

Cost-effectiveness of brief interventions on alcohol compared to other population-based alcohol policies

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Conflict of interest

- There is no specific conflict of interest for this presentation on cost-effectiveness of screening and brief intervention
- Obviously, my work has been financially support by WHO, NIH (NIAAA), CIHR, Canadian government agencies, the EU and others, and they may have certain interests relevant. However, none of the funding partners had imposed any obligations regarding results. Current funding includes membership of the Steering Committee and PI for the TU Dresden of the project “Scale-up of Prevention and Management of Alcohol Use Disorder and Comorbid Depression in Latin America (SCALA)” (€ 2,568,692.50 from the European Commission Horizon 2020).
- In addition, some of my work has been supported by pharmaindustry – in particular Lundbeck and Debregeas et Associés Pharma.
- While none of these grants received has anything to do with the data I will present, one may argue, that companies which produce medication for AUD have an interest in high prevalence and burden of alcohol problems and the effectiveness of interventions.

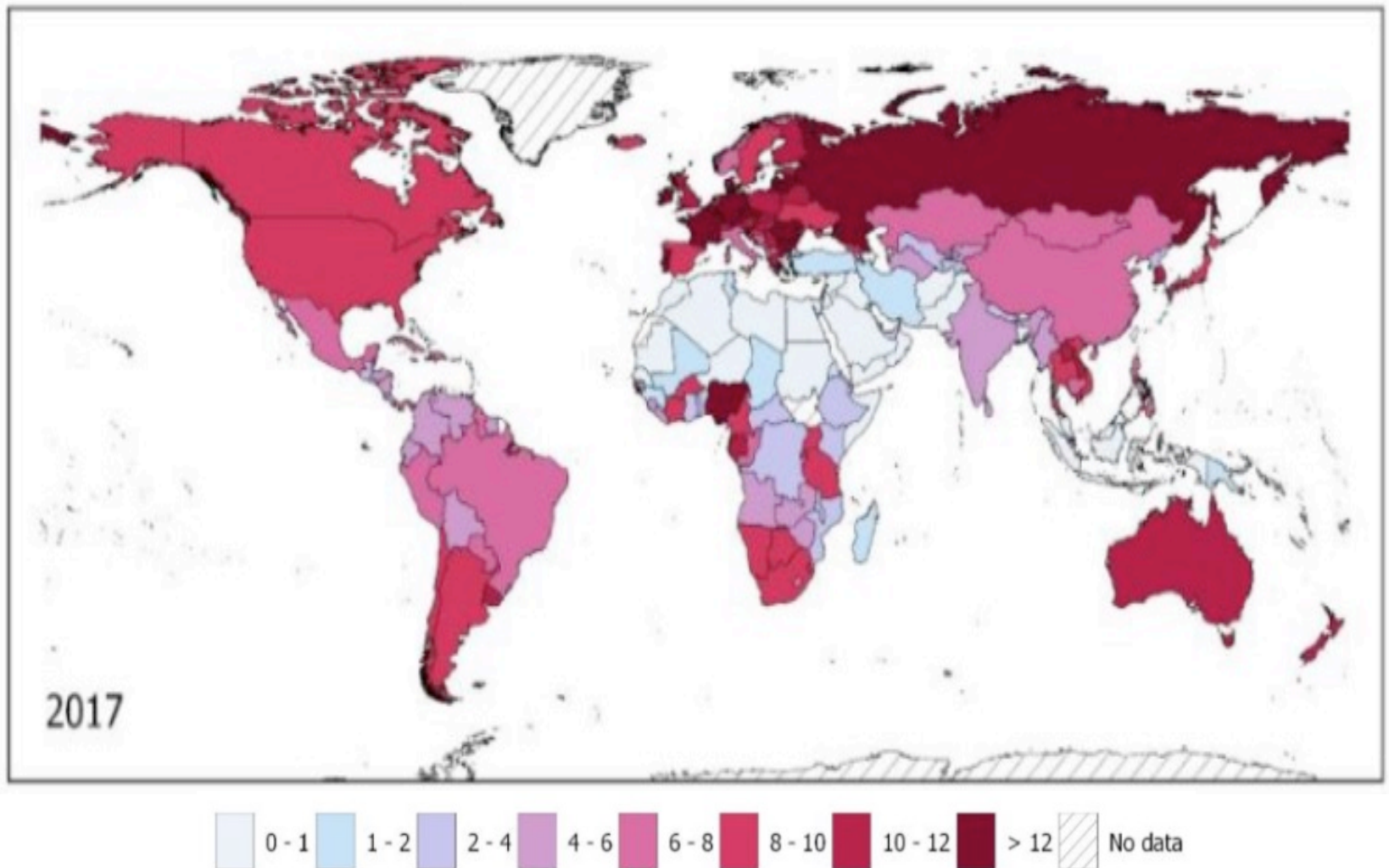
Topics

- Burden of disease and costs linked to alcohol use
- Cost and cost-effectiveness of brief interventions
- Comparative cost-effectiveness of screening and brief interventions with other policy measures
- The role of screening and brief interventions in a policy mix
- Conclusions

Burden of disease and costs linked to alcohol use

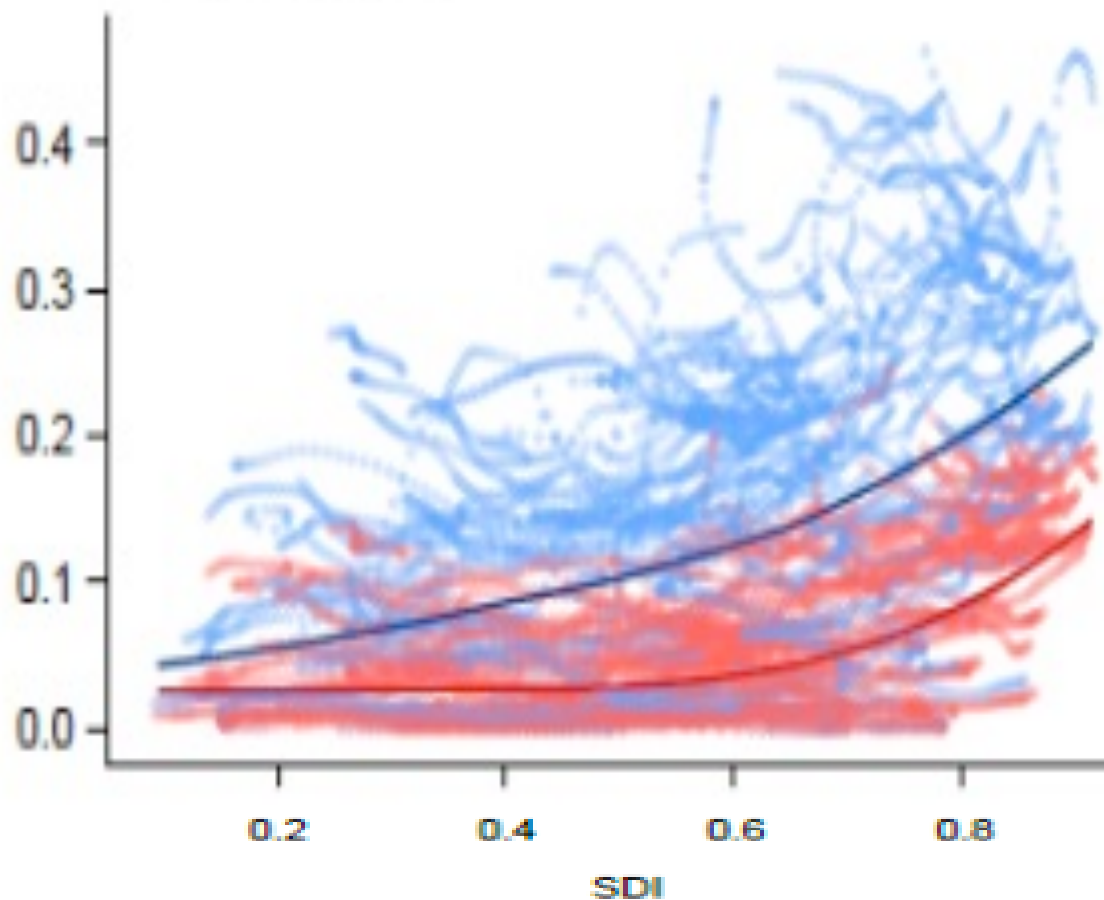
Causes of death, YLL, DALYs

Alcohol per capita consumption level in litres pure alcohol 2017 (Lancet in review)



Relationship between age-standardised summary exposure values and Socio-demographic Index by number of attributable DALYs globally (GBD 2017)

Alcohol use

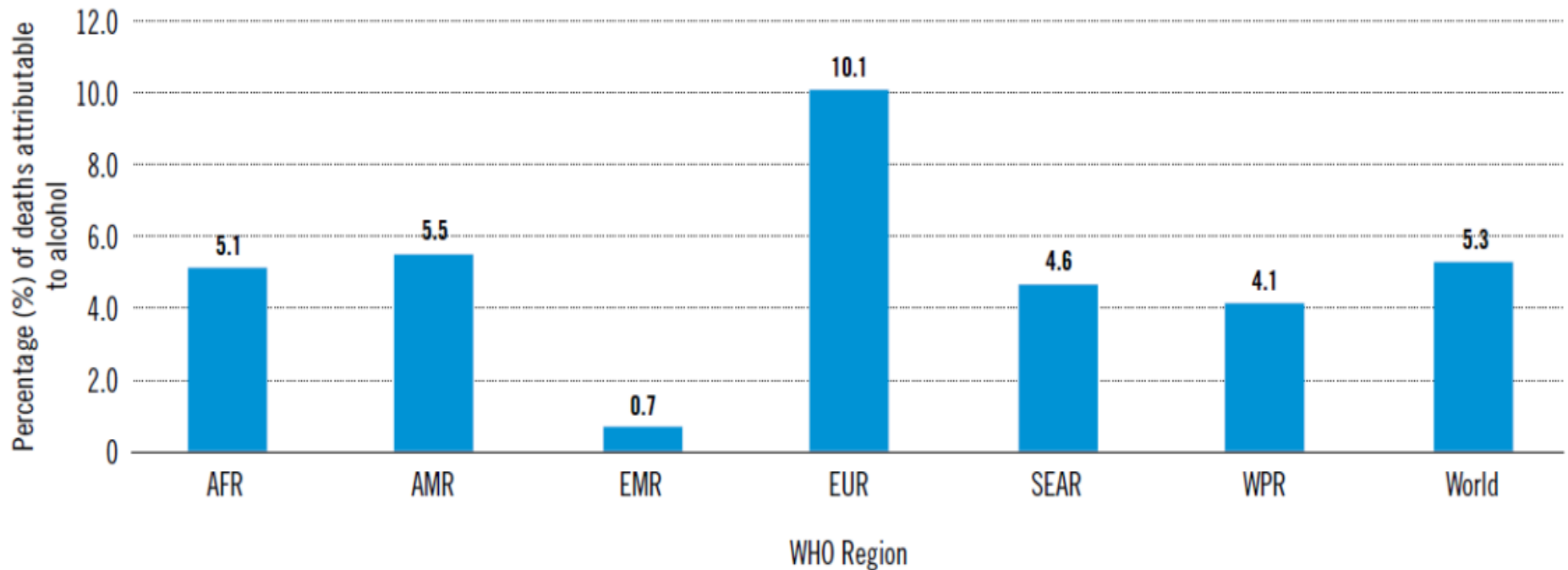


Socio-demographic Index (SDI) is a summary measure of a geography's socio-demographic development. It is based on average income per person, educational attainment, and total fertility rate (TFR). SDI contains an interpretable scale: **0** (zero) represents the lowest income per capita, lowest educational attainment, and highest TFR observed across all GBD geographies from 1980 to 2015, and **1** (one) represents the highest income per capita, highest educational attainment, and lowest TFR.

