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The economic costs of alcohol-related harms in New South Wales

Development of an interactive costing tool

November 2022

The economic costs of alcohol-related harms in New South Wales: Development of an interactive costing tool

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Conflicts of interest

The authors have no conflicts to declare.

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Costing tool

The Excel-based interactive Alcohol-Related Harms Costing Model (ARHCM) can be provided to collaborating organisations upon request to: nslhd-healthpromotion@health.nsw.gov.au

Users will be required to sign a memorandum of understanding specifying the intended use of the model, agreeing not to change or adapt the model in any way, not redistributing the model to other parties, and recognising the limitations of the model and the estimates it produces as described in this report.

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Executive summary

The challenge

Alcohol products are associated with substantial morbidity, mortality, health sector spending and broader social and economic costs. One of the levers that government uses to protect public health involves controlling the supply of alcohol products by regulating the businesses authorised to sell alcohol through a licensing system. In Australia, liquor licensing is the responsibility of state and territory governments. Much evidence exists linking alcohol availability to alcohol-related harms, so decisions by these regulatory entities influence public health outcomes.

In New South Wales (NSW), liquor licence applications are the responsibility of Liquor and Gaming NSW (L&GNSW) and the Independent Liquor and Gaming Authority (ILGA). These agencies seek input from the community and key agencies such as NSW Health and the NSW Police Force. NSW Health assesses the health impact of proposed new and amended licences and provides specific recommendations to ILGA. However, the influence of health impacts alone on licensing decisions is limited. NSW Health and local stakeholder response to applications can be enhanced by including the cost of alcohol-related harms, including broader social and economic costs, particularly relevant at the local level in the application.

This project aimed to undertake a cost impact analysis of liquor licences in NSW, establishing both the unit cost and total cost of alcohol-related harms to a local area. Priority was placed on interactivity and use of the costing tool at the local level. The **Alcohol-Related Harms Costing Model (ARHCM)** enables NSW Health staff to compare costs borne by a particular community (defined by local government area [LGA]) with the purported economic benefits proposed by the new liquor licence. The information will hopefully strengthen the quality of decisions in responding to liquor licence applications. This project focused on packaged liquor licences which account for most new liquor licence applications.

What did we do?

A new costing model was developed in Excel combining data on alcohol-related harms from various sources with the costs of those harms to estimate the health and social costs related to the consumption of alcohol products in each LGA in NSW. The user can select an LGA (or the whole state of NSW) and total tangible and intangible costs are reported for each type of harm. Examples of harms included in the model are alcohol-related hospitalisations, deaths, some non-admitted patient healthcare and assaults. Productivity impacts are also estimated. The cost of harms is reported for each of the last five financial years up to 2020–21. In this report, results are reported for two LGAs from participating local health districts (LHDs) and the whole of NSW.

What did we find?

The following tables (1–3) summarise the results for NSW, Northern Beaches LGA and Central Coast LGA. These are example LGAs only and significant variations exists across the nine LGAs of NSLHD. Substantial social and economic costs are accumulated for each cost category. The largest cost category was the intangible cost related to premature mortality. The largest tangible cost category was premature mortality, followed by crime and hospitalisation. The spread of costs among the cost categories was similar for the two example LGAs. However, one interesting finding was that the cost of alcohol-related hospitalisations exceeded the cost of crime for Northern Beaches LGA, whereas for Central Coast LGA medical costs were about half the cost of crime, similar to the NSW estimates.

Next steps

The interactive costing model developed for this project allows LHDs and other stakeholders in NSW to estimate the cost of some alcohol-related harms relevant to their LGA that have occurred in prior years. There are a number of future research opportunities that would enhance the economic evidence available to decision-makers when assessing the appropriateness of new, or amended, liquor licences, including to:

1. Capture a broader spectrum of alcohol-related costs, such as motor vehicle and other transport accidents, ambulance attendances and primary healthcare services.
2. Conduct further studies of the links between off-premises alcohol availability and harms in NSW specifically. This would allow researchers, economic modellers and L&GNSW/ILGA to more accurately estimate and factor in potential future consequences of new licences or other policy changes for the NSW population.
3. Develop a forecasting tool, including economic measures, to test the impact of new licences, alcohol harm reduction interventions or other policies before they are implemented.
4. Ensure that any changes to policies or regulations affecting alcohol availability are partnered with a robust evaluation framework that includes both health and economic outcomes.

Table 1: Summary of alcohol-related costs, NSW, 2018–19

Cost category	Amount
Tangible costs	
Premature mortality	$1,153,855,109
Hospital morbidity	$257,430,314
Other health costs	$15,623,437
Crime	$394,012,585
Total tangible costs	$1,820,921,444
Intangible costs	
Premature mortality	$9,604,000,000
Victims of crime	$95,602,161
Total intangible costs	$9,699,602,161
TOTAL COSTS	**$11,520,523,605**

Table 2: Summary of alcohol-related costs, Northern Beaches LGA, 2018–19

Cost category	Amount
Tangible costs	
Premature mortality	$27,104,715
Hospital morbidity	$11,245,680
Other health costs	$565,684
Crime	$10,596,956
Total tangible costs	$49,513,035
Intangible costs	
Premature mortality	$202,860,000
Victims of crime	$2,557,141
Total intangible costs	$205,417,141
TOTAL COSTS	**$254,930,176**

Table 3: Summary of alcohol-related costs, Central Coast LGA, 2018–19

Cost category	Amount
Tangible costs	
Premature mortality	$44,453,511
Hospital morbidity	$12,505,890
Other health costs	$753,143
Crime	$20,132,413
Total tangible costs	$77,844,957
Intangible costs	
Premature mortality	$388,570,000
Victims of crime	$4,678,247
Total intangible costs	$393,248,247
TOTAL COSTS	**$471,093,204**

Introduction

Alcohol use in Australia

Alcohol is a harmful, toxic and addictive substance that causes many health issues and conditions. Alcohol is a Level 1 carcinogen for humans according to the International Agency for Research on Cancer (IARC).[1] The World Health Organization (WHO) estimates that approximately three million deaths per year and 5.1% of the global health burden are caused by the harmful use of alcohol.[2] WHO also notes this burden is inequitable, with more disadvantaged and vulnerable populations experiencing higher rates of alcohol-related deaths and hospitalisations.[2] There are also links between harmful alcohol use and poorer mental health outcomes. For example, a review of the scientific literature by WHO found: strong evidence for a link between anxiety disorders and harmful alcohol use, with several potential causal pathways; some evidence that harmful alcohol use is a risk factor for depression and vice versa; and clear evidence that harmful alcohol use is a risk factor for self-harm and suicidal behaviour.[3]

In Australia, 4.46% of overall health burden was attributable to alcohol use in 2018 as measured by disability-adjusted life years (DALYs).[4] The majority of this was fatal burden estimated to result in 132,845 years of life lost (YLLs), compared with non-fatal burden estimated at 89,263 years of healthy life lost due to disability (YLDs). There were an estimated 6,512 alcohol-related deaths in Australia in 2018.[4] There was a substantial difference in health burden between the sexes with males experiencing well over double the DALYs experienced by females. There were 29 diseases and injuries linked causally to alcohol use in the Australian Burden of Disease Study 2018 (ABDS 2018) (Figure 1).[4] This list is ranked according to proportion of disease burden in terms of DALYs associated with alcohol for all persons (males and females combined). For example, alcohol is associated with 100% of alcohol use disorders in both males and females, 48% of liver cancer burden in males and 21% of liver cancer burden in females. The rest of the top 10 diseases that alcohol is associated with are: nasopharyngeal cancer, other oral cavity and pharynx cancers, lip and oral cavity cancer, road traffic injuries (motorcyclists), other land transport injuries, road traffic injuries (pedal cyclists), road traffic injuries (motor vehicle occupants), and road traffic injuries (pedestrians).[4] Alcohol is somewhat unique, compared with other behavioural or lifestyle-related risk factors, due to the degree that intentional and unintentional injuries and violence contribute to the attributable health burden experienced by the Australian population by gender.

Alcohol-attributable health burden also incurs a financial cost to the healthcare system and wider Australian society. The Australian Institute of Health and Welfare (AIHW) has estimated that $2.108 billion of healthcare expenditure was attributable to alcohol use in Australia in 2018–19, ranking fourth in terms of attributable healthcare expenditure after overweight and obesity, tobacco use and high blood plasma glucose.[5] The majority of this expenditure was for treating alcohol use disorder, injuries, cancers and cardiovascular diseases. There are broader social and economic costs beyond healthcare expenditure. Whetton et al.[6] estimated these broader costs and found that alcohol-attributable tangible costs in Australia in 2017–18 were $18.2 billion, including of $2.6 billion due to premature mortality (including lost economic output), $716.7 million for hospitalisations, $2.1 billion for other healthcare costs, $4 billion in workplace costs such as absenteeism and occupational injuries, $3.1 billion for crime-related costs, and $2.4 billion for road traffic crashes.[6] Intangible costs due to alcohol use were even greater and estimated at $48.7 billion.[6] A systematic review identified several other studies that estimate the broader economic costs associated with alcohol, including a report by the NSW Auditor General on costs of harmful alcohol use.[7,8] The NSW Auditor General estimated costs to NSW Government services of $1.029 billion in 2010 and $3.87 billion of total societal costs in NSW.

Liquor licences

There are 2,370 liquor retail businesses in Australia with a revenue of $14.7 billion. More than 70% of this revenue is earned by outlets owned by three companies.[9] There is evidence that the availability of alcohol products and the density of outlets that sell alcohol are linked to alcohol-related harms, as summarised in a recent systematic review.[10] One of the levers that government uses to protect public health involves the controlling of the supply of

alcohol products by regulating the businesses authorised to sell alcohol through a system of licensing, with responsibility for this sitting at the state and territory level. A range of licence types are available depending on the nature of the business (Table 4). The licence type 'Packaged – Bottle shop and delivery class' is of most interest to this project because this makes up the majority of submissions made by NSW Health in response to liquor licence applications. These are also known as off-premises liquor licences.

