [51], Connecticut [134], Florida [75, 76], Hawaii [135], Idaho [79], Illinois [80], Kentucky [81, 82], Maine [139, 140], Maryland [140], Massachusetts [84], Minnesota [86, 87], Missouri [141–143], Montana [144], Nebraska [16, 44], Nevada [88, 89], New Hampshire [145, 146], New Jersey [25, 90, 91], New York [92, 93], North Dakota [95], Oregon [43, 98, 99], Rhode Island [149, 150], Tennessee [101, 102], Vermont [47, 151], Virginia [104]</p> <p><b>Canada: n = 6</b> Alberta [105], British Columbia [106–108], New Brunswick [110], Ontario [117], Saskatchewan [23, 31, 122], Nunavut [116]</p> <p><b>Australia: n = 8</b> Australian Capital Territory [36, 123], New South Wales [29, 33], Northern Territory [40, 168], Queensland [34, 124, 125], South Australia [27, 28, 30], Tasmania [38, 126, 127], Victoria [35, 128], Western Australia [39, 129]</p> <p><b>New Zealand</b> [18, 130]</p> <p><b>United Kingdom: n = 3</b> England and Wales [21, 45], Scotland [26], Northern Ireland [54]</p> <p><b>Ireland</b> [131–133]</p>	<p><b>USA: n = 14</b> Arizona [71, 72], California [73], District of Columbia [74, 171], Georgia [41, 77, 78], Indiana [46, 136], Iowa [137, 138], Louisiana [83], Michigan [57, 85], North Carolina [94], Ohio [96, 97], Oklahoma [147, 148], Pennsylvania [17, 100], Texas [103], Washington [22, 152]</p> <p><b>Canada: n = 6</b> Manitoba [109, 172], Newfoundland and Labrador <sup>b</sup> [111–113], Nova Scotia [48, 114, 115], Prince Edward Island <sup>c</sup> [118–121], Quebec [164–166], Northwest Territories [49, 167]</p>	<p><b>USA: n = 8</b> Arkansas [153, 154], Kansas [154], New Mexico [155, 156], South Carolina [157, 158], South Dakota [159], West Virginia [160], Wisconsin [161], Wyoming [162, 163]</p>

<sup>a</sup> Note: information in this table does not include emergency temporary legislation brought in during the COVID pandemic.

<sup>b</sup> All liquor stores in Newfoundland and Labrador are state-run under the banner of the Newfoundland Labrador Liquor Corporation (NLC). These stores do not offer delivery [173] however, the NLC can grant manufacturers (brewers/wineries/distilleries) and on-premises licensees temporary authorization to deliver [111–113].

<sup>c</sup> On-premises establishments must hold a ‘Package Sales License’ to be able to deliver.

**Table 4**  
Labelling requirements for packages containing alcohol (n = 72).

Label required for shipments from wineries and/or other manufacturers only (n = 29)	Label required for all alcohol deliveries (n = 14)	No label required (n = 29)
<p><b>USA: n = 29</b> California [73], Colorado [51], Georgia [41, 77, 78], Hawaii [135], Idaho [79], Illinois [80], Indiana [46, 136], Iowa [137, 138], Louisiana [83], Maine [139], Maryland [140], Minnesota [86, 87], Missouri [141–143], Montana [144], New Hampshire [145, 146], New York [92, 93], Oklahoma [147, 148], Rhode Island [149, 150], Tennessee [101, 102], Texas [103], Vermont [47, 151]</p> <p>Only wine shipping from wineries permitted: Arkansas [153], Kansas [154], New Mexico [155, 156], South Carolina [157, 158], South Dakota [159], West Virginia [160], Wisconsin [161], Wyoming [162, 163]</p>	<p><b>USA: n = 14</b> Alaska [15, 70], Arizona [71, 72], Connecticut [134], Kentucky [81, 82], Massachusetts [84], Michigan [57, 85], Nebraska [16, 44], Nevada [88, 89], North Carolina [94], North Dakota [95], Oregon [43, 98, 99], Pennsylvania [17, 100], Virginia [104]</p>	<p><b>USA: n = 4</b> District of Columbia, Florida, New Jersey [25, 90, 91], Ohio [96, 97]</p> <p><b>Canada: n = 12</b> Alberta [52, 105], British Columbia [106–108], Manitoba [109], New Brunswick [110], Newfoundland and Labrador [111–113], Northwest Territories [49, 167], Nova Scotia [48, 114, 115], Nunavut [116], Ontario [117], Prince Edward Island [118–121], Quebec [164–166], Saskatchewan [23, 31, 122]</p> <p><b>Australia: n = 8</b> Australian Capital Territory [36, 123], New South Wales [29, 33], Northern Territory [40, 168, 169], Queensland [34, 124, 125], South Australia [27, 28, 30], Tasmania [38, 126, 127], Victoria [35, 128], Western Australia [39, 129]</p> <p><b>New Zealand</b> [18, 130]</p> <p><b>United Kingdom: n = 3</b> England and Wales [21, 45], Scotland [26], Northern Ireland [54]</p> <p><b>Ireland</b> [131–133]</p>

