The cost effectiveness of brief intervention by primary health care workers to reduce alcohol related disease and injury in Vietnam

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Abstract

This study examines the cost-effectiveness of early identification and brief advice for people with hazardous and harmful alcohol use in Vietnam. Two scenarios in which BI is financed by the government (BI-GOV) and non-government organisations (BI-NGO) were compared with current practice. Costs and health outcomes were measured over a 10 year period, referenced to 2006 and discounted at 3%. Cost-effectiveness was modelled using a multi-state and multiple cohort life table approach using a Vietnamese health sector perspective. Cost-effectiveness ratios were measured in United State dollars per disability adjusted life year averted (DALY). When intervention costs are offset by savings to the health care system, BI-GOV will save US$0.27m while BI-NGO will cost US$3.96m. Both BI scenarios are very cost-effective with BI-GOV being a dominant intervention (i.e., cheaper and more effective). Vietnam is in need of a comprehensive and sustainable alcohol policy that can balance the government’s commitment to remove barriers to economic growth with a long term public health approach to minimize preventable harms and related economic burden. These findings provide sound policy advice of an effective and cost-effective strategy to reduce the burden of harm associated with hazardous and harmful alcohol consumption in Vietnam.

Keywords: Alcohol; Brief Intervention; Policy; Vietnam, Cost-Effectiveness

Introduction

Alcohol consumption has been identified as an important risk for chronic disease and injury, with an estimated 3.8% of all global deaths and 4.6% of disability adjusted life-years (DALYs) attributed to alcohol [1]. Vietnam, one of the emerging economies of the developing world, is currently experiencing an increase in the amount of alcohol consumption. This can be attributable to a number of factors including liberalisation, economic growth, changing cultural attitudes towards drinking and a low level of market controls imposed by the government [2]. Higher rates of alcohol consumption are associated with higher alcohol-related crime, traffic accidents and adverse health outcomes and the recent burden of dis-
For the purpose of this paper, brief intervention (BI) was defined to include: screening by the health care practitioner for hazardous and harmful alcohol consumption by using the Alcohol Use Disorders Identification Test (AUDIT) [12]; providing consultation to hazardous and harmful drinkers focusing on changing behaviour to reduce drinking; and following up patients and providing further advice if necessary. These services are further assumed to be provided by primary health providers. Modelled in our analysis are two scenarios: government funded BI (BI-GOV) and non-government funded BI (BI-NGO). Government funded primary health providers currently represent the largest workforce providing primary health care, and are employed on standard State contracts. Influencing behaviour in this workforce has the potential for change nationally. Health providers working in non-government facilities have higher salaries and benefits, and frequently operate in environments that offer greater motivation for change in their practice. With the Doi Moi economic reforms opening Vietnam to private provision of health services, the private not for profit sector, though more costly, is likely to continue to be seen as offering better quality services, and influence health system performance more broadly.

Measurement of health benefits

The methodology used to model the taxation scenarios is based on the ACE-Alcohol project (Assessing the Cost-Effectiveness of interventions to reduce the burden of harm from alcohol-related harm misuse. The method and several applications are reported in detail elsewhere [9, 13]. Health outcomes were evaluated in disability adjusted life years (DALYs), using a multi-state, multiple cohort life table approach to determine changes in incidence, prevalence and mortality of alcohol-related diseases and injuries due to each intervention. A reduction in alcohol consumption affects the incidence, prevalence and mortality of alcohol-related diseases and injury, which in turn influence overall rates of mortality and disability in the intervention population. Diseases modeled are those related to alcohol and included ischaemic heart disease, ischaemic stroke, mouth and oropharynx cancer, oesophagus cancer, breast cancer, liver cancer and alcohol use disorders. Injury from road traffic accidents was also included.

All epidemiological inputs were based on the Vietnamese Burden of Disease study, a component of the “Vietnam Evidence for Health Policy” (VINE) project [3]. Where relevant epidemiological data was missing, DISMOD was used to estimate case fatality rates of all cancers and alcohol use disorders from prevalence, incidence and remission rates data [14]. The relative risks of diseases and injury for different alcohol exposure categories are shown in Table 1. Data on the prevalence of different levels of alcohol use were obtained for the Vietnamese population [15-17]. The model measures total health gains in DALYs averted. Disease specific disability weights were calculated from the Vietnamese Burden of Disease study with background disability weights based on Thailand disability rates [2, 17]. All costs and health outcomes were measured over a 10 year period, referenced to 2006 and discounted at 3%. The model was built in Excel and used the Ersatz software for uncertainty analysis [18].

