



Alcohol prices, taxes, and alcohol-related harms: A critical review of natural experiments in alcohol policy for nine countries

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ABSTRACT

Objective: Evidence for alcohol-price policy relies heavily on aggregate econometric studies for the United States. Prior reviews of prices and alcohol-related harms include only a few studies based on natural experiments. This study provides a comprehensive review of natural experiments for a wide variety of harms from studies published during 2003 to 2015. We examine policy changes that importantly affected alcohol taxes and prices, and related changes in availability.

Methods: Forty-five studies met inclusion criteria, covering nine countries: Australia, Denmark, Finland, Hong Kong, Iceland, Russia, Sweden, Switzerland, and United States. Some studies cover more than one harm or country, and there are 69 outcomes for review. Summaries are provided for five outcome groups: alcohol-related mortality and hospitalizations; assaults and other crime; drink-driving; intoxication; and survey-indexes for dependency. The review notes both positive/mixed results and negative/null results.

Results: Findings indicate that changes in taxes and prices have selective effects on harms. Mortality outcomes are positive for liver disease and older persons, especially in Finland and Russia. Mostly null results for assaults and drink-driving are found for five countries. Intoxication results for Nordic countries are mixed for selective subpopulations. Results for survey indexes are mixed, with no strong pattern of outcomes within or across countries. **Conclusion:** Prior reviews stress taxes as a comprehensive and cost-effective intervention for addressing alcohol-related harms. A review of natural experiments indicates the confidence placed on this measure is too high, and natural experiments in alcohol policy had selective effects on various subpopulations.

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1. Introduction

Numerous studies examine the relationship between alcohol prices and either alcohol consumption or

alcohol-related harms. Systematic reviews and meta-analyses of price-consumption relationships focus on price elasticities for total populations, which combine elasticity values for light and heavy drinkers [1–4]. However, success or failure of alcohol policies, such as higher tax rates, might depend on the extent to which heavy drinkers and critical subpopulations (women, youth, unemployed) respond to price changes. Evidence for price-elastic responses by heavy drinkers and other groups is less abundant [4,5]. Further, in reviews of Nordic Tax Studies (NTS), substantial

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reductions in taxes and prices were shown to have little or no effect on alcohol consumption in Denmark and southern Sweden, and disputable effects in Finland [6,7]. These null outcomes have been attributed to the phenomenon of “saturation,” whereby economic and cultural factors combine to produce highly inelastic demands for many drinking subpopulations [6]. An alternative explanation advanced by Cook [8] is that survey data used in NTS studies were too weak to reveal accurately the expected inverse relationship with prices. Instead, Cook argues the best evidence might come from administrative data on alcohol-related harms, such as mortality and crime statistics. Data on alcohol harms also avoids measurement problems associated with substitution among alcohol beverages or consumption of unrecorded alcohol such as illegal or private imports and homemade beverages [11, p122].

Past reviews of alcohol-related harms attempt to synthesize studies that employ different empirical methodologies, including time-series, cross-sectional, and panel-data econometric studies and studies that focus on conditions that approximate a natural experiment. The latter methodology is particularly attractive since it avoids some issues associated with identification of causal effects in econometric studies [9,10]. As explained by Babor et al. [11, p104], “the most direct evidence on the effects of alcohol policies comes from studying what happens when the intervention is applied or removed, in comparison with another time or place when there is no change in the intervention . . . when the political process creates what, from the researcher’s perspective, is a natural experiment.” However, past reviews of alcohol harms have included only a few natural experiments for price or tax policies. A 2010 review by Elder et al. [12] examined 22 econometric studies of alcohol-related harms, principally for the US, including motor vehicle crashes, non-traffic mortality, violence, and alcohol dependence. None of these studies are associated with distinct major changes in alcohol policies, but rather are based on other economic changes such as marginal differences in state excise taxes or erosion over time in inflation-adjusted real taxes or real prices (see Dee [13] for a critique). A second review in 2012 by Patra et al. [14] examined 36 taxation studies and 38 price studies for high-risk drinking patterns or harms from alcohol. They included only four natural experiments for alcohol dependency, alcohol-related hospitalizations, interpersonal violence, and other harms (poisonings, drunk-driving, assaults). In a widely-cited review, Wagenaar et al. [15] examined 50 diverse mortality and morbidity studies. Their review included only three studies for Finland and one study for Switzerland that are representative of natural experiments. During the period 2010–2015, numerous additional studies based on natural experiments appeared in the literature, which provide additional evidence on the success or failure of alcohol policy interventions. A more comprehensive review of natural experiments for price–tax changes for a wider variety of countries can therefore fill an important gap for evidence-based alcohol policy.

“Natural” or “quasi-experiments” are a class of research designs based on before-and-after changes in outcomes due to an important exogenous policy intervention,

labelled “the treatment effect” [10,16]. Such research designs are not truly randomized experiments, but provide credible measures of causal effects especially in cases where effects due to pre-existing trends and other confounders are absent or controllable. A long history exists for the use of natural experiment methods in alcohol-related research [69]. As summarized below, primary studies have adopted several different approaches to identify policy effects within the context of a quasi-experiment. These methods range from research designs using within-group comparisons on a before–after basis, comparisons with an untreated control group, and auto-regressive integrated moving-average (ARIMA) time-series methods designed to pinpoint the magnitude of intervention effects. Given these alternative approaches, this review is concerned with changes in alcohol-related harms that follow major policy changes in alcohol taxes and prices. Some closely related changes in availability also are included. Results for nine countries are examined. Our review has two main objectives: (1) summarize before–after effects of important price–tax changes on alcohol-related harms, including mortalities, hospitalizations, violence, drink-driving, intoxication, and indexes of harmful outcomes (dependency, extrinsic problems); and (2) compare these outcomes across countries in order to generalize about effects of important changes in alcohol prices on measures of harmful health outcomes for various subpopulations.

2. Methods

The vast majority of price–tax studies examine relationships with alcohol consumption, i.e., the demand function for alcohol beverages [1–4]. While useful as background, these studies are focused on marginal changes in prices and taxes. A working bibliography was assembled that includes 578 econometric studies, mostly for the United Kingdom and United States (available upon request). Our narrower literature search was guided by a 2011 European Commission (EC) report [17,18], which lists previously-studied European policy changes and alcohol-related harms, and two systematic reviews for less-developed countries [19,20]. The EC report includes 31 countries and covers all types of policy interventions, including tax changes. Based on studies and countries listed in [17–20], eight non-US countries were identified as possible candidates for natural experiments involving important price–tax interventions and alcohol harms: Australia, Denmark, Finland, Hong Kong, Iceland, Russia, Sweden, and Switzerland. Two major databases were searched for country-specific studies: PubMed and IARD Research Database (www.drinksresearch.org). The latter database provides approximately 67,000 citations from 2300 journals going back to 2003, with expanded coverage of non-medical journals. Two parallel searches were conducted for recent studies published during 2003–2015 using, first, various combinations of a country’s name and title/abstract keywords for “alcohol” OR “spirits” OR “beer” AND “price” OR “tax” OR “policy”. A second search focused on alcohol harms using various combinations of a country’s name and title/abstract keywords for “alcohol” AND “mortality” OR “cirrhosis” OR “drink-driving” OR “assaults” OR

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