



# **Alcohol Measures for Public Health Research Alliance AMPHORA**

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## DELIVERABLE 1.2

### Framework for evaluating European alcohol policies and programmes

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#### Objectives

- 1) To provide a common framework for evaluating effectiveness and cost-effectiveness of interventions, including a tool to assess effectiveness and cost-effectiveness of different interventions in different modules;
- 2) To enable comparisons between different interventions across countries and time in terms of costs and effectiveness; and
- 3) To estimate joint effects of multiple interventions.

#### Background and theoretical model

In the core of the program will be a causal pathway, which can be characterized as follows:

[External cause, e.g. planned intervention or “natural cause”]

- $\Delta$  consumption of alcohol
- $\Delta$  alcohol-attributable harm
- $\Delta$  alcohol-attributable costs

Please note that causality should be established for each step of the pathway. Consider the following example: in a recession, the costs for mental disease and addition services were increasing substantially. In order to calculate alcohol-attributable costs, we should only consider costs, which are **causally** related to alcohol, usually operationalized by a counterfactual scenario, whether these costs would have incurred as well in a situation where ceteris paribus no alcohol had been present (Rothman et al., 2008; Hill, 1965). Clearly, in the above situation, any costs associated with alcohol use disorders (AUD) satisfy this definition. However, for other mental disorders, such a depression, we cannot establish causality or estimate attributable fractions (AF) for alcohol consumption (Hanley, 2001), i.e., proportions of depression and resulting costs caused by alcohol.

While depression and AUD are strongly associated, and while depression also is associated with alcohol use, the causal pathways of these associations cannot be disentangled easily to allow the estimation of AFs. Based on current knowledge, it is likely, that part of the depression were caused by alcohol use and/or AUD, part of the alcohol use and AUD were caused by depression, and another portion of the association of depression with AUD/alcohol use had third causes, i.e. genetic vulnerability (Rehm et al., 2004). Consequently, unless we have clear indicators which allow us to calculate alcohol AF, if the above example, we should only include the AUDs as alcohol-attributable costs.

Causality does not have to be established in each study to calculate AFs for this project. Thus, if one of the outcomes measures is liver cirrhosis, we can base our calculations on the established causal relationship between alcohol and liver cirrhosis (e.g., Rehm et al., 2003), and use the epidemiological indicators for prevalence of alcohol use and risk relations to combine the AF using the below formula.



$$AAF(x) = \frac{P_a RR_a + P_{ex} RR_{ex} + \int_{\min(x)}^{\max(x)} P(x) RR(x) dx - 1}{P_a RR_a + P_{ex} RR_{ex} + \int_{\min(x)}^{\max(x)} P(x) RR(x) dx}$$

- where
- $P_a$  is the prevalence of lifetime abstainers
  - $RR_a$  is the relative risk of lifetime abstainers (set to 1)
  - $P_{ex}$  is the prevalence of former drinkers (all types of former drinkers with no drinking in last year)
  - $RR_{ex}$  is the relative risk of former drinkers
  - $x$  average volume of alcohol consumption per day
  - $P(x)$  is the prevalence of alcohol with consumption  $x$
  - $RR(x)$  is the relative risk of drinkers with consumption  $x$

Of course, instead of no consumption at all, other counterfactuals could be modelled, e.g., the effects of interventions can be modelled by comparing two different distributions of drinkers and ex-drinkers.

We programmed and implemented an R program to estimate these formulas including integration i.e., not 100 intervals but solving the integral).

The above framework allows for evaluations and comparisons where the following information is given:

- Information about changes in drinking volume only (we will be able to model not only the drinking but in addition alcohol-attributable mortality and Years of Life Lost – YLL - for all EU countries as well as selected Disability-Adjusted Life Years – DALYs – for some cases).
- Information about changes in drinking volume and patterns of drinking
- Information about changes in health outcomes only

Of course, the more information available the better the modelling will be.