In the absence of any local data on the effectiveness of BI, the effectiveness rate of Cobiac et al. (2009) was used [9]. Cobiac et al. (2009) conducted a meta-analysis using a random effects method and reported a pooled estimate of decrease in self-reported alcohol consumption of -44 grams of alcohol consumed per week (p<0.001). This is in addition to any decrease in consumption reported by the control groups in each study. Cobiac et al. (2009) interpreted this to mean that when BI are implemented with the guidelines there is potential to significantly reduce self-reported alcohol consumption by up to four standard drinks per week more than controls. This rate converts to a reduction of 6.29 grams of alcohol per day for those drinking alcohol at risky levels (i.e., harmful and hazardous levels) [9].
To account for the increased affordability of alcohol relative to GDP this rate of effectiveness is decayed by an annual factor of 14% [2].

Table 1: Relative risks of alcohol-related diseases and injuries at different categories of alcohol consumption (with abstinence§ as the reference value)

<table>
<thead>
<tr>
<th>Disease/Injurya</th>
<th>Alcohol intake level</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowb</td>
<td>0.85 (0.82–0.88)</td>
<td>0.84 (0.80–0.87)</td>
</tr>
<tr>
<td></td>
<td>Hazardousc</td>
<td>1.02 (0.94–1.11)</td>
<td>1.14 (1.05–1.25)</td>
</tr>
<tr>
<td></td>
<td>Harmfuld</td>
<td>0.62 (0.50–0.77)</td>
<td>0.77 (0.52–1.09)</td>
</tr>
</tbody>
</table>

- Ischaemic heart disease  
- Ischaemic stroke  
- Breast cancer  
- Mouth and oropharynx cancer  
- Oesophageal cancer  
- Liver cancer  
- Road traffic accidents  
- Road traffic accidents (years lived with disability)

bValues are mean relative risk and 95% CI at average alcohol consumption for intake category versus abstainers.  
cDefinition of alcohol categories:  
Abstinence: 0.2 g alcohol consumption per day for males and females;  
Low: 16.2 g alcohol consumption per day for males, and 8.9 g alcohol consumption per day for females;  
Hazardous: 48.4 g alcohol consumption per day for males, and 27.3 g alcohol consumption per day for females;  
Harmful: 98.3 g alcohol consumption per day for males, and 60.8 g alcohol consumption per day for females.

Program management costs and costs associated with delivering BI are assumed to be constant each year (notwithstanding an adjustment for inflation). Professional staff receive refresher training courses once every 3 years. The cost of providing the service for BI-GOV is driven by the number of people eligible for the intervention (discussed in results under target population) multiplied by the cost of a consultation (i.e., VND1,000). For BI-NGO, the cost to the patients is nothing. Rather government providers receive salary support based on time spent on the program – up to 40% of salary in mountainous communes.

Program supplies include the cost of materials used in training health care professionals and other meeting related travel and logistical expenses. Rent and utilities are apportioned using a formula advised by the Government which considers such expenses equivalent to two-thirds of the cost of HR.

Different sources of data were used to measure and value resource use. The bottom-up ingredient approach was used predominantly in the measurement phase, while the top down approach was used to generate estimates of unit prices from budget and other government reports. All assumptions and resource items were checked with national experts to ensure the costing templates captured the full spectrum of resource use and appropriate values were being used. The relevant value of each resource is estimated using one of the three based sources: Government norm for expenditure of program financing by government or ODA (the latest legal documents); actual cost data at the time of investigation; and, expert opinion. The key difference between the two scenarios i.e., BI-GOV and BI-GOV.
NGO; is the reimbursement of time. NGOs reimburse at much higher rates than the government.

Cost offsets

The interventions reduce alcohol use and thereby reduce the future prevalence of alcohol-related disease and injury. Intervention costs are offset by these avoided future alcohol-related health care costs. Cost offsets, for seven alcohol-related diseases including IHD, mouth and oropharynx cancer, oesophagus cancer, breast cancer, ischaemic stroke, liver cancer and alcohol dependence, were valued using inpatient costs from a national hospital in Hue City [20]. For alcohol-related road traffic accidents (RTAs) injuries, costs were assumed to accrue per year lived with disability that is averted. Due to lack of injuries cost data, direct costs at health facilities associated with treatment of traumatic brain injury due to motorcycle accidents in Vietnam were taken as a proxy for RTAs injury costs [20].