Table 4: Types of liquor licences available in NSW

Business type	Liquor licence type
Café or restaurant where supply of food is the primary purpose of the business	On-premises – restaurant class
Pub or large bar with more than 120 patrons	Hotel or General bar
Small bar with under 120 patrons	Small bar
Bottle shop	Packaged – Bottle shop and delivery class
Winery	Producer / wholesaler
Nightclub	On-premises
Registered club, RSL, Diggers Club, golf club	Club
Online alcohol delivery	Packaged – delivery only class
Single function such as a ball, convention, or sporting even held by a non-profit organisation	Limited licence – single function
Multiple functions such as a ball, convention, or sporting event by a non-profit organisation	Limited licence – multi-function
Selling or supplying alcohol at a trade fair, such as a wine show or food show	Limited licence – trade fair
Selling or supplying alcohol at a temporary or infrequent event such as an annual four-day arts festival, V8 supercar race, or international weekend conference	Limited licence – special event
Catering company	On-premises – catering class
Vessel	On-premises – vessel class

Several studies relate specifically to the Australian context and here we focus on packaged liquor licences as this makes up the bulk of new or amended licence applications. Livingston et al. conducted a longitudinal analysis of alcohol outlet density and domestic violence and found an "increase in the overall rate of alcohol outlet density of one outlet per 1,000 residents resulting in an increase in the domestic violence rate of 0.08 per 1,000 residents".[12] Another study by Livingston et al. examined data on assault-related hospitalisations and alcohol use disorder and found that a "10% increase in packaged liquor licences would increase assault rates by 0.8%".[13] Hobday et al. considered the effect of alcohol outlets, sales and trading hours on alcohol-related injuries presenting at emergency departments in Perth and found that "an increase of 10kL [(kilolitres)] sold per off-premises outlet increased risk of injury by 1.9% for both outcomes variables".[14] Morrison et al. focused on the association between intentional and unintentional injuries and off-premises alcohol outset density and found that "off-premises outlet density was positively related to both intentional … and unintentional injuries".[15] "After disaggregation by outlet characteristics, chain outlet density was also related to both intentional and unintentional injuries."[15] A more recent study by Scott et al. found that "access to a liquor licence outlet was significantly associated with family violence-related attendances across all types of outlets, including on-premise (late night) licences…, restaurant licences … and packaged liquor licences…".[16] However, all of these studies relate to Victoria or Western Australia, with no similar studies on New South Wales identified.

Given the health, social and economic costs associated with alcohol use and the density of liquor licences, these impacts should be considered if decisions on new liquor licence applications are to be made in the public interest.

Built environment interventions (restricting number of licences and trading hours of licensed venues) have been reported to be effective in reducing alcohol consumption and alcohol-related harms, supporting the notion that a LGA-level costing tool would be useful for decision-making. A systematic review concluded that:

> The impact of built environment policy change was looked at in 43 studies. Eight of these studies were reviews and/or meta-analyses. The remaining 35 studies were single studies included to look at the impact and benefits of specific interventions in different contexts. The evidence suggested there are multiple health, social and other benefits to restricting alcohol availability and access through a range of mechanisms, particularly through reducing the number of licensed outlets in a defined geographic area and restricting trading hours of licensed venues. … Key benefits of built environment changes include: reductions in alcohol consumption; reduction in alcohol-related violence and assaults (including violence against women); reduction in emergency department presentations; and reduction in injuries and motor vehicle crashes. While many health and social benefits were identified, few studies reported mental health benefits and no studies reported economic benefits.[10]

Licensing in New South Wales

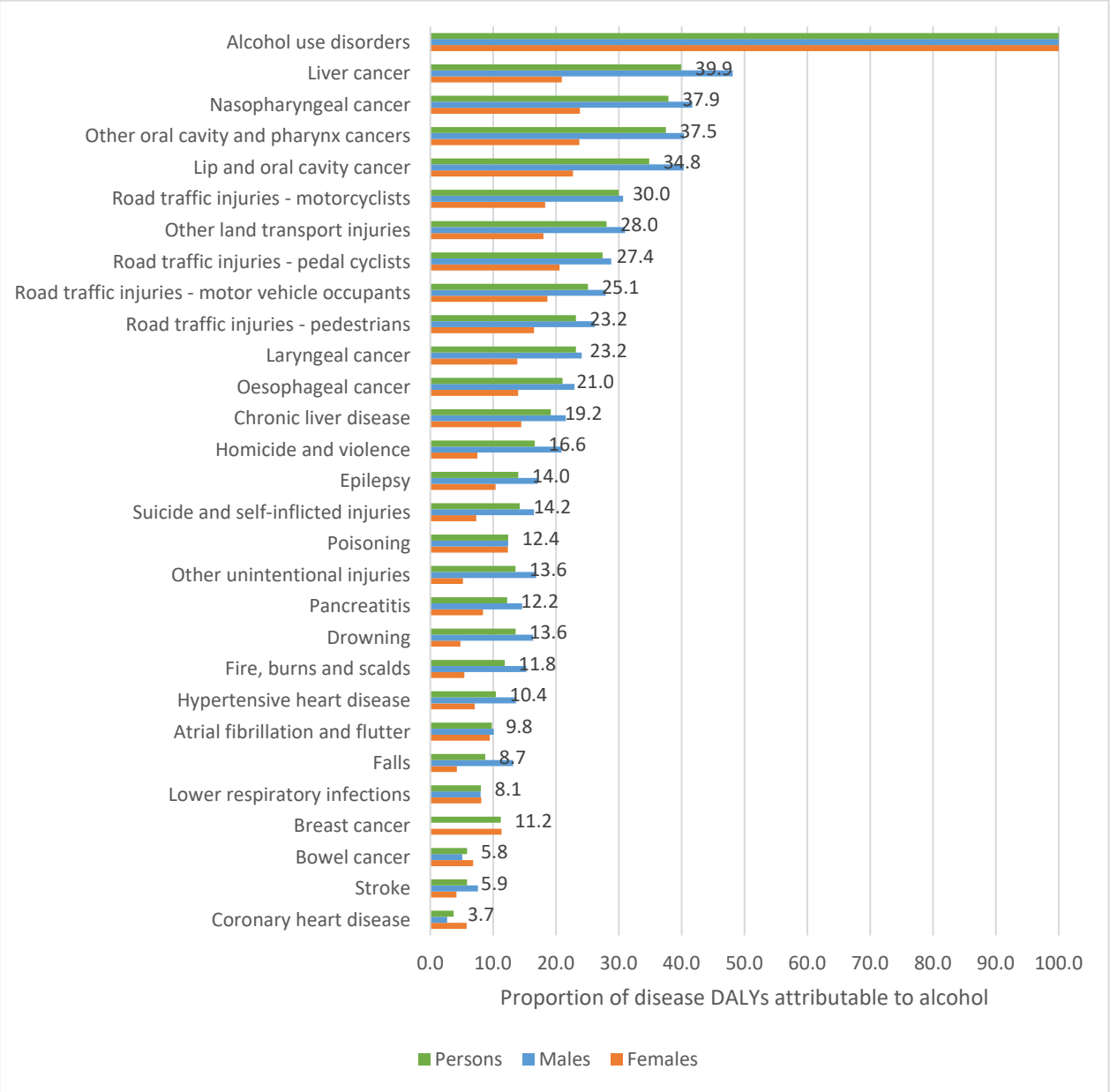
Decision-making on liquor licence applications in NSW is the responsibility of Liquor and Gaming NSW (L&GNSW) and the Independent Liquor and Gaming Authority (ILGA) under the Liquor Act 2007. These agencies seek input from the community and key agencies such as the NSW Police Force and NSW Health[17]. NSW Health is notified of higher risk liquor licence applications in NSW and assesses the health impact of the proposed new licence and provides specific recommendations to ILGA. However, the influence of health impacts alone on licensing decisions is limited. Estimates of the social and economic costs at the local level adds to the evidence available to NSW Health.

Aims and objectives

This project aimed to undertake a cost impact analysis of liquor licences in NSW, establishing both the unit cost and total cost of alcohol-related harms to a local area. There was priority placed on interactivity and use of the Alcohol-Related Harms Costing Model (ARHCM) at the local level. The findings of the analysis are to enable NSW Health staff to compare costs borne by a particular community with the purported economic benefits proposed by the new liquor licence applicant. This information will hopefully strengthen the quality of decisions in responding to liquor licence applications.

As noted above, many studies already exist on the cost of alcohol consumption in Australia. The unique contribution of this project to that body of knowledge is that the new costing model estimates costs at the LGA level in NSW. One of the challenges in this area of research is attributing alcohol-related harms to any one licence type, or estimating the increase in harms that is likely to eventuate due to a single new licence – this is outside the scope of this project. This study developed social and economic cost estimates for a set of alcohol-related harms for the whole state of NSW and all LGAs of NSW, selectable by the user.

Figure 1: Overall health burden (DALYs) for diseases and injury attributable to alcohol as a proportion by gender, 2018



Source: Australian Burden of Disease Study 2018[4]

Note: Data labels are for total persons. For example, out of the fatal and non-fatal health burden due to liver cancer, 39.9% of this is attributable to alcohol. For fatal and non-fatal health burden related to liver cancer experienced by males, a higher proportion, nearly 50%, is attributable to alcohol. This proportion is lower for females (around 20%).

A note on types of economic measures included in the analysis

Several measures not traditionally included in health economic analysis were estimated at the request of collaborating organisations. The number of people employed in liquor retailing has been provided for each LGA. Liquor retail turnover has also been approximated for each LGA. Liquor licensing fees have been reported by licence type and LGA. Fees and taxes such as this are often not included in the societal perspective of economic analyses because they are transfer payments from one agent of the economy to another (cancelling each other out in the societal perspective) but may be relevant for narrower perspectives such as the payers or receiver of the taxes.

A number of 'economic' arguments are often tendered in support of new packaged liquor licence applications or the expansion of trading hours for existing licences: employment, sales of alcohol products, and fostering an area of cultural and tourist attraction. The economic concept of opportunity cost is key to assessing the validity of these claims. Regarding employment, to conduct a full economic assessment of whether this is a benefit, we would need to identify and quantify the alternative employment the staff members would be engaged in. For example, would the staff members otherwise be unemployed, or would they be in other paid employment or training, and what would the productive value of this alternative employment be in comparison to liquor retailing?

This also applies to premises from which the liquor retail outlet operates. For example, what are the relative health, financial and societal welfare costs and benefits of operating a gym or healthy food retailer in comparison to selling alcohol products? In the present costing model, the number of people employed in liquor retailing has been provided for each LGA but not monetised. In regards to the economic contribution of the sale of alcohol products, there are three components to this: the cost to consumers of purchasing alcohol products, a portion of which is borne by people with an alcohol dependency; the costs of running the business including payments to employees, accountants, leasing etc.; and the remaining amount as profits to the owner of the business, the primary reason for operating a liquor retail outlet, which is around 5% in Australia.[9]

In other words, the gross value of liquor retail revenue is not a positive contribution to societal welfare. The third argument for fostering an area of cultural attraction implies that this area would not exist to the same degree without the existence of liquor retail nearby. Again, the counterfactual, or opportunity cost, of the alternative scenario is relevant here. A full cost-benefit analysis taking all of these factors and broader macroeconomic impacts into account usually requires a computable generalised equilibrium (CGE) model or agent-based model (ABM). This approach is outside the scope of this project. Most CGE models focus on financial impacts and do not include impacts on population health, disease and wellbeing.