three studies was relatively poor, ranging from 0% (i.e. no orders failed due to age verification), 18.2–20%, and 46% compliance.

Only one study (Williams and Ribsil, 2012) differentiated between age verification practices at the time of purchase and the time of delivery [61]. In this study, underage participants made 100 online purchase attempts from 100 different alcohol retailers in the USA. Thirty-nine orders failed for reasons related to age verification (time of purchase and delivery). Twelve of these failed due to age verification at the point of purchase, including three where partic-

ipants responded with a false date of birth over 21 years of age. The authors suspect the retailers may have been using an online age verification method which involved verification based on government records. Five orders failed because the retailer requested a driver’s license number at the point of purchase, indicating that the number was indeed used to verify the age of the purchaser. Of the 60 orders that made it to the recipient for a face-to-face interaction at the point of delivery, age verification was attempted in only half the cases. In only 16 of these was the delivery actually

**Table 5**  
Changes due to the COVID pandemic ( $n = 77$ ).

Temporarily relaxed liquor regulations to enable increased availability of alcohol home delivery ( $n = 53$ )	No or minimal changes to liquor delivery regulations ( $n = 24$ )
<p><b>USA: <math>n = 34</math></b> Alaska [15], Arizona [174], Arkansas [175], California [176], Colorado [55, 56], Connecticut [177, 178], District of Columbia <sup>a</sup> [171, 179], Florida [180, 181], Georgia <sup>a</sup> [68, 182], Hawaii [183], Idaho [184], Illinois [185, 186], Indiana [187], Iowa <sup>a</sup> [137, 188], Kentucky [189], Maine [190], Maryland [191], Massachusetts [192, 193], Michigan <sup>b</sup> [57], Montana [194, 195], Nebraska [196, 197], Nevada [198], New Hampshire [199, 200], New Jersey [201], New York <sup>c</sup> [202], Ohio <sup>a</sup> [96, 203, 204], Oklahoma <sup>a</sup> [148, 205], Oregon <sup>a</sup> [206], Tennessee [207], Texas [208], Vermont [209], Virginia [210], Washington [211], West Virginia [212]</p> <p><b>Canada: <math>n = 11</math></b> Alberta [213], British Columbia <sup>d</sup> [214], Manitoba <sup>a</sup> [172], New Brunswick [215], Newfoundland and Labrador <sup>a</sup> [216–218], Nova Scotia <sup>a</sup> [115], Ontario [219], Prince Edward Island <sup>a,e</sup> [119, 120], Quebec <sup>a</sup> [220], Saskatchewan [221], Northwest Territories <sup>a</sup> [49, 222]</p> <p><b>Australia: <math>n = 6</math></b> Australian Capital Territory [223], New South Wales <sup>a</sup> [224, 225], Queensland [226], South Australia <sup>f</sup> [227], Victoria [228], Western Australia [229]</p> <p><b>UK: <math>n = 1</math></b> England and Wales [230]</p> <p><b>Ireland [231]</b></p>	<p><b>USA: <math>n = 17</math></b> Alabama [232], Delaware [233], Kansas [234], Louisiana [235], Minnesota [236, 237], Mississippi [238–240], Missouri [141, 241], New Mexico [242], North Carolina, North Dakota [243], Pennsylvania [244, 245], Rhode Island [246], South Carolina [247], South Dakota [248], Utah [249], Wisconsin [250], Wyoming</p> <p><b>Canada: <math>n = 2</math></b> Nunavut, Yukon</p> <p><b>Australia: <math>n = 2</math></b> Northern Territory, Tasmania</p> <p><b>New Zealand [251]</b></p> <p><b>UK: <math>n = 2</math></b> Scotland, Northern Ireland [252]</p>

<sup>a</sup> Some or all regulatory relaxations have been implemented permanently ( $n = 13$ ).