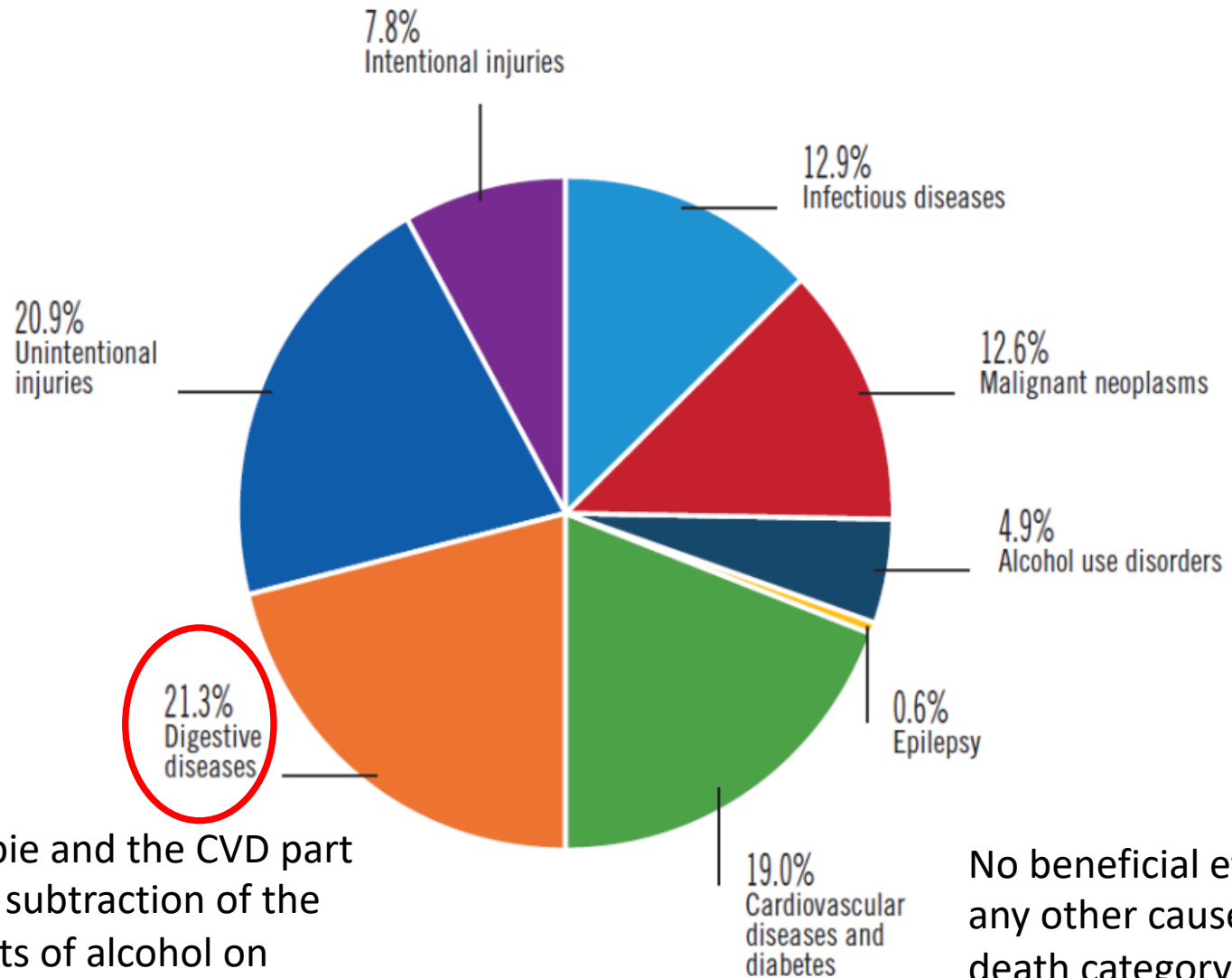
Burden of disease 2016: deaths

(Global Status Report on Alcohol and Health, 2018)

Figure 4.1 Share of all deaths (in %) attributable to alcohol consumption, by WHO region, 2016



What is the distribution of causes of death? WHO GSRAH, 2018



Both the total pie and the CVD part is net, i.e. after subtraction of the beneficial effects of alcohol on ischemic disease and diabetes.

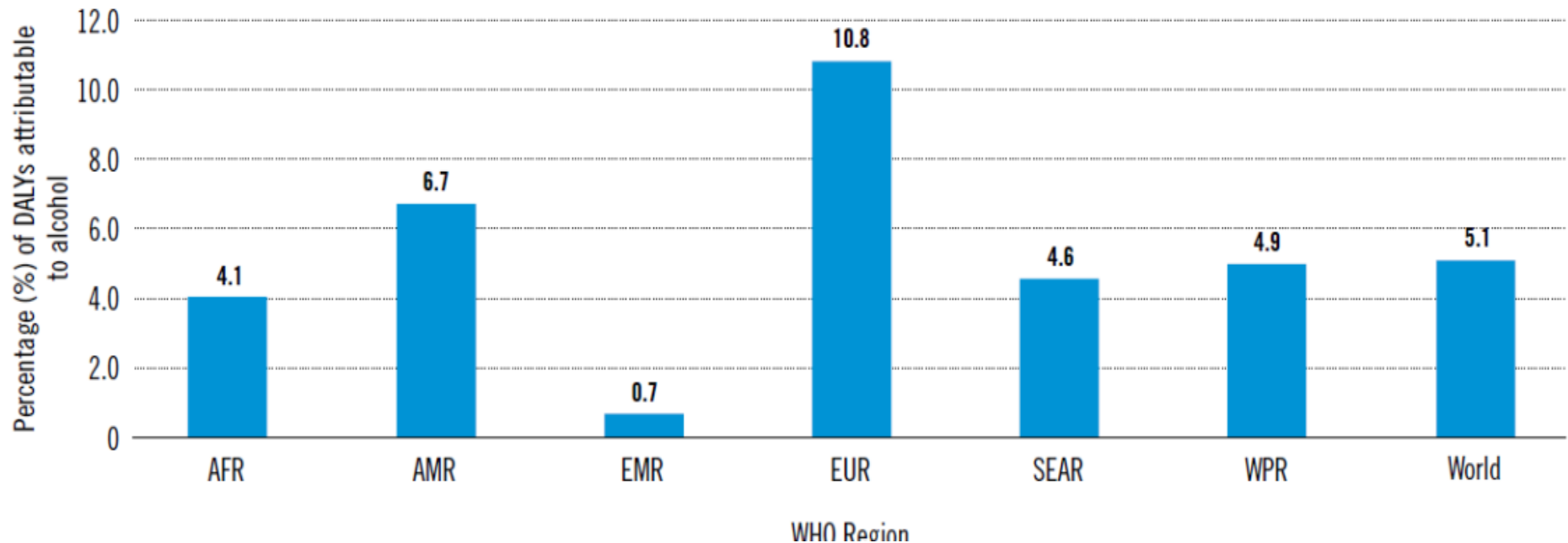
Net total = 3.0 million deaths

No beneficial effect in any other cause of death category!

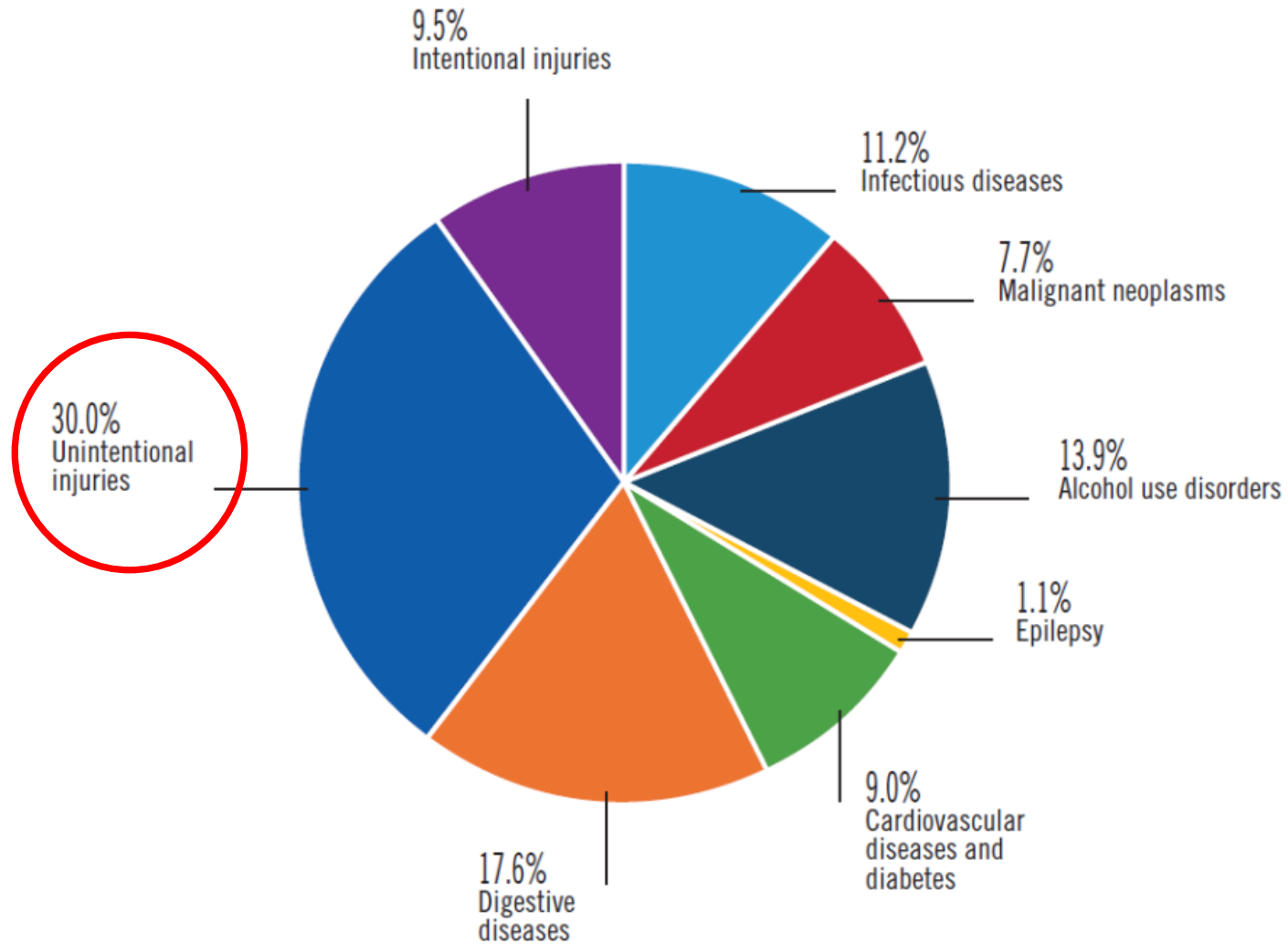
Burden of disease 2016: DALYs

(Global Status Report on Alcohol and Health, 2018)