Methods

Overall approach and structure

The cost analysis, based on cost of illness methods, was used to estimate the health and social costs related to the consumption of alcohol products in each LGA in NSW. Costs included in the analysis were: alcohol-related hospitalisations, deaths, crimes, alcohol-related emergency department attendances and outpatient presentations. Productivity impacts were also included. We adopted a prevalence approach following the methodology of Whetton et al.[6] A full summary of all unit costs is available in the appendix.

The reference year for the primary analysis was 2018–19. This was selected as the main reference year because it was the last full financial year prior to the onset of the COVID-19 pandemic and related to alcohol restrictions and also the latest financial year for which we have data for all included harms. Results are presented for four additional financial years (2016–17 to 2020–21) as well as an average over all 5 years and a 3-year, pre-COVID, average (2016–17 to 2018–19). Multiple years were included in this analysis to maximise flexibility for users, taking into account the COVID pandemic and the potential for estimates to be of interest both during and before this period based on feedback from our research collaborators. Costs were indexed to 2018–19 using the Gross Domestic Product, Gross National Expenditure or AIHW's health price index deflators depending on the type of cost. A discount rate of 7% was used by Whetton et al. [6] and therefore is inherently incorporated in our cost estimates because we adopted their net present values to calculated unit costs in our model.[6]

Many of the judgements and decisions that guided the development of the costing model were influenced by the primary objective of the project to produce a costing tool that could be used at the local level to assist with submissions to the Independent Liquor and Gaming Authority (ILGA). For example, data on harms was obtained at the Local Government Area (LGA) level rather than broader geographical units, such as local health districts (LHDs). Many assumptions were required to operationalise the model due to limitations of available source data or the scope and timeframe of the project. These assumptions are clearly described in this report to fulfil our objective of maximising transparency of development of the model.

The model includes statistics of harms, and the costs related to these, but does not attempt to convert this into an overall measure of health status such as quality-adjusted life years (QALYs). Nor does it include specific interventions, policies or scenarios (to reduce alcohol consumption), which were outside the scope of the project. Therefore, the analysis is not a cost-utility analysis or cost-benefit analysis where alternative courses of action can be directly compared and the most cost-effective one recommended for future implementation. However, it does provide estimates of the costs of current harms which can be informally compared against the purported benefits of granting new liquor licences.

Table 5: Summary of economic methods

Methodological element	Approach taken
Type of analysis	Cost analysis
Perspective	Limited societal
Reference year	2018–19 financial year
Discount rate	7%
Included costs	Alcohol-related deaths (including productivity and intangible costs) Alcohol-related hospitalisations Alcohol-related crimes (police, domestic and non-domestic assaults, sexual assaults, disorderly conduct, malicious damage) (including productivity and intangible costs) Alcohol-related primary care & non-admitted patient healthcare (emergency department costs, non-admitted patient care costs)

Methodological element	Approach taken
Excluded costs	Motor vehicle crashes and transport accidents Ambulance attendances Alcohol purchases by people dependent on alcohol Foetal alcohol spectrum disorder Presenteeism Absenteeism Costs to business of occupational injury Violence and harms to partners and children living with people with a dependence on alcohol Child abuse and child protection services Population-wide alcohol prevention and health promotion programs Primary healthcare services Pharmaceuticals Dental services High-level residential and other aged care services Informal care

Premature death

Tangible costs of premature death

Tangible costs are those costs for which a market price exists as they can be traded in the market economy.[6] Examples include healthcare costs incurred through providing treatment for a disease and the reduced productivity contributed to an economy when an employee dies prematurely. This contrasts with the experience of ill-health or loss of life experienced by a person themselves, which can be 'monetised' to estimate a value of intangible costs (details below).

Lost economic output of people in paid employment

Lost economic output occurs when a worker dies prematurely from alcohol-related disease or injury and refers to the years of productive life lost between the age of death and when they otherwise would have retired.[18,19] This was derived by calculating the average net present value of expected future economic output of a deceased individual in paid employment at the time of death, taking into consideration the proportion of people who are in paid employment, and multiplying this by the number of alcohol-related deaths. Productivity costs related to absenteeism and presenteeism were not included.

The number of alcohol-attributable deaths by LGA was obtained from HealthStats, a publicly available website run by NSW Health.[20] Alcohol attributable deaths is a measure of the amount by which deaths would be reduced if exposure to alcohol had been avoided. This data was derived by applying aetiologic fractions (the probability that a particular case of illness or death was caused by alcohol) to mortality data.[21] The data on deaths were provided by the Australian Coordinating Registry, Cause of Death Unit Record File; the data for the most recent 2 years are preliminary (SAPHaRI).[20] Data on alcohol-attributable deaths beyond 2018–19 were not available at the time of modelling so subsequent years were excluded from the analysis. The number of premature deaths that were in employment at time of death was estimated by multiplying the number of alcohol-attributable deaths by the proportion of people employed per LGA from the 2016 Census.[22]

The net present value of lost economic output for an individual was derived from the total costs calculated by Whetton et al.[6] The total lost economic output estimate per individual was reported as $1,019,950.[6] After indexation to the 2018–19 financial year using the GDP deflator this resulted in a lost economic output per alcohol-related death of $1,074,763.[23]

Assumptions:

- The alcohol-attributable deaths data from HealthStats estimates the proportion of deaths that are alcohol-related using attributable fractions informed by scientific evidence and, for the data at the LGA level, implicitly assumes that these attributable fractions apply equally at the LGA level as they do at the national level.
- The average value of lost economic output at the national level is representative of the economic output lost at the local level.
- The age and sex distribution of alcohol-related premature deaths at the LGA level is the same as the national data used in Whetton et al.[6]
- The proportion of people employed is the same every year based on the 2016 Census.

Recruitment and training costs to employers

Employers incur a one-off cost to recruit and train a new employee to replace someone who has died prematurely from alcohol-related causes. This is calculated in the costing model by multiplying the number of alcohol-related deaths per LGA, or for the whole of NSW, by the cost of recruitment and training per premature death. The unit cost of replacement recruitment and training of $8,448 was obtained from a report by the Bureau of Infrastructure Transport and Regional Economics as identified in Whetton et al.[6] This was then indexed to 2018–19 dollars using the Gross National Expenditure deflator for a cost of $8,763 per deceased employee.[23]

Assumptions:

- The same assumptions used for lost economic output above also apply to this measure.
- The cost of recruitment and training estimated by the Bureau of Infrastructure, Transport and Regional Economics for 2006 is representative of this cost in the present day.

Lost value of unpaid work

Also known as household activity or home-based production, unpaid work occurs if an economic agent other than the household itself could have supplied an equivalent service. Examples include domestic activities, childcare, purchasing goods and services and volunteer work.[18,19,24,25] These are included as a social cost because they are all services lost by the community in the event of death or severe illness of the person supplying them.[6] This was calculated in the costing model by multiplying the net present value of future years of life lost by the number of alcohol-related deaths for each LGA, or NSW as a whole, which was then multiplied by the unit cost of the net present value of unpaid work per person. The number of alcohol-related deaths by LGA was obtained in the same fashion as lost economic output described above. The net present value of unpaid work per person was calculated by dividing the total value of lost household work from Whetton et al. by the number of deaths that applied in that report (5,219) resulting in an average loss per person of $182,301.[6] This was indexed to the 2018–19 financial year using the GDP deflator for a final value of $192,099 per decedent.[23]

Assumption:

- The same assumptions used for lost economic output above also apply to this measure.

Healthcare costs avoided

The premature death of a person from alcohol-attributable causes results in a reduction of lifetime healthcare costs which these individuals would have incurred in future years had they lived to their expected age at death.[6] Also known as unrelated future costs, there is no consensus as to whether or how they are included in health economic analysis, and they rarely are.[26,27] However, there are greater calls in methodological papers for them to be more regularly included, and for the sake of completeness we have included future healthcare costs avoided in the present costing model.[18,28–30] This offsets some of the alcohol-related healthcare costs estimated in other modules of the model.

The number of alcohol-related deaths by LGA was obtained in the same way as lost economic output described above.

The unit cost of healthcare expenditure avoided was derived from Whetton et al. by dividing the total cost by the number of deaths in that report.[6] This resulted in a cost saving per death of $89,510. This was indexed to the 2018–19 financial year using the AIHW's health price index for a final value of $93,046 per decedent.[23]

Assumption:

- The same assumptions used for lost economic output above also apply to this measure.

Intangible costs of premature mortality

Intangible costs are those costs which cannot be traded such as reduced quality of life from ill-health or the value placed on the lost years of being alive.[6] In this costing model we adopt the value of a statistical life (VSL) to calculate these estimates, similar to how this is treated in cost-benefit analysis by government Treasuries. VSL is an estimate of an individual's willingness to trade their wealth for a reduction in fatality risk.[31] It is not the value governments place on saving identified lives, but "the willingness-to-pay for fatality risk reduction of an unidentifiable 'statistical' life".[31] In the present model we calculate the total cost of premature mortality by multiplying the number of alcohol-attributable deaths in a year per LGA by the VSL. The number of alcohol-related deaths by LGA was obtained in the same fashion as lost economic output described above.

The VSL of $4.9 million was recommended by the Department of Prime Minister and Cabinet for 2019.[32] The original study informing this figure was published in 2007, with the estimate indexed each year since then in the advice issued by the Australian Government.[32] This is a conservative approach (also adopted by Whetton et al.[6]) because a recent systematic review estimated a weighted mean of $7 million based on the only two Australian studies published in the last 15 years and a median of $7.3 million for the collection of review-level evidence of international estimates (converted to Australian dollars for 2017).[6,31] Although we do not alter this conservative input (for example, by conducting sensitivity analysis) because it is already the dominant cost category in our estimates, users of the costing model may input these higher VSL figures.

Assumptions:

- The same assumptions used for lost economic output above also apply to this measure.
- The VSL recommended by the Australian Government has been adopted as the conservative estimate in the base case. A more contemporary VSL estimate for the Australian population is likely to be at least 40% higher than this.

Healthcare costs

Hospitalisation

Alcohol products have been linked to a range of diseases and injuries requiring admission to hospital for treatment. These include cancers, cardiovascular diseases, intentional injuries and unintentional injuries. The total cost of hospital separations was calculated by multiplying the number of alcohol-related hospitalisations per LGA by the average cost of a single hospital separation.

The number of alcohol-related hospitalisations by LGA was obtained from HealthStats NSW, which is based on the NSW Combined Admitted Patient Epidemiology Data and ABS population estimates.[20] LGA is based on place of residence rather than the location of the facility providing the care.