<sup>b</sup> With an expiry date of December 2025, the changes in Michigan are semi-permanent.

<sup>c</sup> As of 1 February 2021 a bill before the New York Senate (Senate Bill S8392) was pending which would extend the regulatory relaxations for two years after the expiration of the COVID-19 state disaster emergency [58].

<sup>d</sup> The regulatory relaxations are due to expire on 31 March 2021. A private members' bill (M 209 Liquor Control and Licensing Amendment Act, 2020), which would make the changes permanent, was introduced into the British Columbia parliament on 29 July 2020 but as of 1 February 2021 has not progressed past the first reading [253].

<sup>e</sup> Prior to the onset of the COVID-19 pandemic delivery of alcohol was prohibited in Prince Edward Island. Temporary relaxations to allow delivery were introduced at the beginning of the pandemic and subsequently implemented permanently in December 2020 [254].

<sup>f</sup> On 24 November 2020, South Australian Premier Steven Marshall made comments in the media indicating that he will be seeking to make the regulatory changes permanent [255].

refused. In the remaining 14 purchase attempts, the alcohol was handed over to the participant.

The two studies from the Netherlands [59, 60] measured compliance with age restrictions in on- and off-premises establishments, and alcohol home delivery services. Across the two studies a total of 4507 purchase attempts were made by underage study participants in 2011, 2013, 2014 and 2016, with 136 of these from alcohol home delivery services. Orders from the delivery services were made either over the phone or online, however a breakdown of the figures for each was not given. Across the four years, compliance with age restrictions for alcohol home delivery services ranged from 0% (i.e. no orders were refused due to age verification) to 20%, with compliance improving in later years. As the studies largely focused on compliance in bricks-and-mortar outlets there was little detail about age verification practices at the time of on-line purchase or home delivery. The studies, however, did measure how often ID was requested at the point of delivery and whether, when presented with an underage ID, the retailer still gave the alcohol to the purchaser. In the 99 purchase attempts made in 2011 and 2013, ID was not requested for any orders. Of the 15 purchase attempts made in 2014, ID was requested in four cases and in only one of those cases was the order still given to the purchaser despite the evidence of them being underage. In 2016, ID was requested in four of the 22 purchase attempts and the retailer refused to give the order to the purchaser in all cases.

In the studies from the Netherlands the compliance with age restrictions was worse for alcohol delivery services than for bricks-and-mortar stores. Across the four years the average compliance rate across all outlet types was 28% to 74%, much greater than the 0 to 20% compliance for alcohol delivery services. The authors con-

tend that the increased compliance reflected a trend towards less acceptability with underage drinking. For the US study, the authors suggest a compliance rate of 46% for online sales and home delivery is comparable to the compliance rate of physical retail liquor stores in communities of the US where there is little or no enforcement of youth access laws.

## 5. Discussion

This is the first study, that we know of, to systematically review international policies governing the online sale and delivery of alcohol and examine research on the effectiveness of such policies. Of the 77 jurisdictions examined across the USA, Canada, Australia, New Zealand, Ireland and the UK, home delivery of alcohol is permitted in most ( $n = 72$ ). Typically, alcohol delivery is only permitted by off-premises establishments ( $n = 44$ ). Most jurisdictions ( $n = 53$ ) permit delivery of all alcohol types (beer, wine and spirits) with 39 of these limiting the quantity that can be delivered from some or all premises types. Few jurisdictions require liquor license information ( $n = 7$ ) or age warnings ( $n = 4$ ) to be displayed on websites selling alcohol, and only states in the USA ( $n = 43$ ) require a label to be affixed to packages identifying the product as alcohol and/or outlining the requirement for an adult's signature on delivery. Few jurisdictions require age verification at the time of purchase ( $n = 7$ ), but most require it at the time of delivery ( $n = 71$ ). The use of third-party delivery services is allowed in most jurisdictions ( $n = 69$ ) for some or all alcohol deliveries, with some ( $n = 15$ ) requiring delivery drivers to have completed training in the responsible service of alcohol.