Figure 4.2 Percentage (in %) of all disability-adjusted life years (DALYs) attributable to alcohol consumption, by WHO region, 2016



DALYs caused by alcohol use (WHO, 2018)



Net total = 133 million DALYs

Burden of disease by alcohol use

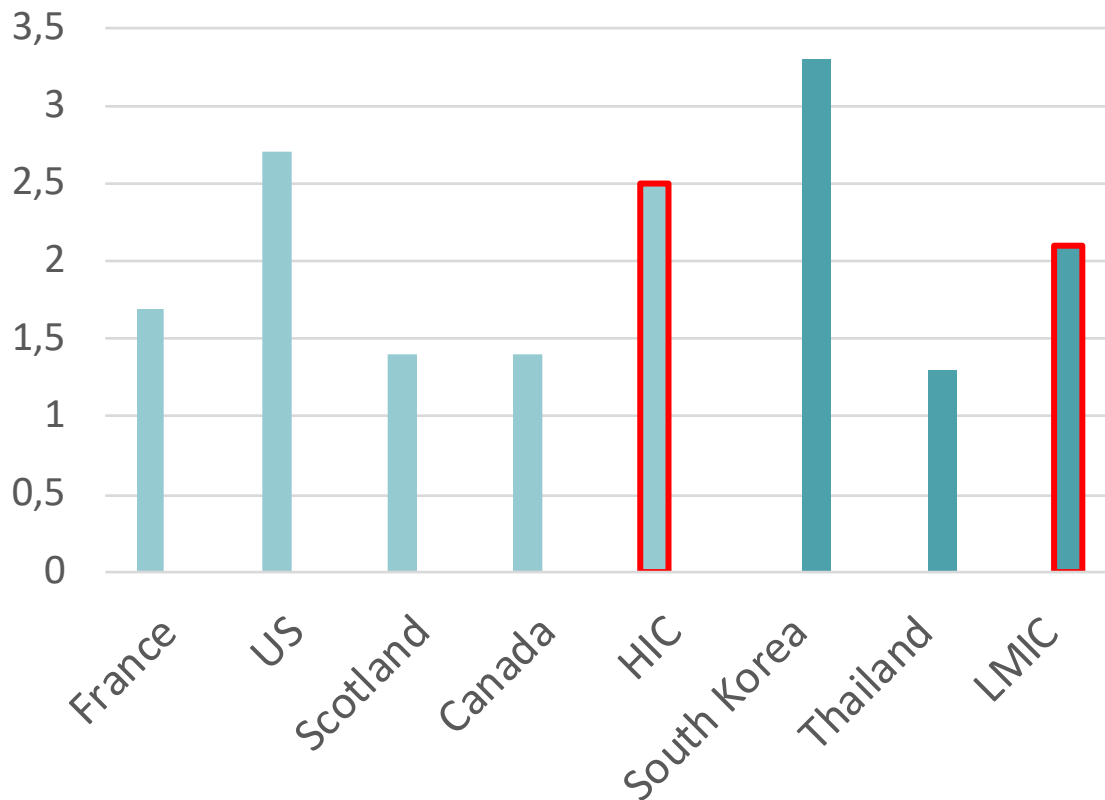
- Both IHME and WHO came to the conclusion that in 2016 about 3 million deaths globally (> 15 years of age) were attributable to alcohol use. **This means that about every 20th death was due to alcohol use, and would not have happened in 2016 without alcohol use.** This does not necessarily mean that the cause of death distribution is the same between IHME and WHO.
- As for DALYs, there are differences in the estimates between IHME and WHO (every 25th DALY vs. every 20th DALY globally!).

However, it is very clear that in all estimates of global monitoring and surveillance that alcohol use was one of the major risk factors in 2016.

Sources: IHME (GBD for 2016 alcohol -> in Lancet 2017 as part of the overall risk factor paper, and again in 2018 as a single article on alcohol as a risk factor); WHO Global Status Report on Alcohol and Health, 2018 (data from 2016)

And this burden incurs costs!

Overview of economic cost studies (Rehm et al., 2009 Lancet):
costs of alcohol as part of GDP-PPP in %



But highly heterogeneous methodology in cost studies! Most of the costs were indirect and incurred by losses of productivity via mortality.

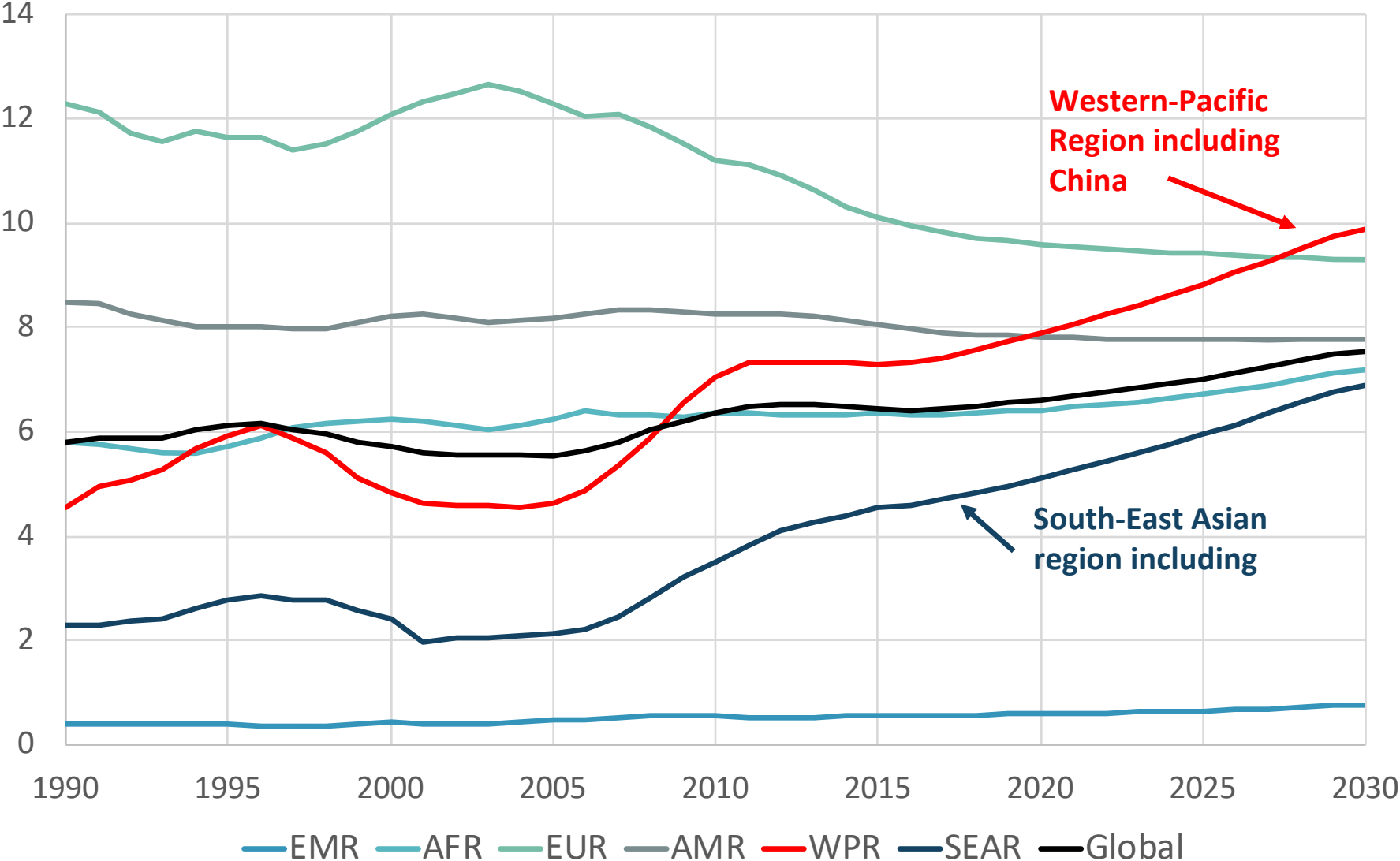
Health care costs were responsible for > 10% of total in high income countries (HIC), but lower in middle-income countries (MIC).

	High-income countries					Middle-income countries		
	France ⁴⁷	USA ⁴⁸	Scotland ⁴⁹	Canada ^{50,51}	Weighted average	South Korea ⁵²	Thailand ⁴⁵	Weighted average
Study year	1997	1998	2001-02	2002	NA	2000	2006	NA
Population in study year (million)	58.6	280.6	5.1	31.9	NA	47.5	64.6	NA
GDP (PPP) in study year*	1301087	8587884	133179	929912	6689552	760549	604575	670666
Direct health-care cost	3592	29855	162	3045	23090	1516	344	841
Direct laws	72	8049	454	2830	6262	..	15	9
Other direct cost	7619	26244	145	966	20848	5459	49	2341
Indirect cost	11223	170707	1052	6564	129659	17938	7496	11921
Total economic costs of alcohol	22506	234854	1813	13406	179859	24914	7903	15111
Cost per head (2007 US\$ PPP)	384	837	358	420	725	524	122	293
Health-care costs (% of total cost)	16.0%	12.7%	8.9%	22.7%	12.8%	6.1%	4.3%	5.6%
Law enforcement (% total cost)	0.3%	3.4%	25.0%	21.1%	3.5%	..	0.2%	0.1%
Other direct cost (% total cost)	33.9%	11.2%	8.0%	7.2%	11.6%	21.9%	0.6%	15.5%
Indirect cost (% total cost)	49.9%	72.7%	58.0%	49.0%	72.1%	72.0%	94.8%	78.9%
Total cost (% GDP [PPP])	1.7%	2.7%	1.4%	1.4%	2.5%	3.3%	1.3%	2.1%
Health-care costs (% GDP [PPP])	0.3%	0.4%	0.1%	0.3%	0.3%	0.2%	0.1%	0.1%
Law enforcement (% GDP [PPP])	0.0%	0.1%	0.3%	0.3%	0.1%	0.0%	0.0%	0.0%
Other direct cost (% GDP [PPP])	0.6%	0.3%	0.1%	0.1%	0.3%	0.7%	0.0%	0.3%
Indirect cost (% GDP [PPP])	0.9%	2.0%	0.8%	0.7%	1.7%	2.4%	1.2%	1.7%

GDP=gross domestic product. NA=not applicable because data unavailable. PPP=purchasing power parity. *Adjusted to 2007 US\$million.

Table 4: Overview of economic costs attributable to alcohol in selected high-income and middle-income countries (in 2007 million international \$)

Trends for the future: alcohol per capita consumption by WHO region (Lancet in review)



Cost and cost-effectiveness of brief interventions

Several reviews: questions about

- Effectiveness of long-term effects;
- setting (most information is gathered in primary care setting);
- Cost-benefits (i.e., return on investment > investment).

Review of Latimer et al., 2009

Latimer Nicholas, Guillaume Louise, Goyder Elizabeth, Chilcott Jim, Payne Nick. (2009). Interventions on control of alcohol price, promotion and availability for prevention of alcohol use disorders in adults and young people. SchARR Public Health Evidence Report 2.3

- Overall limited amount of evidence
- Main evidence for primary health care (few for ER and hospital settings)
- Overall moderate quality of studies
- Cautiously optimistic conclusions:
 - Several studies of varying quality provide evidence on the likely future resource impact associated with brief interventions. These studies do not allow firm conclusions to be made regarding the net cost impact of brief interventions. The evidence is uncertain as to whether screening plus brief intervention for alcohol misuse will result in either net costs or savings.
 - Screening plus brief intervention is cost effective, but there is a desire for more research because considerable uncertainty exists, particularly regarding the cost effectiveness of specific types of brief intervention. Further analysis has allowed a conclusion that screening plus brief intervention is cost effective in the primary care setting....
- But questions about long-term effects remain!