The cost per hospital separation was derived from Whetton et al. by dividing the total cost of hospitalisations by the number of hospitalisations that applied in that study.[6] Whetton et al. calculated hospitalisation costs by multiplying the average cost of an acuity-adjusted hospital separation by the cost weights for each attributed separation. Here our unit cost of $5,644 represents an average across all attributable conditions. This was indexed to the 2018–19 financial year using AIHW's health price index for a cost of $5,867.23.

Assumptions:

- The alcohol-attributable hospitalisations from HealthStats estimates the proportion of hospital separations that are alcohol-related using attributable fractions informed by scientific evidence and, for the data at the LGA level, implicitly assumes that these attributable fractions apply equally at the LGA level as they do at the national level.
- The average cost of alcohol-related hospital separations calculated by us based on Whetton et al. is representative of the costs experienced at the local level and applies across all LGAs. In other words, the mix of alcohol-related diseases and their resulting hospitalisations is generalisable across all LGAs and for NSW as a total.

Emergency department

Similar to hospital separations, people may present to emergency departments (ED) for a range of reasons related to consumption of alcohol. To calculate the total cost of alcohol-related ED presentations, the number of alcohol-related ED presentations was multiplied by the unit cost of a single presentation.

The number of ED presentations related to alcohol consumption was obtained from the Emergency Department Records for Epidemiology (EDRE) where the presentation has been flagged as being alcohol-related (personal communication, Population Health Intelligence Systems, Centre for Epidemiology and Evidence, NSW Health). This is a different approach by the source data compared with other harms described above, where alcohol-attributable deaths and hospitalisations have been estimated based on aetiological fractions. This has the advantage of enhancing our confidence that the costs estimated for this component of the costing model are in fact directly related to alcohol consumption. However, the limitation of this approach is that ED presentations recorded as being related to an alcohol consumption, including acute intoxication and chronic alcohol problems, underestimates the burden of alcohol on Eds because the data only has one diagnosis and many alcohol-related ED presentations are either coded as other problems (such as injury) or patients leave before diagnosis and treatment occur. A review of 1,000 presentations from this category found that 54% of presentations were for acute alcohol intoxication, 12% were for chronic alcohol problems where the person was intoxicated, 14% were for chronic alcohol problems and 21% could not be classified. Young persons (12–24 years) were more likely to present to ED with acute alcohol harm, with 82% of presentations within this age group classified as acute intoxication.[33] In summary, this is a conservative approach to estimating the alcohol-related ED costs in the present model.

The unit cost of an ED presentation of $705 was obtained from Whetton et al., which was calculated from total cost of ED presentations by the Independent Hospital Pricing Authority, and indexed to the 2018–19 financial year using AIHW's health price index.[6,23]

Similar to alcohol-related hospitalisations and deaths, data on ED presentations and outpatient treatment are based on place of residence, which may not be the same as the LGA in which care was provided.

Assumptions:

- The average cost of all ED presentations is representative of the cost of alcohol-related ED presentations.
- Some LGAs (e.g. Bland, Carrathool, Coolamon, Coonamble) had low number of ED visits and data does not report the specific number of visits below 5. We assumed that data reported as less than 5 but not 0 was 2.

Outpatient treatment

People can seek treatment from alcohol-related outpatient services. The total cost of alcohol-related outpatient services was estimated by multiplying the outpatient treatment episodes by LGA by the cost of those services.

The number of alcohol-related outpatient treatment episodes in NSW-funded drug and alcohol services for alcohol as the principal drug of concern was obtained from the NSW Alcohol and other drugs treatment service minimum data set (personal communication, Centre for Alcohol and other Drugs, NSW Ministry of Health). Similar to ED presentations, this data represents outpatient episodes directly linked to the use of alcohol. Again, the advantage of this approach is that it enhances the certainty that these costs are directly due to alcohol use but it does underestimate the costs of other alcohol-related diseases and injuries that would have been captured using an

alternative approach based on aetiological fractions. Therefore, the alcohol-related outpatient costs estimated our model is a conservative estimate. Some of the other healthcare costs excluded by this approach include care provided by GPs, community service and pharmaceuticals.

The unit cost was obtained from Whetton et al. which estimated the average per episode cost using data on the total cost of non-admitted patient care from the Independent Hospital Pricing Authority. This amount of $317 was then indexed to the 2018–19 financial year using AIHW's health price index for a final unit cost of $329.52 per alcohol-related outpatient episode.

Similar to alcohol-related hospitalisations and deaths, data on ED presentations and outpatient treatment are based on place of residence, which may not be the same as the LGA in which care was provided.

Assumptions:

- The average cost of all non-admitted episodes is representative of the cost of providing NSW-funded drug and alcohol treatment services.
- Some LGAs (for example, Snow Valleys, Bourke, Brewarrina, Carrathool) had low number of outpatient visits and data does not report the specific number of visits below 5. Similar to ED data, we also assumed that data reported as less than 5 but not 0 was 2.

Crime

We have included four types of offences which are commonly associated with alcohol use: domestic, non-domestic and police assaults; sexual assaults; disorderly conduct, including both offensive conduct and offensive language; and malicious property damage. Different costs apply to the victims and offenders of crimes. For example, healthcare costs apply to the victims of assault but costs related to the criminal justice system apply to offenders. Due to limited data, the cost of domestic, non-domestic and police assaults were assumed to be the same.

Data was obtained from the NSW Bureau of Crime Statistics and Research (BOCSAR).[34] Data on domestic, non-domestic and police assaults, sexual assaults and disorderly conduct were filtered based on whether they were alcohol-related or not. This is not recorded for malicious damage. For malicious damage it was estimated that 49.5% were alcohol-related based on a study by Howard et al.[35] Some LGAs, particularly those with lower populations, experience a low number of crimes and BOCSAR does not report the specific number of crimes below 5 due to reasons of privacy and confidentiality. We assumed that data reported as less than 5 but not 0 was 2.

Victims

To estimate the total cost of crimes incurred by victims, the number of crimes for each offence category was multiplied by the unit cost for each crime. The unit costs for assaults and sexual assaults were distinguished between medical, lost productivity and intangible costs. Medical costs were further subdivided by hospitalisation, injured requiring treatment on a non-hospital setting, injured but no treatment required, and no injury. The proportion that each of these medical costs and the unit costs for each were taken from Whetton et al.[6] Results are reported both including and excluding these victim-related medical costs because it is unknown to what degree alcohol-related hospitalisations already contain the victims of crime. The total excluding victim-related medical costs is the most conservative option ensuring no double counting. For malicious property damage, unit costs were distinguished by property loss and property damage, lost output and intangible costs. BOCSAR does not provide victim information for property crimes so it was assumed that all incidents were linked to a victim and 49.5% were alcohol-related.[35] The costs associated with the victims of disorderly conduct were excluded from the cost calculations as we assumed there was no cost associated with this crime to victims, an approach which has been taken in previous costing studies.[36]

Offenders

There are a range of costs incurred by offenders related to the criminal justice system including police, courts and imprisonment. Costs of imprisonment include the recurrent costs of correction facilities; lost economic output,

workplace disruption and recruitment and training for new employees who replace prisoners that were in paid work; lost productivity of unpaid household work; prison assault and potential cost savings through reduced government welfare payments. Not all of these costs will apply to every offender. To estimate the total costs of criminal justice, we adopted a four-stage probability-based model with seven possible post-crime outcomes based on the work by Byrnes et al (Figure 2).[36]

Data on alcohol-related 'persons of interest' by LGA was provided by BOCSAR. Persons of interest are suspected offenders recorded by police in connection with a criminal incident and all persons of interest in this data and analysis were proceeded against.

The total cost for each offence was calculated by multiplying the number of offenders for each crime by the probabilities of each final post-crime outcome. The result of this was then multiplied by its respective unit cost. For example, the number of offenders being sentenced to prison in the magistrate's court was estimated by multiplying the probability of each stage occurring along the path to the final outcome. In 2018–19, there were 12,289 offenders that was linked to alcohol-related assault in New South Wales. This figure was multiplied to the probability of case being resolved in the magistrate's court (13%), probability of being found guilty (90.6%) and probability of being sentenced to prison (25.5%). The probabilities used in the decision tree model are summarized in Table 9, which is based on Byrnes et al.[36]

The average police expenditure per reported incident and average court cost per case resolved were obtained from Brynes et al. and the annual cost of imprisonment was based on Whetton et al.[6,36] We used the annual cost of imprisonment from Whetton et al. as the authors included not only the prison costs but also the costs related to 1) lost productivity of prisoners in paid work, 2) workplace disruption and costs of recruiting replacement employees, 3) lost productivity of prisoners in unpaid household work, 4) prison assault and 5) reduced government payments.

The estimated net average annual cost of imprisonment (AUD$209,900) was multiplied for each year that the offender was convicted of that offence. The expected imprison sentence for assault, disorderly conduct, sexual assault, and property damage were reported as 2.4, 1.3, 5.9 and 1.3 years, respectively.[36] Note that since the cost of imprisonment would be borne in future years, an annual discount rate of 7% was applied. Table 9 presents the summary of probabilities and unit costs used in this alcohol-related cost category.

Table 6: Summary of input data for premature mortality and healthcare costs

Cost category	Volume	Unit cost (2018–19 $)	Unit cost source	Inflator
Premature mortality				
NPV of lost economic output	# of alcohol-related deaths X Employment rate	$1,074,763.39	6	GDP
Recruitment/training costs to employers	# of alcohol-related deaths X Employment rate	$8,763.49	6	GNE
NPV of value of lost unpaid household work	# of alcohol-related deaths	$192,098.50	6	GDP
NPV of healthcare costs avoided	# of alcohol-related deaths	–$93,045.76	6	Health
Intangible costs	# of alcohol-related deaths	$4,900,000.00	32	n/a
Admitted hospitalisations				
Cost of hospital separations	# of alcohol attributable hospitalisations	$5,866.90	6	Health
Non-admitted healthcare costs				
Emergency Department (ED) costs	# of alcohol attributable ED presentations	$732.85	6	Health
Non-admitted patient care costs	# of alcohol attributable outpatient presentations	$329.52	6	Health