Cost-effectiveness analysis

When calculating cost-effectiveness ratios, we considered what would happen from today if all resources could be re-allocated. The cost-effectiveness of each intervention was assessed in relation to the counterfactual scenario, in which none of the proposed interventions was implemented; this is the average cost-effectiveness ratio. Classification of cost-effective interventions was based on the suggestions from the Commission on Macroeconomics and Health (CMH) [21] in which to be considered cost-effective, an intervention has to have a cost-effectiveness ratio of less than three times gross domestic product (GDP) per capita (i.e., US$2,181) [22,23]. Below that threshold, WHO-CHOICE considers an intervention to be very cost-effective if each DALY can be averted at a cost of less than GDP per capita (i.e., US$727). All cost results are reported in US dollars.

Sensitivity and uncertainty analysis

Parametric bootstrap was conducted to provide the uncertainty interval (UI) of ICERs. These UIs are represented diagrammatically in the cost-effectiveness plane. Key input parameters were subject to extensive sensitivity analysis by assuming distributions (beta, lognormal, triangular) around the point estimate. These variations test the robustness of results to changes in key parameters. Ersatz software was employed to perform bootstrap by re-sampling the values of parameters 2,000 times from those distributions [18].

Results

Target population

In 2006 the population of Vietnam was 82.78 million with an estimated 62.54 million people aged 18 years and over. Data suggests that around 12% of adult population will visit a primary health care facility each year, equivalent to 7.4 million adults. The 2009 Health Strategy and Policy Institute survey found 8.12% of adults consumed alcohol at harmful and hazardous levels) [15]. Assuming that hazardous/harmful drinkers frequent a health service at the same rate as other members of the population suggest that a total of 601,740 hazardous/harmful drinkers would be eligible to receive a brief intervention for their alcohol use. If these drinkers attended a health service and were screened for their alcohol use using the AUDIT (which has an estimate local sensitivity rate of 81.85%) [24], approximately 492,524 hazardous/harmful drinkers will be detected and then offered an intervention. If 70% of these come back for a follow-up visit a total of 344,767 hazardous/harmful drinkers would have been screened, offered a BI and then followed up.
Table 2: Year 1 cost estimates for BI-GOV and BI-NGO

<table>
<thead>
<tr>
<th>Cost component</th>
<th>BI-Gov</th>
<th>BI-NGO</th>
<th>BI-Gov</th>
<th>BI-NGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human resource requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National level management</td>
<td>405,804</td>
<td>655,488</td>
<td>25,489</td>
<td>41,172</td>
</tr>
<tr>
<td>Provincial level management</td>
<td>100,000</td>
<td>796,677</td>
<td>10,050</td>
<td>20,048</td>
</tr>
<tr>
<td>National level training</td>
<td>6,410</td>
<td>502,360</td>
<td>5,314</td>
<td>15,894</td>
</tr>
<tr>
<td>Provincial level training</td>
<td>6,369,700</td>
<td>7,395,000</td>
<td>393,808</td>
<td>464,527</td>
</tr>
<tr>
<td>Cost of delivering intervention</td>
<td>837,291</td>
<td>9,258,944</td>
<td>51,591</td>
<td>581,411</td>
</tr>
<tr>
<td>Subtotal</td>
<td>7,775,485</td>
<td>18,496,976</td>
<td>487,234</td>
<td>1,158,106</td>
</tr>
<tr>
<td>Program supplies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National training materials</td>
<td>285,080</td>
<td>341,800</td>
<td>7,906</td>
<td>21,399</td>
</tr>
<tr>
<td>Provincial training materials</td>
<td>9,178,515</td>
<td>14,081,100</td>
<td>576,515</td>
<td>884,452</td>
</tr>
<tr>
<td>Subtotal</td>
<td>9,463,595</td>
<td>14,424,900</td>
<td>394,421</td>
<td>906,047</td>
</tr>
<tr>
<td>Rent, utilities, equipment, office supplies</td>
<td>193,870</td>
<td>604,776</td>
<td>6,524</td>
<td>4,640</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17,324,870</td>
<td>33,526,653</td>
<td>1,088,106</td>
<td>2,105,853</td>
</tr>
</tbody>
</table>

Cost-effectiveness analysis

Table 3 represents health effectiveness in terms of mean DALYs averted, median cost offsets, median intervention costs and median net costs (in 2006 USD) and, the average cost-effectiveness ratio for BI-GOV and BI-NGO. In terms of effectiveness, both BI scenarios avert around 15,000 DALYs and generate similar cost-offsets with similar confidence intervals identified by the uncertainty analysis. BI-GOV is the least costly intervention at around US$1.9 million with BI-NGO costing US$6.13m. BI-GOV saves US$0.27 million when intervention costs are adjusted for cost offsets. Conversely, BI-NGO results in a positive next cost of US$3.96 million.