#### Selection of outcomes indicators

Different interventions in different countries use different criteria for success. Often, more than one criterion and indicator is available. Triangulation of indicators will allow a better picture of the profile (i.e. certain interventions such as enforcement of drinking driving laws impact mainly on traffic injury) and the overall effectiveness of interventions. Within available indicators, AMPHORA will try to establish the best indicator or indicator set of the policy intervention, which can be used for comparative analysis in Europe. A draft for such indicators is given below.

An ideal comparative indicator for the effectiveness of policy interventions should measure alcohol-attributable harm directly<sup>1</sup> and should have the following characteristics, in addition to being available in a comparative fashion across Europe:

1. Short latency period to be able to detect changes in alcohol-attributable harm within a temporal proximity, as most data on policy and interventions have been collected shortly after the intervention (i.e. one or two years);

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<sup>1</sup> Overall, for our framework, we prefer to work with examples and situation, where not only consumption indicators are available, but where we obtain consumption and harm indicators. However, as indicated above, we will be able to model harm based on consumption data only, as we have time series of mortality data for all EU countries.



2. Reliability of outcome measurement or of proxy for outcome;
3. Relation to different dimensions of alcohol wherever possible;
4. Relatively broad occurrence with respect to age and sex-groups;
5. Importance for both fatal and non-fatal outcomes, and for social harm; and
6. Explicitly include effects on others than the drinker, as harm to others has high policy relevance.

#### Health outcomes

A listing of relevant indicators from health can be seen in Table 1. If one would look for one single indicator overall, liver cirrhosis would be the best choice as it exists in a mostly comparative fashion for all European countries. Liver cirrhosis is also linked to social harm in most countries, even though it is not clear to what degree in particular. Liver cirrhosis is not as wide as all alcohol-attributable harm, and has the disadvantage, that alcohol-attributable harm for countries in South-East Europe may be overestimated, if solely based on liver cirrhosis.

Thus, it would be better to take alcohol-attributable **Years of Life Lost (YLL)** as basis. This indicator can be relatively easily calculated based on mortality figures available for all European countries. It needs alcohol consumption by sex and age as other input, which is available as well from all countries. It does not capture explicitly social harm or alcohol-related disability, but there is reason to believe, that it is correlated with both. For disability, we can use relationships from prior CRAs. For social harm, there is the overlap in the area of aggression/violence, which is one key component of social harm, but also an injury category.

In addition we will try to use WHO estimates to construct an alcohol-attributable **burden of disease (BOD)** indicator in DALYs. This is preliminary and will not serve as a main indicator, as we will probably not be able to have BOD estimates on a yearly basis.

#### Exposure as outcome

For some modules, we would need exposure and not alcohol-attributable harm as outcome. In these cases, we would use the *per capita* consumption figures from the WHO data base, which have been validated in recent months, as basis (recorded plus unrecorded). If the country representative believes to have qualitatively better comparable data, this will have to be discussed, as there has been a comprehensive validation effort for all WHO data, and any other data will have to be scrutinized with the same rigor.

If the data have to be disaggregated, we will additionally use survey data. **For surveys to be comparable**, we would not only need the final numbers converted to average volume of consumption in g/day or indicators of patterns of drinking (heavy drinking occasions indicator), but additionally clear information on representativity (i.e. sample design), weighting variables to include design effects, and response rate. We will make adjustments for coverage of *per capita* consumption where necessary (as it is impossible to compare surveys when the *per capita* coverage is vastly different; see Rehm et al., 2007) and will use the current algorithms of the Comparative Risk Analyses within the GBD study for disaggregation.

#### Social harm

Social harm should be better integrated into the framework in the final stage. We will open a forum of all interested to start constructing such an indicator. In construction one should note that we want to go beyond self-attributed responses to questionnaires, which cannot be easily related to more objective indicators or costs.