More recent evidence: systematic reviews

Angus C, Latimer N, Preston L, et al. What are the implications for policy makers? A systematic review of the cost-effectiveness of screening and brief interventions for alcohol misuse in primary care. *Front Psychiatry*. 2014;5:114.

Jonas DE, Garbutt JC, Amick HR, et al. Behavioral counseling after screening for alcohol misuse in primary care: a systematic review and meta-analysis for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2012;157:645–654.

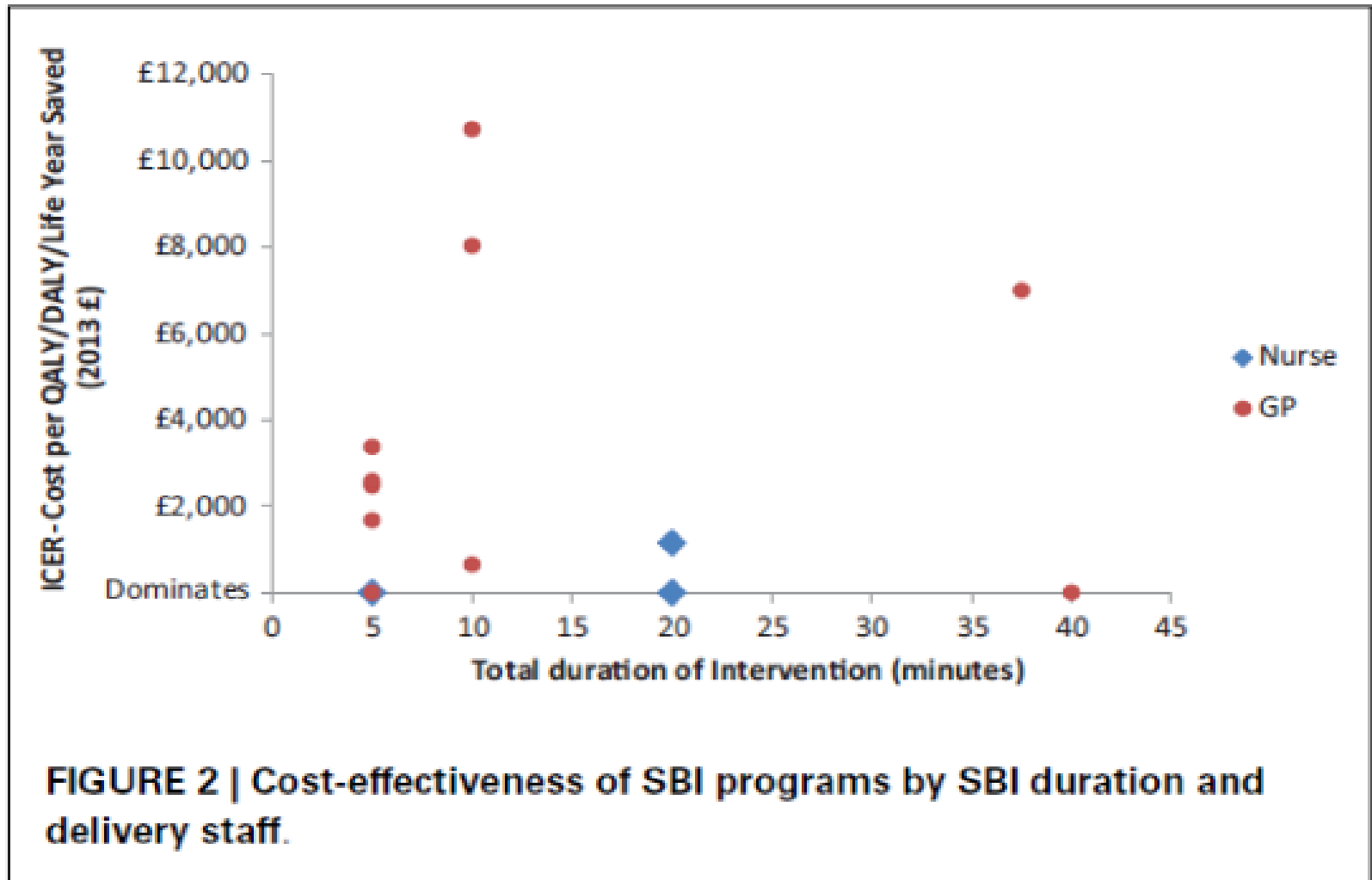
Summary of Angus et al., 2014

Methods: Studies reporting both the costs and a measure of health outcomes of programs combining SBIs in primary care were identified by searching MEDLINE, EMBASE, Econlit, the Cochrane Library Database (including NHS EED), CINAHL, PsycINFO, Assia and the Social Science Citation Index, and Science Citation Index viaWeb of Knowledge. Included studies have been stratified both by delivery staff type and intervention duration and assessed for quality using the Drummond checklist for economic evaluations.

Results: The search yielded a total of 23 papers reporting the results of 22 distinct studies. There was significant heterogeneity in methods and outcome measures between studies; however, almost all studies reported SBI programs to be cost-effective. There was no clear evidence that either the duration of the intervention or the type of delivery staff used had a substantial impact on this result.

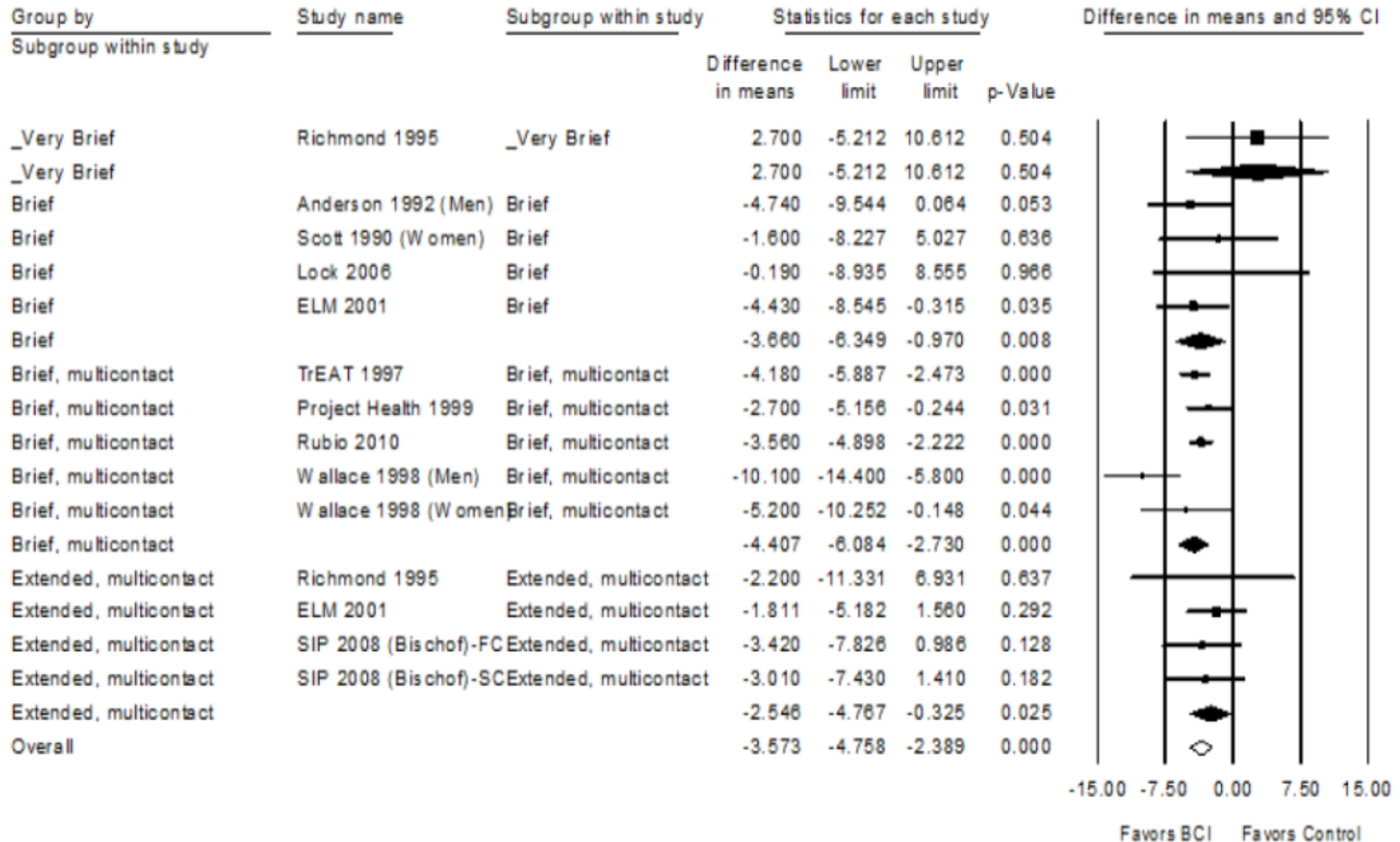
Conclusion: This review provides strong evidence that SBI programs in primary care are a cost-effective option for tackling alcohol misuse.

Key finding from Angus et al., 2014



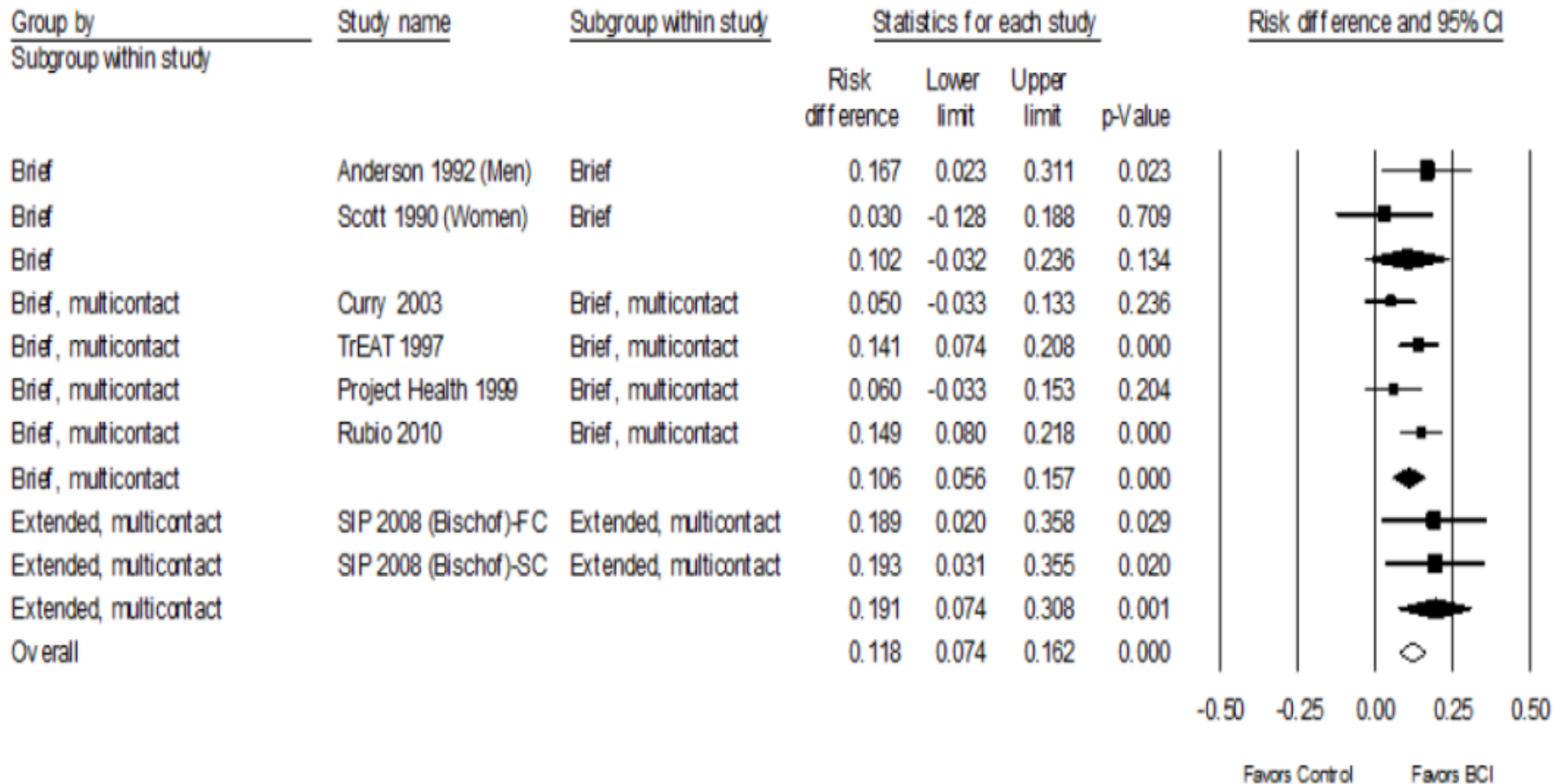
Key results: Jonas et al., 2012 on drinks/week after 12 months