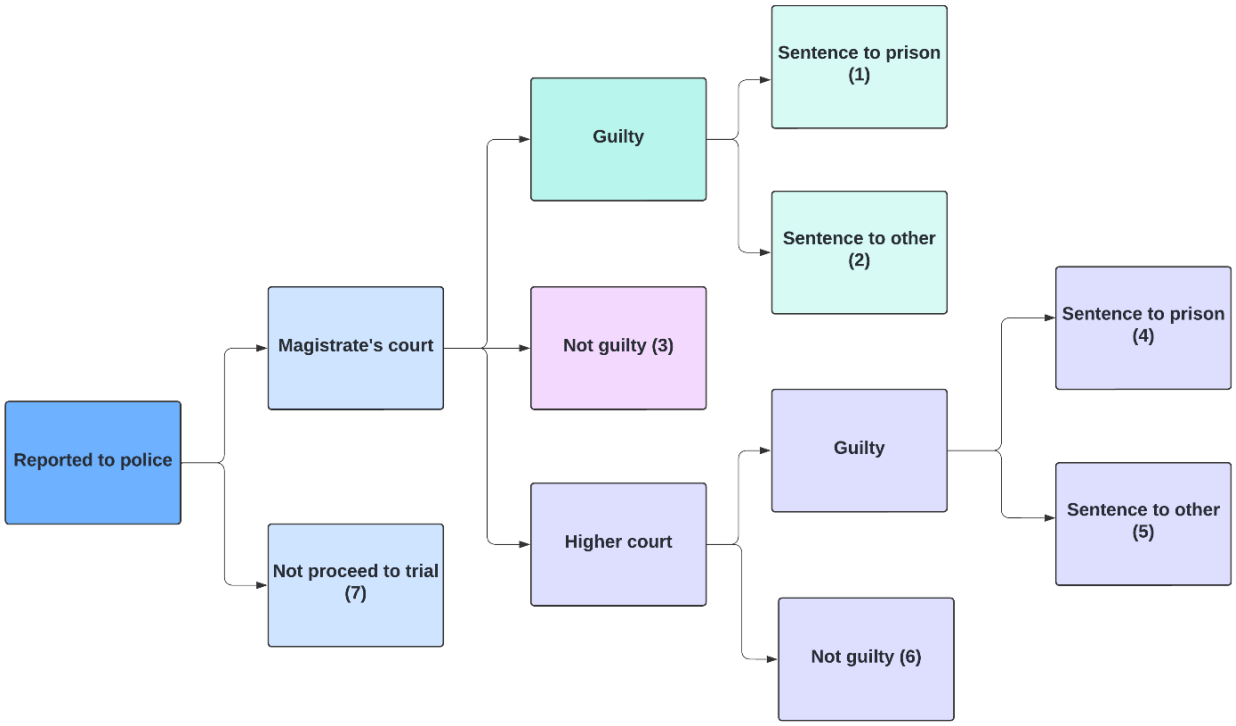
Table 7: Costs incurred by victims

	Volume	Medical or property damage unit cost	Lost output unit cost	Intangible unit cost	Inflators
Assaults					
Hospitalised	# of victims (alcohol-related assaults) X proportion of hospitalised	$13,735.65	$36,849.95	$14,945.31	Medical: Health Lost output and Intangible: GDP
Injured, treatment other than hospital	# of victims (alcohol-related assaults) X proportion of injured treatment other than hospital	$817.05	$3,080.30	$3,194.42	Medical: Health Lost output and Intangible: GDP
Injured no treatment	# of victims (alcohol-related assaults) X proportion of injured without treatment	NA	$764.38	$764.38	Medical: Health Lost output and Intangible: GDP
No injury	# of victims (alcohol-related assaults) X proportion of victims with no treatment	NA	$45.63	$456.38	Medical: Health Lost output and Intangible: GDP
Sexual assaults					
Injury	# of victims (alcohol-related sexual assaults) X % of injured	$1,124.95	$6,630.35	$43,897.05	Medical: Health Lost output and Intangible: GDP
No injury	# of victims (alcohol-related sexual assaults) X % of no injury	NA	$60.48	$11,563.54	Medical: Health Lost output and Intangible: GDP
Malicious property damage					
Malicious property damage	Incidents of malicious damage X 49.5%	$669.71	$49.10	$1,396.68	Property and Intangible: GNE Lost output: GDP

Table 8: Costs incurred by offenders

Crime	Volume	Police costs	Magistrates' costs	Higher costs	Annual cost of imprisonment	Years of imprisonment
Assault	Number of offenders according to crime category X probability of each final post-crime outcome	$2,448.37	$1,040.98	$24,026.67	$209,899.56	2.4
Disorderly conduct	Number of offenders according to crime category X probability of each final post-crime outcome	$1,767.33	$464.82	NA	$209,899.56	1.3
Sexual Assault	Number of offenders according to crime category X probability of each final post-crime outcome	$3,264.06	NA	$29,165.53	$209,899.56	5.9
Malicious property damage	Number of offenders according to crime category X probability of each final post-crime outcome	$1,903.28	$779.44	$23,462.16	$209,899.56	1.3

Figure 2: Criminal justice system probability model



Note: Each number in parentheses indicate an end state of the probability model, an outcome of progressing through the criminal justice system where costs are accumulated through each stage of the process. Adapted from Byrnes et al.[36]

In 2018–19 in NSW, victims reported 21,989 alcohol-related assaults, 1,044 alcohol-related sexual assaults, 4,215 instances of alcohol-related disorderly conduct, and 28,550 estimated instances of alcohol-related malicious property damage. Incidents were recorded against offenders for 12,298 alcohol-related assaults, 250 alcohol-related sexual assaults, 3,772 incidents of disorderly conduct and 6,961 incidents of malicious property damage. In 2018–19 in the Northern Beaches LGA residents reported they were the victims of 617 alcohol-related assaults, 31 alcohol-related sexual assaults, 153 instances of alcohol-related disorderly conduct and 680 estimated instances of malicious property damage. There were 341 alcohol-related assaults, 2 alcohol-related sexual assaults, 130 instances of disorderly conduct and 121 alcohol-related malicious property damage were recorded against persons of interest. In 2018–19 in the Central Coast LGA victims reported 1,272 alcohol-related assaults, 40 alcohol-related sexual assaults, 139 instances of disorderly conduct and 1,420 instances of malicious damage. Meanwhile, the number of recorded offenders from alcohol-related assaults, disorderly conduct, sexual assaults, and malicious property damage were 649, 122, 6 and 391 respectively.

Table 9: Probabilities and costs used in the criminal justice probability model

Justice system contact event	Assaults	Sexual assault	Property damage	Disorderly conduct
Reported crime is resolved in magistrate's court	13.7%	0	7.9%	68.2%
Reported crime is resolved in higher court	0.9%	4.3%	0.2%	–
Magistrate's court finds guilty	90.6%	n/a	96.1%	92.6%
Higher court finds guilty	91.5%	76.5%	93.1%	n/a
Magistrate's court sentences to prison	25.5%	n/a	7.6%	2.2%
Higher court sentences to prison	56.6%	73.0%	46.6%	n/a
Police costs (2018–19$)	$2,448.37	$3,264.06	$1,903.28	$1,767.33
Magistrates' costs (2018–19$)	$1,040.98	n/a	$779.44	$464.82
Higher costs (2018–19$)	$24,026.67	$29,165.53	$23,462.16	n/a
Annual cost of imprisonment (2018–19$)	$209,899.56	$209,899.56	$209,899.56	$209,899.56

n/a = not applicable

Source: Byrnes et al.

Other considerations

A number of measures were included in the interactive tool because they may be useful to stakeholders making submissions related to liquor licence applications but not included in the core cost estimations because they either don't have a financial value attached to them or they are not considered costs or savings in the context of social cost estimates. One of the objectives of this component of the model was to not duplicate information that is already available at https://www.liquorandgaming.nsw.gov.au/livedata

Demographic information

Age, gender, highest educational attainment and income distributions by LGA were extracted from the 2016 Census and converted to proportions to allow comparability between LGAs or NSW as a whole. Socio-economic Indexes for Areas (SEIFA) including the Index of Relative Socio-economic Advantage and Disadvantage (ISRAD) and the Index of Relative Socio-economic Disadvantage (ISRD) are both provided in the model by LGA.[22]

Liquor licences and licence fees

Data on the number of active and trading licences per LGA and the fees paid by these licences were obtained from Liquor & Gaming NSW. Fees by licence type are summed for each LGA in the model.

Liquor retail employment

The number of people employed in liquor retail by LGA and employment type (full-time, part-time or away from work) were obtained from the ABS based on the 2016 Census.

Turnover

The approximate packaged liquor turnover per LGA was estimated based on the average turnover per licence. This was calculated by multiplying the estimated average turnover per licence by the number of active and trading packaged liquor licences per LGA. This is an extremely rough estimate of turnover per LGA in the absence of data at smaller geographical units. The process for calculating average turnover for packaged liquor is as follows:

1. Obtain yearly turnover of liquor retailing at the state level from ABS data.
2. The proportion of active and trading packaged liquor licences for a given financial year was calculated.
3. The proportion of active and trading packaged liquor licences was applied against the total turnover for liquor retail for NSW per year.
4. To estimate the turnover per one active licence, the total revenue in packaged liquor was then divided by the number of active and trading packaged liquor licences.

Table 10: Calculation of turnover per licence

Financial year	NSW Turnover in NSW per year (A)	All active package licences (B)	Total liquor licence (any active) (C)	% of Active package liquor licence (D=B/D)	Total Revenue in package liquor (E=A*D)	Turnover per one active licence (F=E/B)
2016/17	$3,553,300,000	2170	13,972	15.53%	$551,865,230.46	$254,315.77
2017/18	$3,705,700,000	2267	14,763	15.36%	$569,045,715.64	$251,012.67
2018/19	$3,651,900,000	2361	15,560	15.17%	$554,121,844.47	$234,697.94
2019/20	$4,170,900,000	2479	16,300	15.21%	$634,335,036.81	$255,883.44
2020/21	$4,829,200,000	2767	17,414	15.89%	$767,336,418.97	$277,317.10
3yrAvg	$3,636,966,666	2266	14,765	15.35%	$558,169,080.03	$246,675.46
5yrAvg	$3,982,200,000	2409	15,602	15.44%	$614,821,582.13	$254,645.38

Results

Rather than reporting results for all LGAs contained within the costing model, a selection of model outputs are reported for the whole state of New South Wales, Northern Beaches LGA and Central Coast LGA. Detailed costing tables for all three areas are provided in **tables 14, 15** and **16**. A screenshot of the main dashboard with navigation is provided in **Figure 3**. Although the model estimates costs for the last five financial years, the results reported in this report uses 2018–19 for tractability. This was selected as the reference year for reporting because it was the last full financial year before the pandemic and the last financial year for which we have alcohol-related death data.

NSW

In 2018–19, there were 1,960 alcohol-related deaths in NSW. The social cost of these deaths was estimated at $11.5 billion, consisting of $951.9 million of lost economic output, $7.8 million of recruitment and training costs to employers, $376.5 million of lost unpaid household work, and $9.6 billion of intangible costs due to premature mortality. It was estimated there would be cost savings of $182.3 million for future healthcare costs avoided from premature mortality. There were 43,878 alcohol-related hospitalisations in NSW in 2018–19, estimated to cost the healthcare system $257.4 million. Alcohol-related emergency department (14,901 attendances) and non-admitted patient (14,273 attendances) care costs were conservatively estimated at $10.9 million and $4.7 million respectively (Table 14).