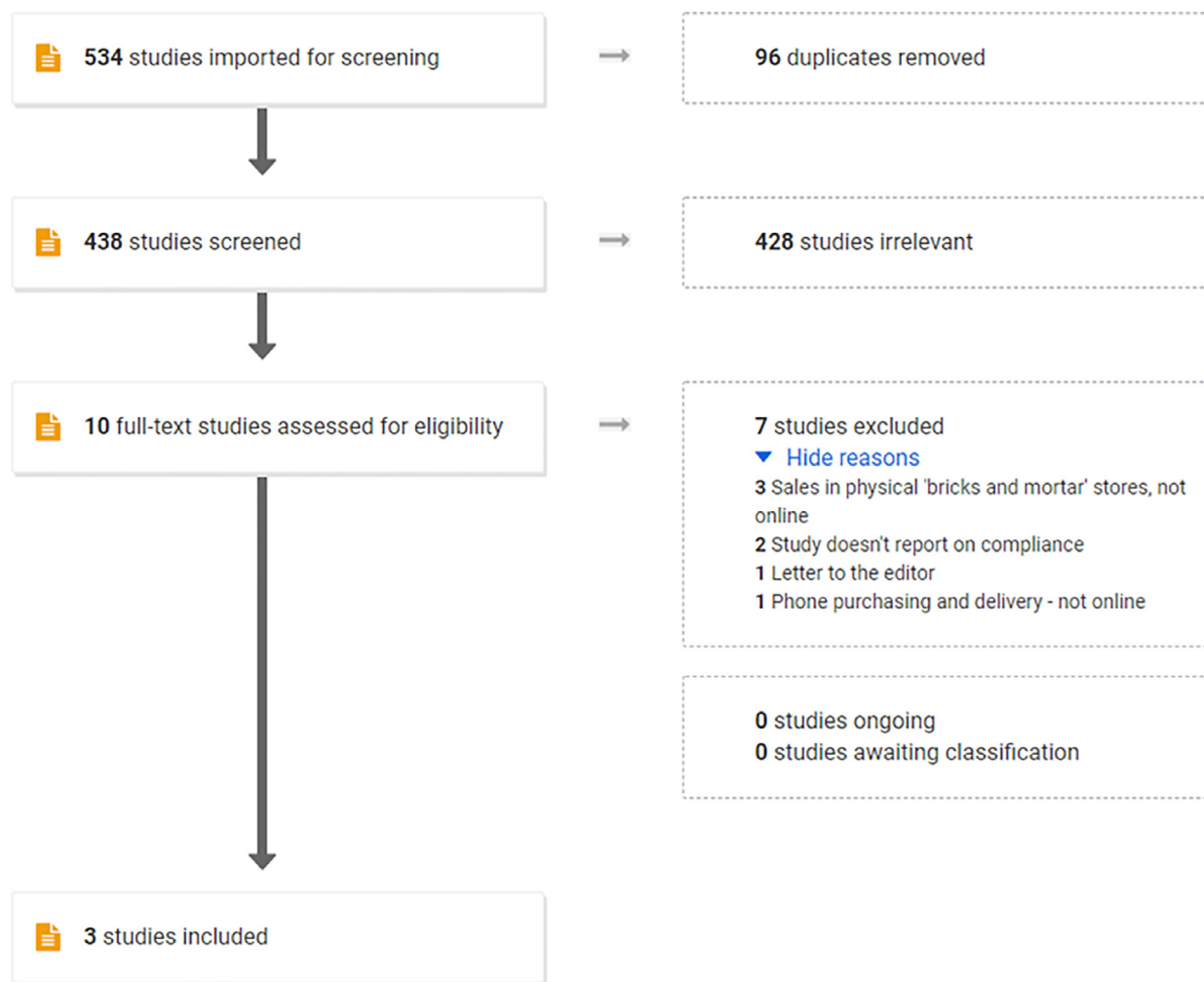


Fig. 1. PRISMA flow diagram.

<sup>a</sup>Excluding results from Google Scholar, which were reviewed using a web browser and could not be uploaded to the Covidence software program. Google Scholar returned more than 282,000 results of which the first 300 were reviewed. No additional papers that met the inclusion criteria were found.