Comparison of behavioral counseling interventions vs. control in adults: 12 month change in alcohol consumption (drinks/week)



Key results: Jonas et al., 2012 on binge drinking after 12 months

Comparison of behavioral counseling interventions vs. control in adults: no binge alcohol use at 12 months



Modelling study of Angus et al., 2017

Angus and colleagues [86] estimated by modeling potential effects of implementing screening and brief interventions for hazardous or harmful drinking that these programs were likely to be cost effective in 24 out of 28 European Union countries (using the standard UK threshold of £20 000/QALY) and yielded cost savings (i.e., investment < return) in 50% of these countries.

They concluded that implementing national alcohol intervention programs in primary healthcare would be a cost-effective means to reduce health burden due to heavy alcohol consumption.

Comparative cost-effectiveness of screening and brief interventions with other alcohol policy measures

Based on

Chisholm, D., Moro, D., Bertram, M., Pretorius, C., Gmel, G., Shield, K., & Rehm, J. (2018). **Are the “best buys” for alcohol control still valid? An update on the comparative cost-effectiveness of alcohol control strategies at the global level.** Journal of Studies on Alcohol and Drugs, 79(4), 514-522. doi:10.15288/jsad.2018.79.514

Interventions modelled (in blue are “best buys”)

- ***an increase in excise taxes on alcoholic beverages***

The impact of a 50% increase in excise taxes on alcoholic beverages on consumption was modelled, adjusted for the observed or expected level of unrecorded use due to illicit production and smuggling.

- ***enforcement of bans or comprehensive restrictions on exposure to alcohol advertising, promotion and sponsorship*** based on a scale where 0 equals no restriction, 1 equals voluntary/self-regulation, 2 equals partial statutory restriction and 3 equals a ban (Cook, Bond and Greenfield, 2014)

- ***enforcement of restrictions on the physical availability of retailed alcohol*** via reduced hours of sale

- ***enforcement of drink-driving laws and blood alcohol concentration limits*** via sobriety checkpoints

- ***provision of brief psychosocial intervention for persons with hazardous and harmful alcohol use***

Associated costs and resources

- For **individualized interventions** like brief interventions:
 - Identify the level of intervention (e.g., primary health care)
 - Identify the level of time necessary: three contacts of x minutes
 - Identify the next steps referral to outpatient (20%) and to hospital (5%)
 - The resulting cost per treated person was applied to 50% of all prevalent cases of hazardous and harmful alcohol use in the first year (**coverage**) and every fifth year thereafter, while for all other years the cost per case was applied to only half of all **incident** cases (to account for the finite period of treatment effect)
 - Plus program costs necessary

Costs and resources associated

- For **population based interventions (legislation and enforcement)**
 - Determine if there is already legislation which has to be changed or if there is need for completely new legislation
 - Determine key categories of resource
 - human resources (e.g. administrators, lawyers)
 - training (e.g. enforcement),
 - meetings,
 - mass media
 - law enforcement / inspection (including related equipment such as a hand-held speed camera, breathalyser, traffic cones and police vehicle for roadside checkpoints).

An adapted, updated version of the NCD costing tool (WHO, 2012b) was used to calculate resource needs and costs over the 100-year-period of analysis.

Program costs if necessary have to be added

Resource tool on alcohol taxation and pricing policies

Editors

Danella Scarpalozzi, Kevin D. Shield,
Eva Österberg, Jürgen Rehm

Example: taxation

What kind of taxes?

What level?

What kind of
enforcement?

What kind of
unintended
consequences?



General types of taxation

Table 2.1. The relationship between three taxes on alcohol and the four types of goods

Types of goods	Source of Product	
	Domestic	Imported
Alcohol	1. Domestic alcoholic beverages	2. Imported alcoholic beverages
General goods	3. Other domestic goods	4. Other imported goods

Alcohol excise taxation (affects 1 and 2)

Customs taxation (affects 2 and 4)

General taxation (affects 1 to 4)

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Intervention	Impact	Comments on evidence
<p>Increase in excise taxes on alcoholic beverages</p>	<p>Impact on prevalence of hazardous and harmful drinking varies according to rates of current tax, (un)recorded use and demand elasticity.</p>	<p>Country-specific rates of excise tax, unrecorded consumption and market distribution for different beverage types extracted from GISAH. Beverage-specific demand elasticities for alcohol, by country income level, based on international reviews (range -0.3 [beer, HIC] to -0.79 [wine and spirits, LMIC]). A 50% increase over current tax rates was modelled.</p>
<p>Enforcement of bans or comprehensive restrictions on exposure to alcohol advertising, promotion and sponsorship (across multiple types of media)</p>	<p>1.2% reduction in prevalence.</p>	<p>Change in prevalence simulated for each world region on basis of estimated change in total drinking volume, based on cross-sectional analyses of data from 15 LAMICs, which found an inverse association between increased marketing restrictions and total drinking volume</p>
<p>Enforcement of restrictions on the physical availability of retailed alcohol (via reduced hours of sale)</p>	<p>1.8-2.1% (male), 4% (female) reduction in prevalence.</p>	<p>Change in prevalence simulated for each world region on basis of estimated change in total drinking volume, based on cross-sectional analyses of data from 15 LAMICs, which found an inverse association between increased restrictions on business hours for off-premises alcohol sales and total drinking volume (-0.88).</p>

Intervention	Impact	Comments on evidence
<p>Enforcement of drink-driving laws and blood alcohol concentration limits via sobriety checkpoints</p>	<p>15-20% reduction in alcohol-attributable years lived with disability (YLD) and road traffic deaths, respectively.</p>	<p>Effect size applied to estimated deaths and YLD for road traffic injuries due to drink-driving (data for which are available at regional and country level)</p>
<p>Provision of brief psychosocial intervention for persons with hazardous and harmful alcohol use</p>	<p>Prevalence reduction (at full coverage) varies by age, sex and region (0% [female, 15-59 years], 11-17% [female, 60+ years], 13-21% [male, 15-59 years], 6-11% [males, 60+ years]).</p>	<p>Intervention coverage modelled at 50%. Change in prevalence simulated for each world region on basis of estimated change in consumption (3.6 drinks per week less) and heavy episodic drinking (12% less, Jonas et al., 2012). Reduction in disability weight also estimated as proportion of harmful use decreases (0.8-2.7%).</p>

Key reference for screening and brief intervention:

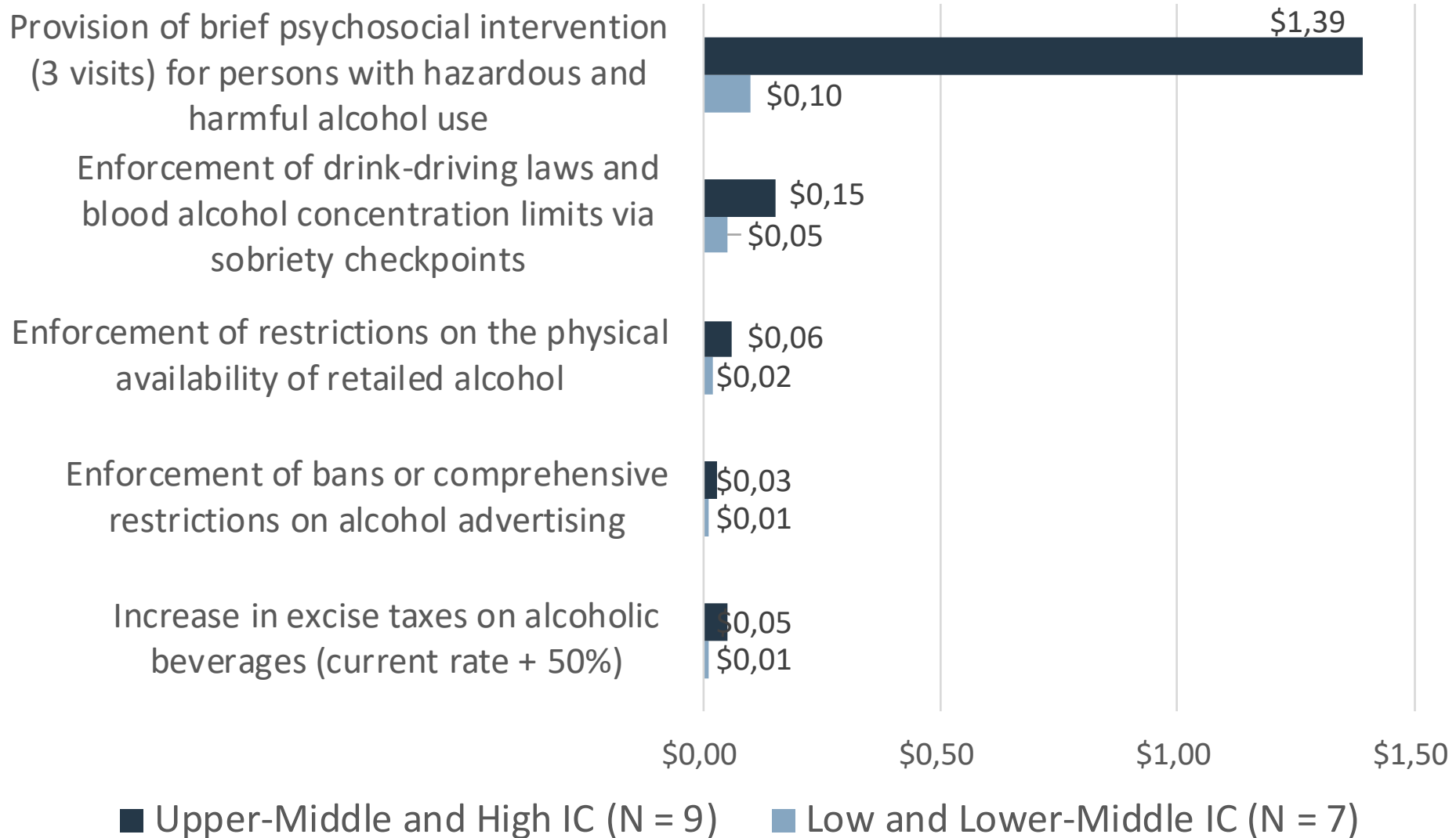
Jonas, D. E., Garbutt, J. C., Brown, J. M., Amick, H. R., Brownley, K. A., Council, C. L., . . . Harris, R. P. (2012). *Screening, behavioral counseling, and referral in primary care to reduce alcohol misuse*. Rockville, MD: Agency for Healthcare Research and Quality.