It was estimated crimes were associated with $50.8 million of costs to police, $4.1 million in costs to the courts, $282.3 million in costs of imprisonment, and $152.3 million in costs incurred by victims, excluding medical-related crime costs ($161.9 million including medical related crime costs). In total (excluding medical-related crime costs), we estimated $11.5 billion of alcohol-related costs for NSW for 2018–19 (Table 14).

Comparing the years in which the COVID pandemic occurred (2019–20 and 2020–21), the costs of alcohol-related crime were estimated to be slightly lower than the three years pre-pandemic. This is mainly due to the lower number of alcohol-related assaults and disorderly conduct recorded during the pandemic period. The cost of alcohol-related hospital separations was slightly higher in 2019–20 compared with the previous three years and we do not have data on alcohol-related hospitalisations for 2020–21. Data was not available for alcohol-related deaths for the pandemic years.

There were $18.3 million in liquor licensing fees paid in NSW in 2018–19. There were 7,521 people employed by the liquor retailing sector in 2016 with over half of these being part-time workers (Table 11).

Table 11: Other considerations, NSW, 2018–19

Licence	Licence fees	Total active licences
Packaged liquor licence	$3,010,582	2,361
Club licence	$3,283,654	1,238
Hotel licence	$6,322,060	1,949
Limited licence	$143,275	1,237
On-premises licence	$5,116,872	7,263
Producer wholesaler licence	$340,441	1,394
Small bar licence	$43,592	118
Total	**$18,260,476**	**15,560**

Continued over page

Licence	Licence fees	Total active licences
Employed in liquor retailing industry based on ABS 2016 data		
Employed, worked full-time	3,508	
Employed, worked part-time	3,711	
Employed, away from work	302	
Total employed	**7521**	

Northern Beaches Local Government Area

The LGA of Northern Beaches experienced 41 alcohol-related deaths in 2018–19. It was estimated this resulted in $22.8 million of lost economic output, $186,054 of recruitment and training costs to employers, $8 million of lost unpaid household work, less $3.9 million in future healthcare costs avoided for an estimate of $27.1 million of tangible costs due to premature mortality. In addition, intangible costs of $202.9 million were estimated. There were 1,917 alcohol-related hospitalisations for the Northern Beaches LGA in 2018–19 at an estimated cost of $11.2 million. The cost of alcohol-related non-admitted patient services was conservatively estimated at $141,365 and ED presentations at $424,319 (Table 15). It was estimated that crimes are associated with $1.3 million of costs to police, $110,369 in costs to the courts, $7.7 million in costs of imprisonment, and $4.3 million in costs incurred by victims (including medical-related crime costs; this was $4.1 million excluding medical-related crime costs) (Table 15). In total, we estimated $255 million of alcohol related costs for the Northern Beaches LGA for 2018–19. This was $258 million in 2016–17 and $232 million in 2017–18 (Table 15).

There were $519,289 in liquor licensing fees paid for licences in the Northern Beaches LGA in 2018–19. There were 309 people employed by the liquor retailing sector in 2016 with under half of these full-time workers (Table 12).

Table 12: Other considerations, Northern Beaches LGA, 2018–19

Licence	Licence fees	Total active licences
Packaged liquor licence	$129,635	106
Club licence	$94,167	44
Hotel licence	$74,107	22
Limited licence	$3,630	30
On-premises licence	$209,684	304
Producer wholesaler licence	$7,630	30
Small bar licence	$436	1
Total	**$519,289**	**537**
Employed in liquor retailing industry based on ABS 2016 data		
Employed, worked full-time	130	
Employed, worked part-time	159	
Employed, away from work	20	
Total employed	**309**	

Central Coast Local Government Area

The LGA of Central Coast experienced 79 alcohol-related deaths in 2018–19. It was estimated this resulted in $36.3 million of lost economic output, $296,007 of recruitment and training costs to employers, $15.2 million of lost unpaid household work, less $7.4 million in future healthcare costs avoided for an estimate of $44.5 million of tangible costs due to premature mortality. In addition, intangible costs of $389 million were estimated. There were 2,132 alcohol-related hospitalisations for the Central Coast LGA in 2018–19 at an estimated cost of $12.5 million. The cost of alcohol-related non-admitted patient services was conservatively estimated at $191,782 and ED presentations at $561,362 (Table 16). It was estimated crimes were associated with $2.6 million of costs to police, $183,479 in costs to the courts, $14.3 million in costs of imprisonment, and $7.7 million in costs incurred by victims excluding medical-related costs ($8.3 million including medical-related costs) (Table 16). In total, we estimated $471.1 million of alcohol related costs for the Central Coast LGA for 2018–19 ($471.6 million including medical-related crime costs). This was $481.8 million in 2016–17 and $508.5 million in 2017–18 (both excluding medical-related crime costs) (Table 16).

There were $587,593 in liquor licensing fees paid for licences in the Central Coast LGA in 2018–19. There were 359 people employed by the liquor retailing sector in 2016 with over half of these part-time workers (Table 13).

Table 13: Other considerations, Central Coast LGA, 2018–19

Licence	Licence fees	Total active licences
Packaged liquor licence	$150,175	93
Club licence	$136,879	41
Hotel licence	$151,195	36
Limited licence	$6,600	56
On-premises licence	$137,730	221
Producer wholesaler licence	$4,578	17
Small bar licence	$436	2
Total	**$587,593**	**466**
Employed in liquor retailing industry based on ABS 2016 data		
Employed, worked full-time	116	
Employed, worked part-time	218	
Employed, away from work	25	
Total employed	359	