We found just three evaluations of compliance with age restrictions for online alcohol sales and home delivery.

### 5.1. Age verification at the time of purchase and delivery

Age verification was much more common at the point-of-delivery than at the point-of-sale. Only seven jurisdictions, all located in the USA, require age verification to occur at the time of purchase. Of these, only two states mandate the requirement for alcohol deliveries other than shipments from wineries or breweries. The limited availability of secure age-gating solutions may seem like a barrier for age verification at the time of purchase, however, a recent report from the UK has demonstrated that there are several existing and emerging technological solutions for age-gating in the online gambling and pornography industries that could be applied to alcohol sales online [20]. Similarly in Australia, an existing identity verification system already in use for other services could be applied to online alcohol sales [62]. In this system, identity and age is verified in advance through a mobile application or in-person, then a 'Digital id' is established which could be used to verify identity and age at the time of an online purchase [62].

Age verification at the point of delivery is explicitly or implicitly required in almost all jurisdictions, however, it must be acknowledged that whether this is actually implemented in practice relies

on delivery drivers adhering to the policy. In particular, the use of third-party delivery services in jurisdictions where these services are not required to obtain a permit or license from the liquor authority, has the potential to undermine adherence to this requirement. Unlicensed third-party delivery drivers are likely not trained in underage drinking laws and checking photo identification to verify purchasers are of legal drinking age. Our systematic literature review demonstrated that compliance with age verification on delivery can be poor and has the potential to fail even when delivery drivers request to see identification from the purchaser.

### 5.2. Mandatory information to be displayed on websites selling alcohol

The finding that only seven of 72 jurisdictions require websites to display their license number and/or registered business name on their website was surprising, given the requirement for these details to be displayed at liquor establishments in most jurisdictions across all the countries examined, e.g. Scotland [26], England and Wales [45], Indiana [46], Vermont [47], Nova Scotia [48], Northwest Territories [49], New Zealand [18], Australian Capital Territory [33, 50] and NSW [33].

Similarly, in many jurisdictions it is mandatory to display age warnings at licensed premises advising of the minimum legal purchase age for alcoholic beverages [26, 29, 44, 51-54] however, in

only four of 72 (5.6%) jurisdictions (all of these located in Australia) is a similar warning required to be displayed on websites selling alcohol. The rationale for displaying age warnings at liquor establishments is to deter minors from attempting to purchase alcohol, and to remind employees of their legal obligations not to sell alcohol to minors [63]. Reminding employees is not applicable when purchases are made via a website, but the rationale of deterring minors from making purchase attempts is still very relevant for an online purchase.

### 5.3. Responsible service of alcohol certification for delivery drivers

One of the key components of most responsible service of alcohol courses is to train participants on underage drinking laws and how to check photo identification to verify purchasers are of legal drinking age [64]. In 79% of jurisdictions we reviewed, training in the responsible service of alcohol is not required for any drivers delivering alcohol. In one of the studies identified in our systematic review, around half of orders were still given to a minor despite the delivery drivers attempting to verify age [61]. This suggests that simply instructing drivers to verify age on delivery may not be sufficient to prevent deliveries to minors and that training may be needed. Completion of a mandatory training program tailored specifically for the safe delivery of alcohol already exists in three states in US, and 12 other jurisdictions require some/all drivers to complete the same training as other alcohol servers. A requirement for drivers to complete training seems sensible not only to prevent access to minors but also to protect the safety of drivers who may need to refuse a delivery to a customer at their home without the support of other staff, security guards or surveillance.

### 5.4. Delivery trading hours

A 2016 systematic review into the impacts of changes to trading hours of liquor licenses on alcohol-related harm found some evidence that reducing availability of packaged liquor late at night can reduce harm, particularly amongst young people [65]. Given this evidence, our finding that around 10% of jurisdictions permit deliveries to occur beyond standard trading hours is concerning. In Australia, advocacy groups have called on state governments to limit alcohol delivery hours to less than standard trading hours for bricks-and-mortar outlets, arguing that late-night alcohol delivery into people's homes is a risk for alcohol-related violence [66, 67]. While there has been no research that we know of to investigate the association between late night alcohol deliveries and harm, it is plausible given the evidence into trading hours and harm in on and off-premises establishments.