Similar results in various meta-analyses (Kaner et al., 2007; 2019)

Comparators modelled:

- Taxation: many meta-analyses with similar results
- Availability, marketing: Cook et al., 2014 (Addiction)
- Drink-driving: meta-analysis (Elvik et al., 2009)

Economic cost of implementation per year (I\$ per capita)



Health impact per year (healthy life years gained per 1 million)

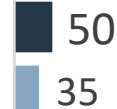
■ Upper-Middle and High IC (N = 9)

■ Low and Lower-Middle IC (N = 7)

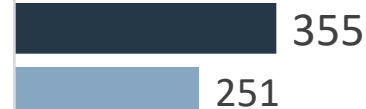
Provision of brief psychosocial intervention (3 visits) for persons with hazardous and harmful alcohol use (50% coverage).



Enforcement of drink-driving laws and blood alcohol concentration limits



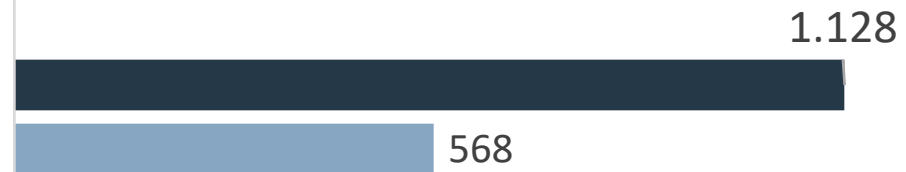
Enforcement of restrictions on the physical availability of retailed alcohol



Enforcement of bans or comprehensive restrictions on alcohol advertising



Increase in excise taxes on alcoholic beverages (current rate + 50%)



Average cost-effectiveness ratio (I\$ / healthy life year gained)

Intervention	Low and Lower-Middle IC (N = 7)	Upper-Middle and High IC (N = 9)
Increase in excise taxes on alcoholic beverages (current rate + 50%)	\$22	\$41
Enforcement of bans or comprehensive restrictions on alcohol advertising	\$48	\$120
Enforcement of restrictions on the physical availability of retailed alcohol	\$77	\$181
Enforcement of drink-driving laws and blood alcohol concentration limits	\$1,454	\$2,979
Provision of brief psychosocial intervention (3 visits) for persons with hazardous and harmful alcohol use	\$143	\$1,434

Conclusions of Chisholm et al., 2018

More than a decade after an initial global analysis, the findings of this study indicate pricing policies and restrictions to alcohol availability and marketing continue to represent a highly cost-effective use of resources. (*J. Stud. Alcohol Drugs*, 79, 514–522, 2018).

But are they actually implemented!

The role of screening and brief interventions in a policy mix

As “best buys” remain unpopular, screening and brief interventions seem to become the more feasible policy actions

The example of Europe, where there is the most extensive scaling system

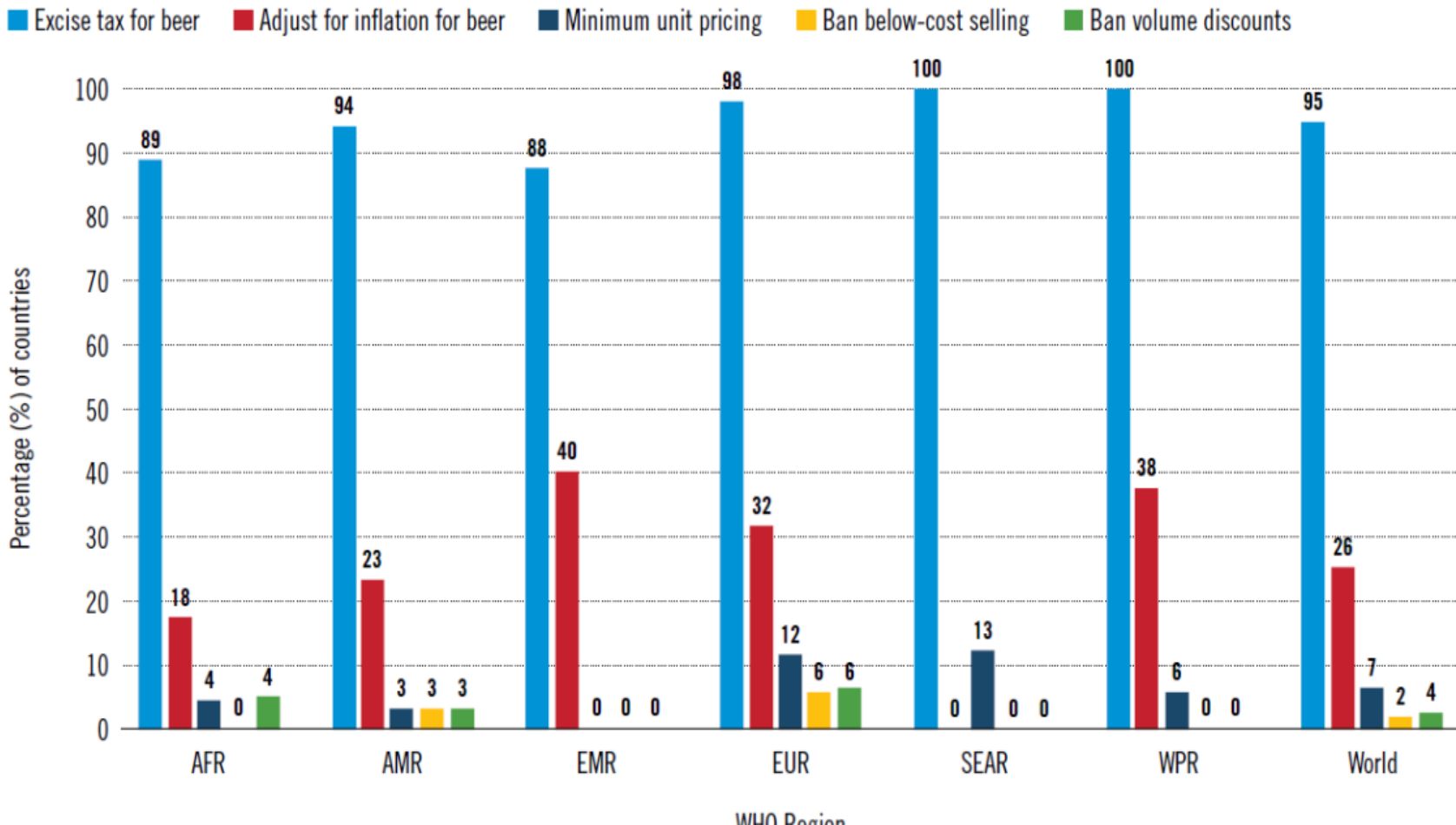
- Pricing is the least tackled policy, and increases in taxation by 50% are not realistic for most countries...
- The same is true globally

Action area (from GAS)	Mean of score	Median	Minimum observed	Maximum Observed
Leadership, awareness and commitment	64	70	0	100
Health services' response	51	50	12	100
Community and workplace action	46	47	0	100
Drink-driving policies and countermeasures	78	85	12	100
Availability of alcohol	60	64	0	94
Marketing of alcoholic beverages	51	50	0	100
Pricing policies	22	20	0	66
Reducing the negative consequences of drinking and alcohol intoxication	29	31	0	100
Reducing the public health impact of illicit alcohol and informally produced alcohol	60	70	0	100
Monitoring and surveillance	52	60	0	100

Some statistics on global implementation of price and taxation measure (GSRAH)

Figure 5.16 Implementation of selected price and tax measures by WHO region and percentage (in %) of countries, 2016

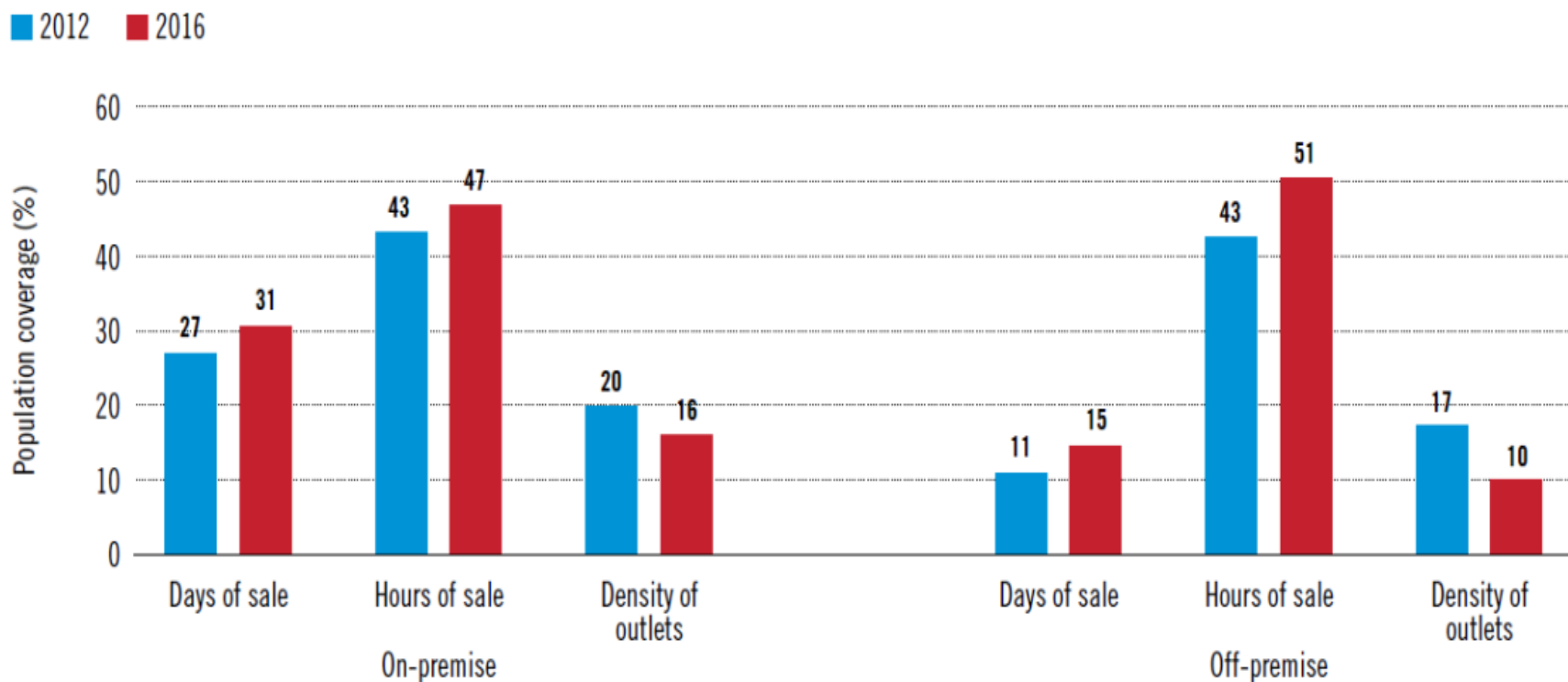
(n = 164 reporting countries, except 137 countries reported on inflation adjustment)