Figure 3: Screenshot of summary dashboard

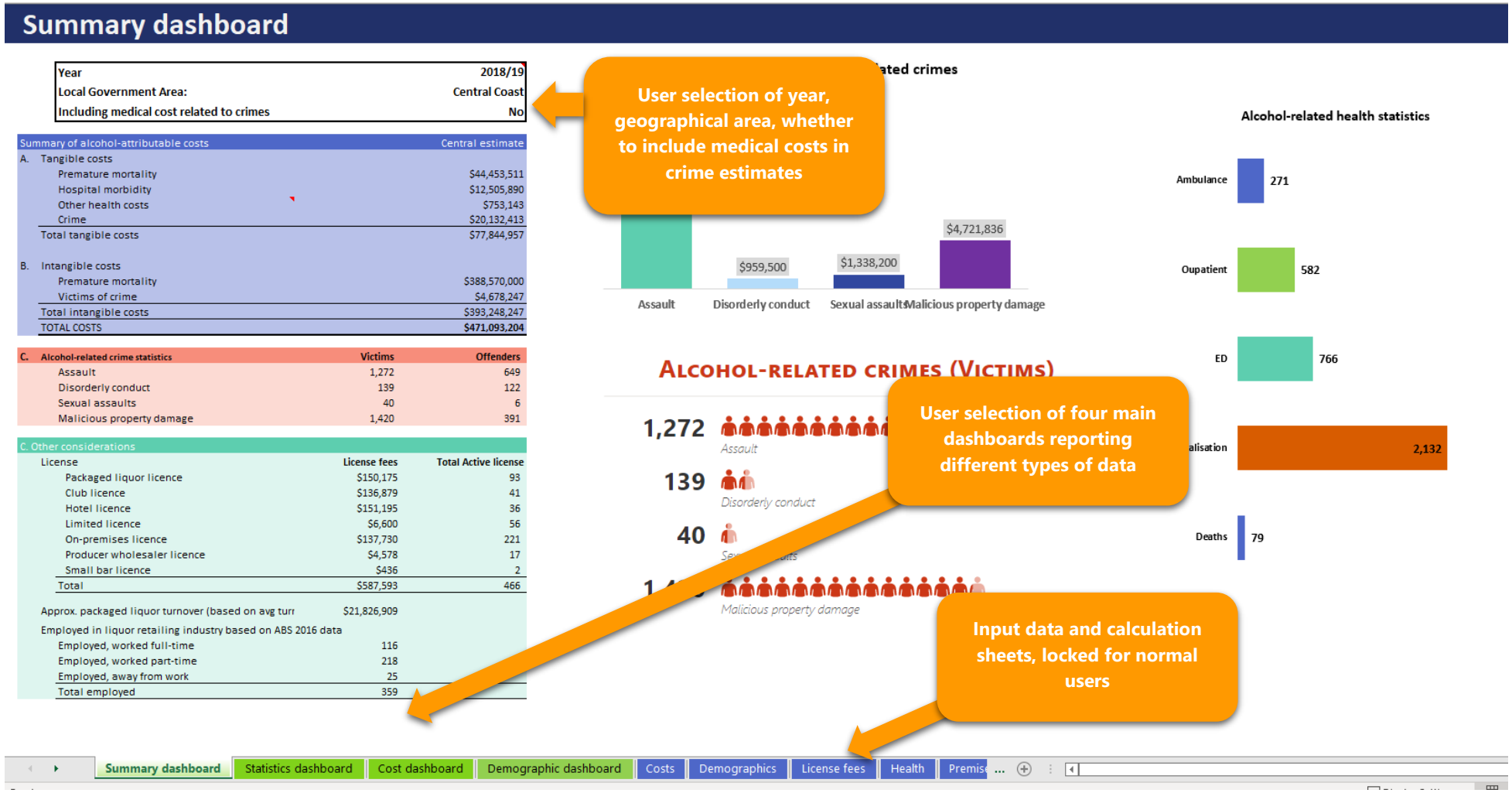


Table 14: Alcohol-related costs for NSW

New South Wales	2016/17	2017/18	2018/19	2019/20	2020/21	3yrAvg	5yrAvg
A. Costs of net alcohol-attributable premature mortality							
Tangible costs							
NPV of lost economic output: non-employee	$947,772,742	$934,124,892	$951,949,664	$0	$0	$944,615,766	$944,615,766
Recruitment/training costs to employers	$7,728,020	$7,616,737	$7,762,078	$0	$0	$7,702,278	$7,702,278
NPV of value of lost unpaid household work	$374,861,013	$369,463,045	$376,513,060	$0	$0	$373,612,373	$373,612,373
NPV of healthcare costs avoided	–$181,569,499	–$178,954,914	–$182,369,693	$0	$0	–$180,964,702	–$180,964,702
Total net tangible costs	$1,148,792,275	$1,132,249,761	$1,153,855,109	$0	$0	$1,144,965,715	$1,144,965,715
Intangible costs							
Value of a statistical life	$9,561,860,000	$9,424,170,000	$9,604,000,000	$0	$0	$9,530,010,000	$9,530,010,000
Total net intangible costs	$9,561,860,000	$9,424,170,000	$9,604,000,000	$0	$0	$9,530,010,000	$9,530,010,000
A. TOTAL COSTS	$10,710,652,275	$10,556,419,761	$10,757,855,109	$0	$0	$10,674,975,715	$10,674,975,715
B. Cost of alcohol-related hospital separations							
Hospital separations	$232,746,493	$244,609,958	$257,430,314	$260,487,557	$0	$244,928,922	$244,928,922
B. TOTAL COSTS	**$232,746,493**	**$244,609,958**	**$257,430,314**	**$260,487,557**	**$0**	**$244,928,922**	**$244,928,922**
C. Primary care & non-admitted patient healthcare							
Emergency Department costs	$9,910,307	$10,334,626	$10,920,172	$10,588,924	$11,341,559	$10,388,368	$10,619,117
Non-admitted patient care costs	$4,504,234	$4,426,796	$4,703,265	$4,400,435	$4,292,351	$4,544,765	$4,465,416
Ambulance costs							
C. TOTAL COSTS	**$14,414,541**	**$14,761,422**	**$15,623,437**	**$14,989,359**	**$15,633,911**	**$14,933,133**	**$15,084,534**
D Crime costs (see detailed calculations below)							
Total police cost	$52,196,744	$51,063,878	$50,840,632	$47,939,732	$47,894,334	$51,367,085	$49,987,064
Court costs	$4,382,632	$4,217,821	$4,081,876	$3,683,128	$3,649,987	$4,227,443	$4,003,089
Cost of Imprisonment	$285,436,280	$281,027,650	$282,341,453	$264,323,901	$267,741,339	$282,935,128	$276,174,125
Cost to Victims (with Medical related costs)	$165,287,761	$164,947,524	$161,931,760	$149,749,089	$159,295,446	$164,055,682	$160,242,316
Cost to Victims (without Medical related costs)	$155,539,585	$155,296,251	$152,350,784	$141,043,219	$150,200,592	$154,395,540	$150,886,086
D.1 TOTAL CRIME COSTS (with Medical related costs)	**$507,303,416**	**$501,256,873**	**$499,195,721**	**$465,695,850**	**$478,581,106**	**$502,585,337**	**$490,406,593**
D.2 TOTAL CRIME COSTS (without Medical related costs)	**$497,555,241**	**$491,605,600**	**$489,614,745**	**$456,989,980**	**$469,486,252**	**$492,925,196**	**$481,050,364**
Total tangible costs	**$1,806,622,197**	**$1,795,297,585**	**$1,830,502,420**	**$652,503,152**	**$397,728,554**	**$1,810,807,401**	**$1,800,391,125**
Total intangible costs	**$9,658,494,528**	**$9,521,750,428**	**$9,699,602,161**	**$88,669,613**	**$96,486,463**	**$9,626,615,706**	**$9,625,004,639**
TOTAL COSTS with Medical related crime costs)	**$11,465,116,725**	**$11,317,048,013**	**$11,530,104,581**	**$741,172,765**	**$494,215,016**	**$11,437,423,106**	**$11,425,395,763**
Total tangible costs	**$1,796,874,022**	**$1,785,646,312**	**$1,820,921,444**	**$643,797,283**	**$388,633,700**	**$1,801,147,259**	**$1,791,034,895**
Total intangible costs	**$9,658,494,528**	**$9,521,750,428**	**$9,699,602,161**	**$88,669,613**	**$96,486,463**	**$9,626,615,706**	**$9,625,004,639**
TOTAL COSTS excluding Medical related crime costs)	**$11,455,368,550**	**$11,307,396,740**	**$11,520,523,605**	**$732,466,896**	**$485,120,163**	**$11,427,762,965**	**$11,416,039,534**

Crime-related medical costs are likely to be duplicated to some degree by the cost estimates for alcohol-related hospital separations and non-admitted healthcare. However, not all crime-related interactions with healthcare services will be reported to police, so the degree is unknown. Therefore, totals are reported both including and excluding medical-related crime costs.

Alcohol-related death data was not available for 2019–20 and 2020–21.

Alcohol-related hospitalisation data was not available for 2020–21.

Three year average is for 2016–17 to 2018–19.

Table 15: Alcohol-related costs for Northern Beaches LGA

Northern Beaches LGA	2016/17	2017/18	2018/19	2019/20	2020/21	3yrAvg	5yrAvg
A. Costs of net alcohol-attributable premature mortality							
Tangible costs							
NPV of lost economic output: non-employee	$23,313,918	$20,888,830	$22,817,878	$0	$0	$22,340,209	$22,340,209
Recruitment/training costs to employers	$190,099	$170,325	$186,054	$0	$0	$182,159	$182,159
NPV of value of lost unpaid household work	$8,125,767	$7,280,533	$7,952,878	$0	$0	$7,786,393	$7,786,393
NPV of healthcare costs avoided	–$3,935,836	–$3,526,434	–$3,852,095	$0	$0	–$3,771,455	–$3,771,455
Total net tangible costs	$27,693,948	$24,813,254	$27,104,715	$0	$0	$26,537,306	$26,537,306
Intangible costs							
Value of a statistical life	$207,270,000	$185,710,000	$202,860,000	$0	$0	$198,613,333	$198,613,333
Total net intangible costs	$207,270,000	$185,710,000	$202,860,000	$0	$0	$198,613,333	$198,613,333
A. TOTAL COSTS	$234,963,948	$210,523,254	$229,964,715	$0	$0	$225,150,639	$225,150,639
B. Cost of alcohol-related hospital separations							
Hospital separations	$10,297,001	$10,739,366	$11,245,680	$13,178,237	$0	$10,760,682	$10,760,682
B. TOTAL COSTS	**$10,297,001**	**$10,739,366**	**$11,245,680**	**$13,178,237**	**$0**	**$10,760,682**	**$10,760,682**
C. Primary care & non-admitted patient healthcare							
Emergency Department costs	$417,723	$473,420	$424,319	$452,900	$465,359	$438,488	$446,744
Non-admitted patient care costs	$130,161	$129,173	$141,365	$145,649	$152,239	$133,566	$139,717
C. TOTAL COSTS	**$547,885**	**$602,593**	**$565,684**	**$598,549**	**$617,598**	**$572,054**	**$586,462**
D Crime costs (see detailed calculations below)							
Total police cost	$1,282,017	$1,059,343	$1,301,997	$993,997	$866,845	$1,214,452	$1,100,840
Court costs	$134,360	$106,586	$110,369	$79,021	$77,764	$117,105	$101,620
Cost of Imprisonment	$6,956,748	$5,925,879	$7,674,480	$5,994,063	$5,057,587	$6,852,369	$6,321,751
Cost to Victims (with Medical related costs)	$3,615,103	$3,601,031	$4,336,941	$3,387,502	$3,980,495	$3,851,025	$3,784,214
Cost to Victims (without Medical related costs)	$3,374,395	$3,378,983	$4,067,251	$3,186,728	$3,778,107	$3,606,876	$3,557,093
D.1 TOTAL CRIME COSTS (with medical related costs)	**$11,988,228**	**$10,692,839**	**$13,423,787**	**$10,454,583**	**$9,982,690**	**$12,034,951**	**$11,308,425**
D.2 TOTAL CRIME COSTS (without medical related costs)	**$11,747,521**	**$10,470,790**	**$13,154,097**	**$10,253,809**	**$9,780,303**	**$11,790,803**	**$11,081,304**
Total tangible costs	**$48,471,207**	**$44,704,076**	**$49,782,725**	**$22,208,384**	**$8,016,202**	**$47,652,669**	**$46,920,066**
Total intangible costs	**$209,325,855**	**$187,853,975**	**$205,417,141**	**$2,022,986**	**$2,584,086**	**$200,865,657**	**$200,886,142**
TOTAL COSTS with medical-related crime costs)	**$257,797,062**	**$232,558,051**	**$255,199,866**	**$24,231,369**	**$10,600,288**	**$248,518,326**	**$247,806,208**
Total tangible costs	**$48,230,500**	**$44,482,027**	**$49,513,035**	**$22,007,610**	**$7,813,815**	**$47,408,521**	**$46,692,945**
Total intangible costs	**$209,325,855**	**$187,853,975**	**$205,417,141**	**$2,022,986**	**$2,584,086**	**$200,865,657**	**$200,886,142**
TOTAL COSTS without medical-related crime costs)	**$257,556,355**	**$232,336,002**	**$254,930,176**	**$24,030,595**	**$10,397,900**	**$248,274,177**	**$247,579,087**

Crime-related medical costs are likely to be duplicated to some degree by the cost estimates for alcohol-related hospital separations and non-admitted healthcare. However, not all crime-related interactions with healthcare services will be reported to police, so the degree is unknown. Therefore, totals are reported both including and excluding medical-related crime costs.

Alcohol-related death data was not available for 2019–20 and 2020–21.

Alcohol-related hospitalisation data was not available for 2020–21.

Three year average is for 2016–17 to 2018–19.