### 5.5. Changes due to the COVID-19 pandemic

Most (69%) of the jurisdictions in our review have relaxed liquor regulations for alcohol home delivery, either temporarily or permanently, since the beginning of the COVID-19 pandemic. While the temporary relaxation may seem logical given the restrictions on movement in place in many locations, what is surprising is that some jurisdictions have implemented permanent changes to their alcohol home delivery laws. Of jurisdictions that have relaxed home delivery regulations during the pandemic around 25% have introduced permanent changes. Some of these permanent changes have been significant. For example, in the US state of Georgia wine shipments from wineries were the only type of alcohol delivery permitted prior to the pandemic. Following the introduction permanent legislation in August 2020, Georgians can now get alcohol delivered from both on and off-premises establishments [68]. There has been only a limited amount of research conducted into harms associated with alcohol home delivery, so this kind of swift

change, potentially without a robust consultation with health and community groups, is concerning.

### 5.6. Strengths and limitations

This study examined the policies governing online alcohol sales and home delivery in 77 jurisdictions across six countries. This research was conducted during the COVID-19 pandemic and provides an insight into the policy changes that have occurred during this period.

As there is limited research on best practice policy in online alcohol sales and delivery, the information was collected to explore and compare the current practices occurring in the selected countries. This study elucidates the diversity of regulatory strategies that are being employed by the jurisdictions, but which policy, or combination of policies are most effective is an empirical question for future research. The policy features extracted are not exhaustive and we recognise there may be other features of licensing laws that curtail online alcohol sales and home delivery.

One of the limitations of this research is the grouping of license categories broadly into on- and off-premises which might exclude some variance and nuance. Additionally, a minority of states in the USA relegate parts of their alcohol policy to the local government level, and in these cases we focused only on state-wide policies. Consequently, some relevant regulation governing online sales and home delivery of alcohol at the local level may have been missed. We focused on government policy only, and excluded self-regulatory arrangements.

We also realise that this study only focused on policy and law in the books and did not examine implementation or enforcement. As we have learned all too well from alcohol control of bricks-and-mortar stores, implementation is not likely unless the resources are available to support such activities [69]. There is very little research on compliance with laws governing online sales and delivery; all focused on compliance with age-verification processes. Further research examining compliance with these policies is warranted, particularly given our finding that text governing age verification on delivery is often vague or implied rather than tightly prescribed.

### 5.7. Policy recommendations

As mentioned, future research is needed to determine which policy or combination of policies is most effective at minimising harms from the online sale and home delivery of alcohol. Based on this review, we recommend that policies governing online sale and home delivery of alcohol should: 1) Include a requirement for age verification at the point of purchase; 2) Explicitly outline a requirement for age verification at the point of delivery, with instructions for what must be done if a person over the legal age is not present to accept a delivery; 3) Require third-party delivery services to obtain a permit or license to deliver alcohol, ensuring in this process that services and their staff become familiar with their legal obligations when delivering alcohol; 4) Ensure maximum delivery trading hours are explicitly outlined (and are no greater than bricks-and-mortar trading hours); 5) Include a requirement that licenses and staff involved in the online sale and delivery of alcohol complete some form of responsible service of alcohol training.

## 6. Conclusion

With the shift towards online purchasing and home delivery of alcohol accelerating since the beginning of the COVID-19 pandemic, and at least some of the increase expected to remain after pandemic restrictions are lifted, the selling of alcohol online is an important area for governments to consider. This study is the first

to systematically review international policies governing the online sale and delivery of alcohol and examine research on the effectiveness of such policies. Regulation of online sales and delivery of alcohol varied widely across the jurisdictions reviewed, but in most it does not meet the same standard as bricks-and-mortar establishments and may be insufficient to prevent youth access. We found that most jurisdictions rely on age verification occurring at the point of delivery. Our systematic review has demonstrated that compliance with age verification on delivery can be poor and has the potential to fail even when delivery drivers request identification from the purchaser. Governments should consider alternative age-gating policies to supplement this method, including mandating age verification at the time of purchase.

### Declaration of Competing Interest

Authors have no interests to declare.

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### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.healthpol.2021.07.005](https://doi.org/10.1016/j.healthpol.2021.07.005).

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