Little progress in availability... (From GSRAH)

Figure 5.29 Population coverage (in %) for regulations on days of sale, hours of sale and density of outlets, by premise type for beer, 2012 and 2016

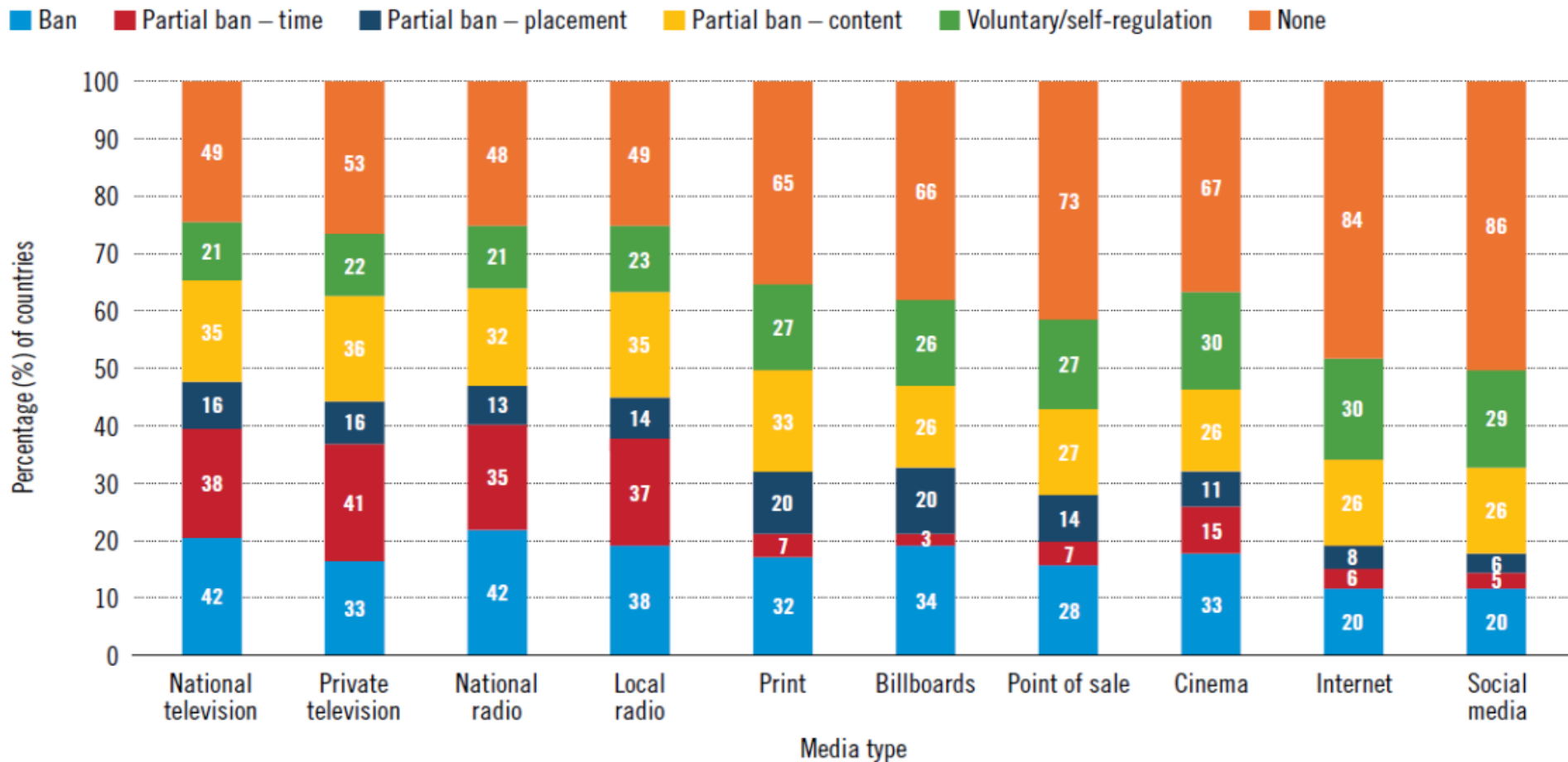
(n = 150 responding countries, except for off-premise hours and on-premise days [151], for on-premise days [152], and outlet density [158]).



And the global situation in marketing...(GSR AH)

Figure 5.12 Restrictions on advertising for beer by media type and percentage (in %) of countries, 2016

(n =162 reporting countries except 161 for billboards and national radio)



Note: The partial bans and voluntary/self-regulation are not mutually exclusive categories, and countries may be counted more than once. The numbers in each coloured bar indicate the number of countries in that category, whereas the length of each coloured bar indicates the percentage of countries in the category.

But there is progress in global implementation of screening and brief interventions

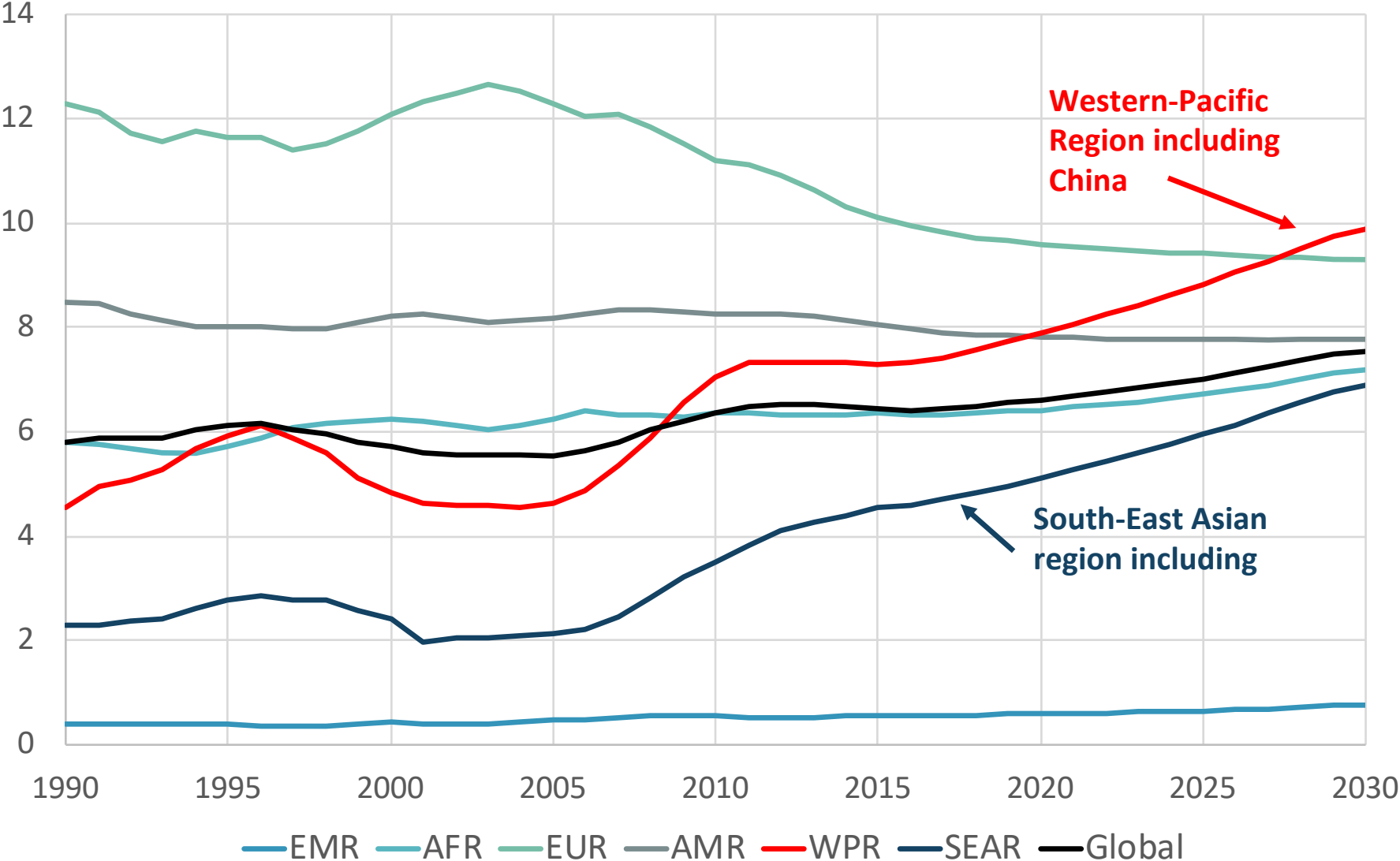
GSRAH 2018: There was substantial progress in the level of screening and brief interventions since 2010. Overall, 52% of reporting countries indicated that they increased the level of screening and brief interventions for hazardous and harmful drinking in primary care settings since 2010. However, most of this progress was confined to high-income and upper-middle-income countries.

So, screening and brief interventions, despite not being the most cost-effective measures, may prove to be the method of choice for alcohol control policies for governments, who chicken out to implement the best buys!

Conclusions

- Alcohol use continues to cause a high burden of disease globally
- No global trend reversal for the better is in sight, and the various goals of WHO/UN will not be reached!
- There are a number of alcohol control policy and health system measures available to reduce alcohol consumption and prevent alcohol-attributable burden.
- Screening and brief interventions in primary care are part of these measures, and they seem to become the default for governments shying away from “best buys” and other more unpopular and more cost-effective alcohol control measures.
- Irrespective of the motive, however, screening and brief interventions should be implemented based on current knowledge, as they are cost-effective and potentially cost-saving for reducing burden.
- More evidence from implementation science is necessary!