Table 1: Alcohol-related costs for Central Coast LGA

Central Coast LGA	2016/17	2017/18	2018/19	2019/20	2020/21	3yrAvg	5yrAvg
A. Costs of net alcohol-attributable premature mortality							
Tangible costs							
NPV of lost economic output: non-employee	$37,172,420	$39,278,246	$36,302,622	$0	$0	$37,584,429	$37,584,429
Recruitment/training costs to employers	$303,099	$320,270	$296,007	$0	$0	$306,459	$306,459
NPV of value of lost unpaid household work	$15,598,398	$16,482,051	$15,233,411	$0	$0	$15,771,287	$15,771,287
NPV of healthcare costs avoided	–$7,555,316	–$7,983,326	–$7,378,529	$0	$0	–$7,639,057	–$7,639,057
Total net tangible costs	$45,518,601	$48,097,241	$44,453,511	$0	$0	$46,023,118	$46,023,118
Intangible costs							
Value of a statistical life	$397,880,000	$420,420,000	$388,570,000	$0	$0	$402,290,000	$402,290,000
Total net intangible costs	$397,880,000	$420,420,000	$388,570,000	$0	$0	$402,290,000	$402,290,000
A. TOTAL COSTS	$443,398,601	$468,517,241	$433,023,511	$0	$0	$448,313,118	$448,313,118
B. Cost of alcohol-related hospital separations							
Hospital separations	$11,878,132	$12,319,323	$12,505,890	$12,789,848	$0	$12,234,448	$12,234,448
B. TOTAL COSTS	**$11,878,132**	**$12,319,323**	**$12,505,890**	**$12,789,848**	**$0**	**$12,234,448**	**$12,234,448**
C. Primary care & non-admitted patient healthcare							
Emergency Department costs	$551,102	$508,597	$561,362	$543,041	$597,271	$540,353	$552,274
Non-admitted patient care costs	$147,296	$164,761	$191,782	$203,974	$203,644	$167,946	$182,291
Ambulance costs							
C. TOTAL COSTS	**$698,398**	**$673,358**	**$753,143**	**$747,015**	**$800,916**	**$708,300**	**$734,566**
D Crime costs (see detailed calculations below)							
Total police cost	$2,662,996	$2,771,994	$2,567,529	$2,352,751	$2,261,227	$2,667,506	$2,523,299
Court costs	$194,244	$207,583	$183,479	$163,851	$160,032	$195,102	$181,838
Cost of Imprisonment	$14,822,343	$15,864,928	$14,325,770	$13,051,811	$12,464,899	$15,004,347	$14,105,950
Cost to Victims (with Medical related costs)	$8,689,486	$8,751,289	$8,277,917	$7,368,557	$7,809,849	$8,572,897	$8,179,420
Cost to Victims (without Medical related costs)	$8,156,163	$8,174,355	$7,733,882	$6,908,241	$7,358,100	$8,021,467	$7,666,148
D.1 TOTAL CRIME COSTS (with medical related costs)	**$26,369,069**	**$27,595,793**	**$25,354,695**	**$22,936,970**	**$22,696,006**	**$26,439,852**	**$24,990,507**
D.2 TOTAL CRIME COSTS (without medical related costs)	**$25,835,746**	**$27,018,860**	**$24,810,660**	**$22,476,654**	**$22,244,257**	**$25,888,422**	**$24,477,235**
Total tangible costs	**$79,492,818**	**$83,730,648**	**$78,388,992**	**$32,236,119**	**$18,838,026**	**$80,537,486**	**$79,282,377**
Total intangible costs	**$402,851,383**	**$425,375,067**	**$393,248,247**	**$4,237,713**	**$4,658,896**	**$407,158,232**	**$406,990,261**
TOTAL COSTS with medical related crime costs)	**$482,344,201**	**$509,105,715**	**$471,637,239**	**$36,473,833**	**$23,496,922**	**$487,695,718**	**$486,272,639**
Total tangible costs	**$78,959,494**	**$83,153,715**	**$77,844,957**	**$31,775,804**	**$18,386,277**	**$79,986,055**	**$78,769,106**
Total intangible costs	**$402,851,383**	**$425,375,067**	**$393,248,247**	**$4,237,713**	**$4,658,896**	**$407,158,232**	**$406,990,261**
TOTAL COSTS without medical related crime costs)	**$481,810,877**	**$508,528,782**	**$471,093,204**	**$36,013,517**	**$23,045,173**	**$487,144,288**	**$485,759,367**

Crime-related medical costs are likely to be duplicated to some degree by the cost estimates for alcohol-related hospital separations and non-admitted healthcare. However, not all crime-related interactions with healthcare services will be reported to police, so the degree is unknown. Therefore, totals are reported both including and excluding medical-related crime costs.
Alcohol-related death data was not available for 2019–20 and 2020–21.
Alcohol-related hospitalisation data was not available for 2020–21.
Three year average is for 2016–17 to 2018–19.

Discussion

Main findings

An interactive costing tool was developed to help stakeholders identify the costs of alcohol-related harm, with a focus on producing estimates at the LGA level. Summary results have been provided in this report for the whole state of NSW and two example LGAs, Northern Beaches and Central Coast. The model produces cost estimates for all LGAs in NSW as selected by the user. It also reports these estimates for the last five financial years, although this is limited by a lack of data on alcohol-related deaths for 2017–18 and 2018–19 and alcohol-related hospitalisations for 2018–19. The model reports a range of cost categories and harm statistics with the user able to extract results at a level of detail relevant to their context.

The estimates demonstrate a substantial financial and economic burden of alcohol-related health impacts and crimes. For NSW, a large portion of social costs was due to the costs of premature death. If each premature death is valued at almost $5 million, any alcohol-related deaths will accumulate significant social costs, and this approach is consistent with economic analysis of transport infrastructure and other cost-benefit analysis assessed by Treasury departments that use a VSL to value what society places on reducing the risk of dying. The VSL is a stated preference measure and therefore the value could also incorporate the other large cost component estimated in this analysis of lost economic output for paid and unpaid work due to premature death. Alcohol-related hospital separations accounted for around $250 million and crime-related costs around $500 million. For the cost of crimes, we reported totals both including and excluding medical costs incurred by victims, with the latter calculated to ensure there is no double counting on top of hospital separations estimated elsewhere in the model. However, this had a negligible impact on results. This is because the largest contributions to the total costs of crime are the costs incurred by the offender interacting with the criminal justice system, particularly the cost of imprisonment, and the productivity costs incurred by the victims.

The spread of costs amongst these categories is roughly similar for the two example LGAs. However, one interesting finding was that the cost of alcohol-related hospitalisations exceeded the cost of crime for Northern Beaches LGA, whereas for Central Coast LGA medical costs were roughly half the cost of crime, similar to the NSW estimates. Caution needs to be applied to making any comparisons of magnitude of costs between LGAs and inferences that may arise from this. For example, Central Coast LGA has a larger population than Northern Beaches LGA so will have a greater volume of harms and costs. Both LGAs exhibited a reduction in crime costs over the two years of the pandemic (2019–20 and 2020–21) compared with the previous two years, similar to the NSW estimates.

Limitations

This exercise and the results produced by the costing model come with several limitations and caveats. First, a number of assumptions were required to operationalise the model within the scope of the project. These have been listed in the methods section. Perhaps the main assumption (and limitation) is our reliance on the nationally representative costs produced by Whetton et al. to derive unit costs to apply against NSW-specific harms data.[6]

We believe that the main costs associated with alcohol-related harms have been included in the ARHCM model but many economic and social costs associated with alcohol were not included in the model due to issues with the data on harms at the local level or limits to the size and scope of the project. Examples of costs excluded from the model are: motor vehicle and transport crashes to the extent they are not already captured by alcohol-related deaths and hospitalisations; ambulance attendances; alcohol purchases by people dependent on alcohol (the consumption cost of buying alcohol products for this portion of the population where the expenditure is not fully rational); fetal alcohol spectrum disorder; presenteeism; absenteeism; the costs to businesses of occupational injury; violence and harms to partners and children living with people with a dependence on alcohol to the extent this is not already captured by alcohol-related hospitalisations and deaths or crimes data; child abuse and child protection services; population-wide alcohol prevention and health promotion programs; primary healthcare

services; pharmaceuticals; dental services; high-level residential and other aged care services; and informal care. Therefore, the estimates produced by our model are likely to be underestimates of the true cost of alcohol use for an LGA.

Comparison with existing research

The ARHCM adds to the existing body of research on the social and economic harms of alcohol use, albeit with a much stronger focus on usability of the actual model to produce estimates at the local level. The most recent robust estimates on the social and economic cost of alcohol use in Australia was by the National Drug Research Institute at Curtin University, a vital resource used extensively to derive the unit costs used in our costing model.6 The authors of this study estimated tangible costs of $18.2 billion (low bound $12.6 billion, high bound $26.1 billion) and intangible costs of $48.7 billion (low bound $20.7 billion, high bound $188.5 billion) for the entire Australian population. Tangible costs consisted of $2.6 billion related to premature mortality; $0.7 billion for hospitalisation; $2.1 billion of other healthcare costs; $4 billion of state estimates are not included in this study. Looking more broadly than 'cost of illness' studies such as this, a systematic review was conducted to collate the evidence on health and economic burden of alcohol use and the effectiveness and cost-effectiveness of interventions to reduce this harm in Australia and internationally.[10] This report concluded that alcohol use contributes significantly to Australia's health burden as well as costing billions of dollars in healthcare and non-healthcare economic costs each year in Australia. One of the studies identified by this review was by the NSW Auditor General which found that alcohol misuse cost the NSW Government $1.3 billion and $645 million in healthcare costs (indexed to 2016–17) over one year.[8] The same study found an additional $2.1 billion in productivity costs to other sectors due to alcohol misuse for one year.

Future research and potential next steps

Development of the costing mode, l is a first step to supporting stakeholders with decision-making on applications for new or amended liquor licence applications. It provides estimates of the social and economic costs for a set of key harms related to alcohol consumption. The next step in economic evidence development is modelling specific preventative interventions or forecasting the impact of changes to availability in the alcohol retail system. A new research project investigating the associations between alcohol availability and harms in NSW will provide valuable data to support a modelling exercise like this.

Another area of potential future research is enhancing the robustness and accuracy of input data on harms and the costs of these harms, including the addition of cost categories not included in this project.

Conclusion

A costing model was developed to allow users at the local level to produce estimates of alcohol-related social and economic costs for their LGA and at the total state level for NSW. Results have been provided in this report for NSW, Northern Beaches LGA and Central Coast LGA. Estimates for all NSW LGAs and further detail behind calculations are available in the model itself. Social and economic costs of alcohol-related harms can contribute to better decision-making on liquor licence applications.

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Appendix

Table 17: Price indexes used for inflating to 2018–19 financial year

Total health price index and industry-wide indexes, 2009–10 to 2019–20 (reference year 2019–20 = 100)											
Index	**2009–10**	**2010–11**	**2011–12**	**2012–13**	**2013–14**	**2014–15**	**2015–16**	**2016–17**	**2017–18**	**2018–19**	**2019–20**
Total health price index[(a)]	83.5	84.3	85.8	87.6	89.3	90.7	92.6	94.7	96.2	98.2	100.0
GNE IPD	83.9	85.7	87.3	89.0	91.1	92.7	94.2	95.0	96.4	98.3	100.0
GDP IPD	82.7	87.9	89.5	89.4	90.8	90.3	89.8	93.1	94.9	98.1	100.0
	2016	2017	2018	Formula for inflation							
Inflator (Health price index)	1.06	1.04	1.02								
Inflator (GNE)	1.05	1.04	1.02	(Index in reference year / [Index in reported year]) * (costs in reported year)							
Inflator (GDP)	1.07	1.05	1.02								

Total health price index and industry-wide indexes, 2006–07 to 2016–17 (reference year 2016–17 = 100)											
Index	**2006–07**	**2007–08**	**2008–09**	**2009–10**	**2010–11**	**2011–12**	**2012–13**	**2013–14**	**2014–15**	**2015–16**	**2016–17**
Total health price index[(a)]	82.6	84.6	87.0	89.2	90.0	91.6	93.8	95.7	97.4	98.8	100.0
GNE IPD	81.3	83.9	86.8	88.4	90.4	92.0	93.9	95.9	97.4	99.1	100.0
GDP IPD	80.1	83.7	87.9	89.0	94.5	96.3	96.1	97.5	96.8	96.4	100.0
	2016	Formula for inflation									
Inflator (Health price index)	1.21										
Inflator (GNE)	1.23	(Index in reference year / [Index in reported year]) * (costs in reported year)									
Inflator (GDP)	1.248439451										

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