#### Cost considerations and cost-effectiveness analysis

Years of Life Lost can be easily integrated into a cost-effectiveness framework. In addition, data on cost for the interventions should be collected.



### Minimal data requirements for all interventions to be included in a comparative framework

Proposal of minimal data requirements for comparing interventions or developments over time (EXCEL will be provided):

1. Assessment of costs of interventions in as much detail as possible. Your data will be supplemented by WHO CHOICE calculations, which includes all those 'programme-level' resources/costs above the patient/facility level that are so often overlooked.
2. Assessment of mortality by cause of death, age, sex before and after the intervention (if there are control groups, all the better)
3. Comparable data for all EU countries on a national level are available. However, if there are interventions based on regional level, these will have to be collected and provided.
4. Assessment of alcohol consumption by sex and age before and after the intervention (if there are control groups, all the better)
5. Comparable per capita data for all EU countries on a national level are available. However, if there are interventions based on regional level, these will have to be collected and provided. To disaggregate the effects, survey data have to be provided with specifications mentioned above.
6. Specifically: if there are data on liver cirrhosis morbidity, in addition to mortality, these should be included
7. If there suggestions for other outcomes, they should be included, especially for social harm

The absolute minimal requirements are in blue.

### Work plan

Months 1-2: Discussion and finalization of the indicator

Months 3-6: Developing tools for data input

Months 7-end: Analyzing interventions in a comparative framework

Refining the indicators

Final result:

- a common indicator and its properties including uncertainty for alcohol-attributable health harm based on YLL is known
- different interventions had been compared in effectiveness and cost-effectiveness with respect to this common indicator
- a common indicator on alcohol-attributable total BOD has been piloted and uncertainty and relation to YLL is known.
- a common indicator on alcohol-attributable social harm is piloted



## **References**

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Table 1: Major categories of disease attributable to alcohol and potential for being used as indicator in monitoring system

Alcohol-attributable disease category	Latency	Strength of relationship to alcohol	Reliability of outcome	Relation to dimensions of consumption			Lifespan	Morbidity & Mortality
				Volume	Patterns	Type		
Mouth & oropharyngeal cancer, oesophageal cancer, liver cancer, female breast cancer, colorectal cancer)	Long	Low to medium	High	++	-	-	+	++
Alcohol use disorders	Problematic, not clear; problem of “two worlds”: survey detected vs. clinical cases	High	Low	++	+	-	++	Mortality problematic
Unipolar major depression	Problematic	Low and causality problematic	Low	+	+	-	++	Mortality problematic
Epilepsy	Problematic	Medium	High	+	?	-	+	+
Diabetes	Long	Low and problematic as harm indicator (in part beneficial effect)	High	+	+	-	+/-	Mortality problematic
Hypertensive diseases	Medium	Low to medium	Medium	+	+(meals)	-	+/-	+
Coronary heart disease	Short to medium	Low and problematic as harm indicator (main beneficial effect)	Medium	+	+	?	-	+
Stroke	Medium	Problematic, different relationships of alcohol to different stroke types	Low	+	+/-	-	-	+



Alcohol-attributable disease category	Latency	Strength of relationship to	Reliability of outcome	Relation to dimensions of consumption			Lifespan	Morbidity & Mortality
Liver cirrhosis	Short	Medium to high	Medium	++	+	+	-	+
Alcoholic liver cirrhosis	Short	High	Often low	++	+	+	-	+
Low birth weight	Short	Low	Low	+	++	?	-	+
Traffic injury	Short	Medium and culture dependent	High	+	++	-	++	+
Other unintentional: drowning, falls, poisonings, other unintentional injuries	Short	Medium	High	+	++	-	+	+/-
Alcohol poisoning	Short	High	Often low, even in ex SU countries	+	++	+	+	Mainly mortality
Intentional injury: Self-inflicted injuries, homicide and violence, other intentional injuries	Short	Medium and culture dependent	Medium	+	++	-	+	+