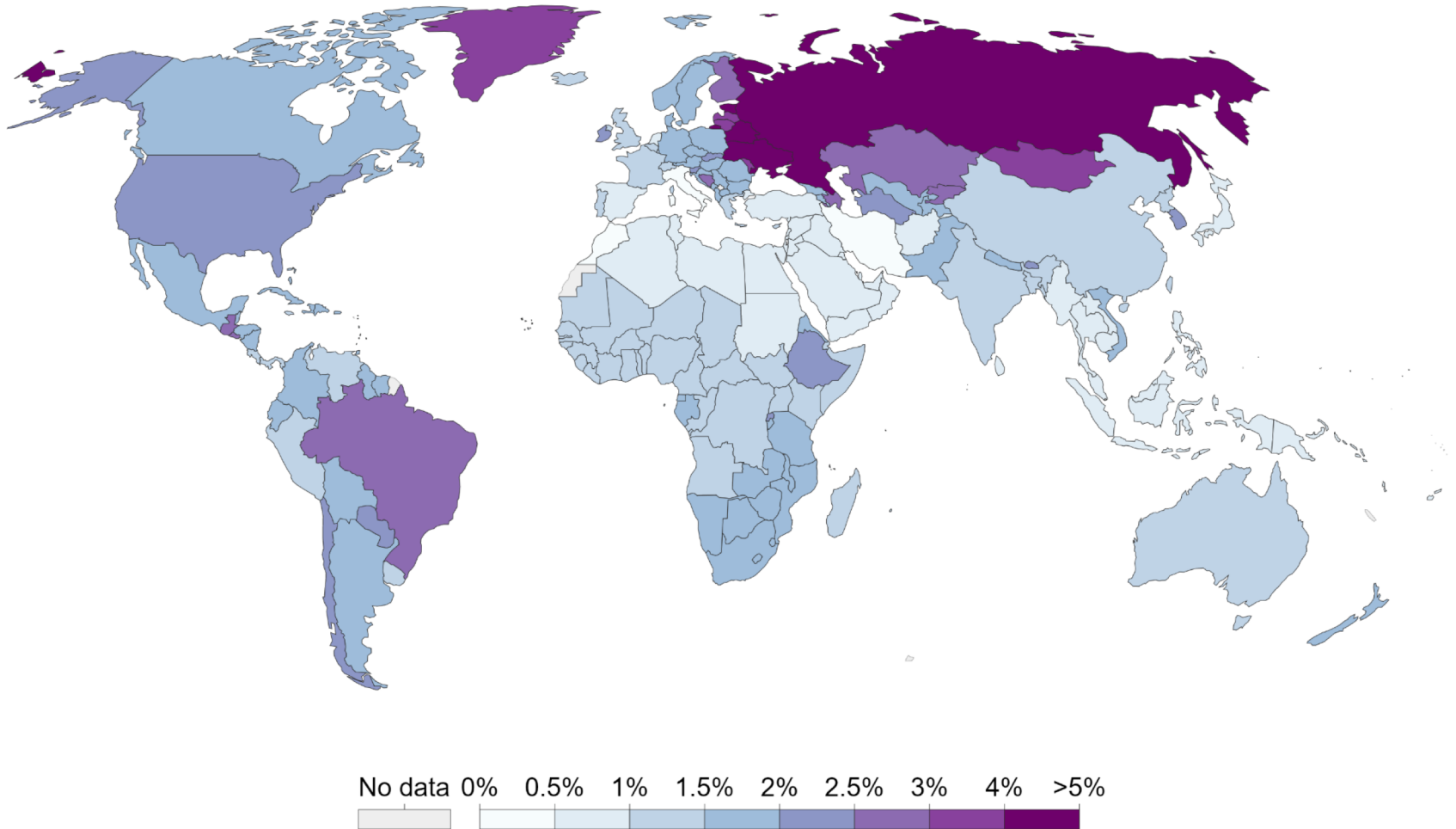
Trends for the future: alcohol per capita consumption by WHO region (Lancet in review)



Alcohol use disorders

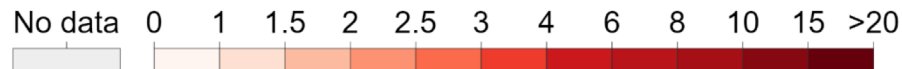
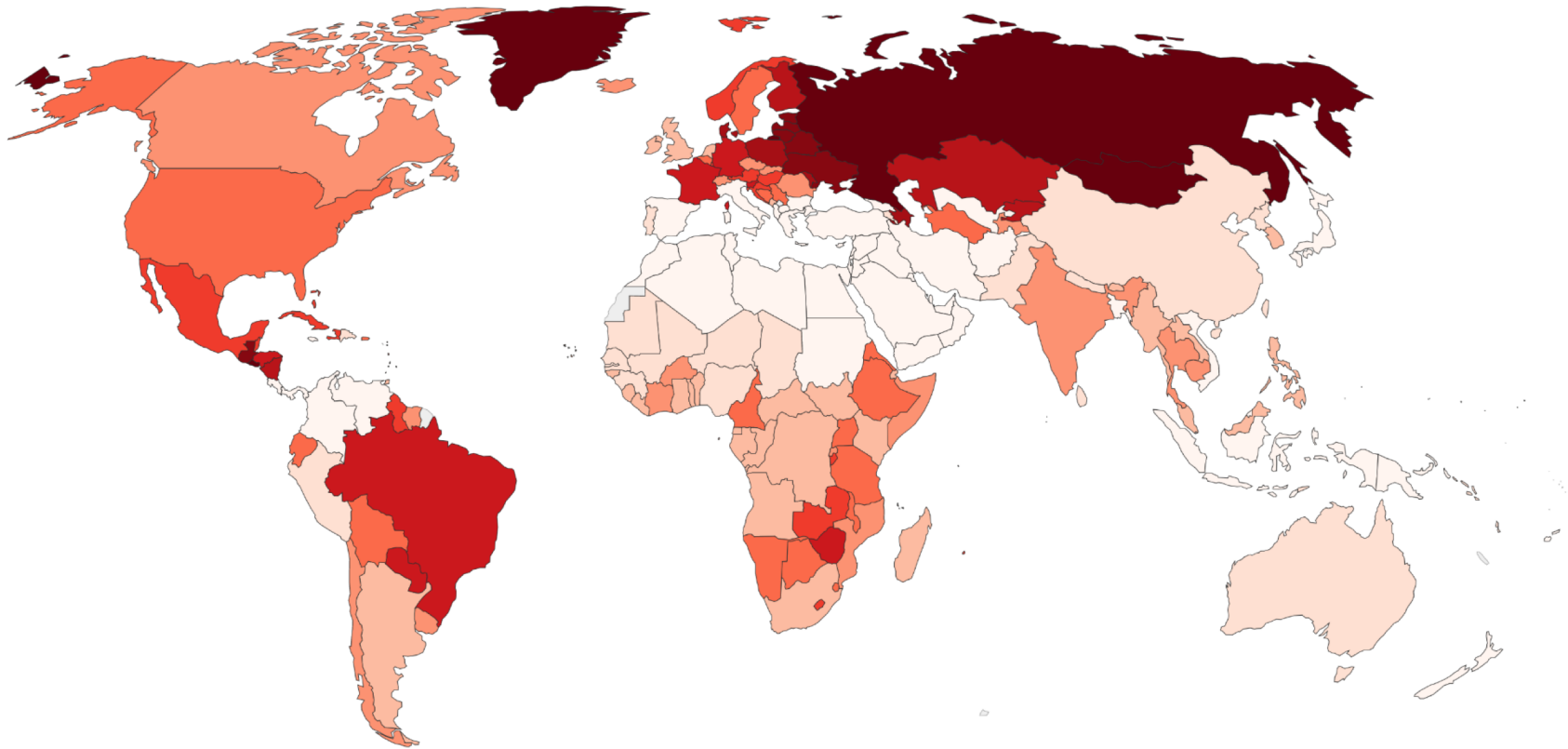
Share of population with alcohol use disorders, 2016

Alcohol dependence is defined by the International Classification of Diseases as the presence of three or more indicators of dependence for at least a month within the previous year. This is given as the age-standardized prevalence which assumes a constant age structure allowing for comparison by sex, country and through time.



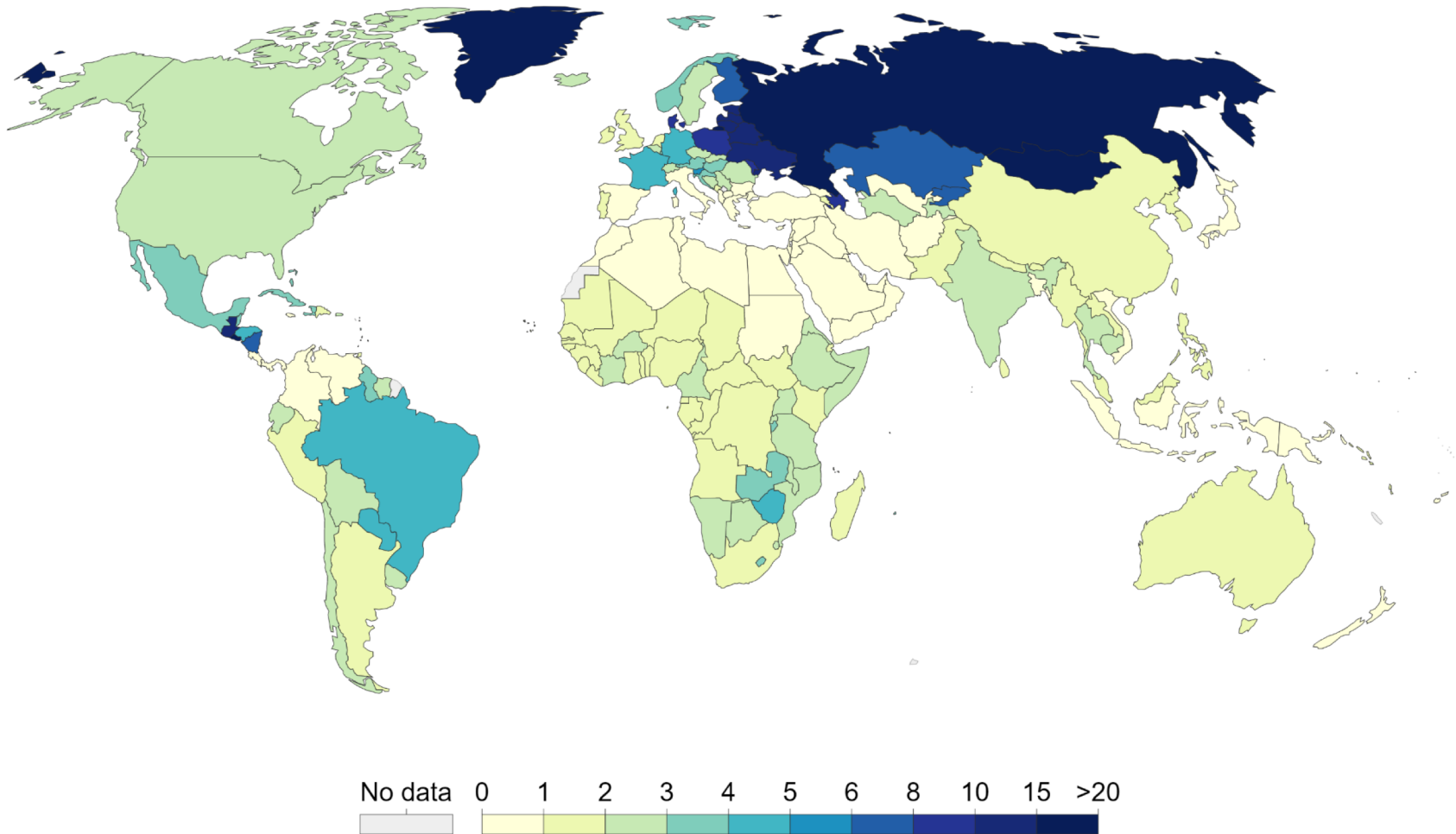
Death rates from alcohol use disorders, 2016

Age-standardized death rates from alcohol use disorders, measured per 100,000 individuals. Figures do not include indirect suicide deaths which may otherwise be related to alcohol use disorders.



Alcohol use disorders DALYs, age-standardized rate, 2016

Age-standardized DALYs (Disability-Adjusted Life Years) from alcohol use disorders per 100,000 individuals. DALYs are used to measure total burden of disease - both from years of life lost and years lived with a disability. One DALY equals one lost year of healthy life.



Conclusion

- Alcohol use continues to cause a high burden of disease
- No global trend reversal to the better is in sight!
- Even in high income countries with decreasing consumption trends over the last years, for some population groups alcohol-attributable burden is increasing
- Alcohol use disorders are a big part of the burden of disease of alcohol use
- **Is it not time for measures to reduce this burden?**