Table 3: DALYs averted, costs and ICERs for BI-GOV and BI-NGO

According to the Commission on Macroeconomics and Health’s classification, both BI scenarios are very cost-effective, i.e. below the threshold of less than GDP per capita (i.e., < US$727). BI-GOV is a dominant intervention which means it will save money (through averting alcohol-related disease and injury) at the same time as improving population health (though reducing alcohol related consumption). Figures 1 and 2 provides the cost-effectiveness planes for BI-GOV and BI-NGO indicating that all results fall on the right of the threshold of affordability (i.e.,< US$727) which means the interventions are both very cost-effective.

Discussion

Adopting a widely accepted definition of brief intervention, two scenarios were examined, a government funded BI (BI-GOV) and non-government funded BI (BI-NGO), given the desirability of the introduction of these interventions in all primary health services. A multi-state and multiple cohort life table approach was used to evaluate the cost-effectiveness of BI. All epidemiological inputs were based on the Vietnamese Burden of Disease study and empirical evidence related to risk of diseases and injury according to hazardous and harmful alcohol consumption. The WHO-CHOICE CostIt program was used to guide the identification, measurement and valuation of resources. A bottom-up ingredient approach was used predominantly in the measurement phase, while the top down approach was used to generate estimates of unit prices from budget and other government reports. All assumptions and resource items were checked with national experts to ensure the costing templates captured the full spectrum of resource use and appropriate values were being used. Cost-offsets were also factored into the model by considering the potential savings to the health care system of preventing alcohol-related disease and injury.

Before discussing the key findings it is important to acknowledge certain limitations. First, in the absence of any local data on the effectiveness of BI, the effectiveness rate of Cobiac et al (2009) was used [9]. Although the methodology used to derive this estimate was valid, the review was based on evidence from developed countries. The delivery and financing of healthcare in Vietnam is different to most Western societies and there may be potential issues with transferring results of a study examining Western behaviour to an emerging country. This rate of effectiveness has been diluted by the inclusion of a 14% annual decay rate to account for the increased affordability of alcohol relative to GDP. Second, the WHO-CHOICE Cost-IT program has five categories (strategy development and evaluation; human resource requirements; program supplies; mass media; and, overhead costs). This study did not include cost components for strategy development and evaluation or mass media. Our assumption is that Vietnam is operating in a steady state situation in that the State has the necessary infrastructure currently in place to implement and support a BI. Mass media was not part of the intervention per se and therefore not included in the costing.

Our results suggest that a BI is able to reach approximately 492,524 hazardous/harmful drinkers and avert up to 15,000 DALYs and an intervention cost of US$1.9 million for BI-GOV and US$6.13m for BI-NGO. This intervention, however, will prevent alcohol-related disease and injury and will save the health care system over US$2 million over a 10 year period. When intervention costs are offset by savings to the health care system, BI-GOV will save US$0.27 million while BI-NGO will cost US$3.96 million. When using the Commission on Macroeconomics and Health’s classification of affordability, i.e. less than GDP per capita of US$727, both BI scenarios are very cost-effective with BI-GOV being what is referred to as a dominant intervention which means it will save money (through avoiding future alcohol-related health care costs) at the same time as improving population health (though reducing alcohol related consumption).

These findings provide sound policy advice of an effective and cost-effective strategy to reduce the burden of harm associated with alcohol misuse in Vietnam. The study presents the first economic evaluation examining the cost-effectiveness of brief intervention to reduce the burden of harm associated with alcohol misuse in Vietnam. Both interventions proposed are feasible, acceptable and affordable in comparison with previous WHO studies investing the cost-effectiveness of BI for the Western Pacific B sub-region (WpRB) that included Vietnam our result reported lower ICERS.

Viet Nam is in need of a comprehensive and sustainable alcohol policy that can balance the government’s commitment to remove barriers to economic growth with a long term public health approach to minimize preventable harms and related economic burden. An effective response will require not only the state, but also non-governmental organizations to support and hold regulatory agencies to account. An essential part of this progress is the development of evidence-based alcohol policy that is independent of commercial interests.

Acknowledgments

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Conflict of Interest

The authors declare no conflict of interest.

References


