The comparative cost-effectiveness of brief interventions for reducing the burden of hazardous alcohol use

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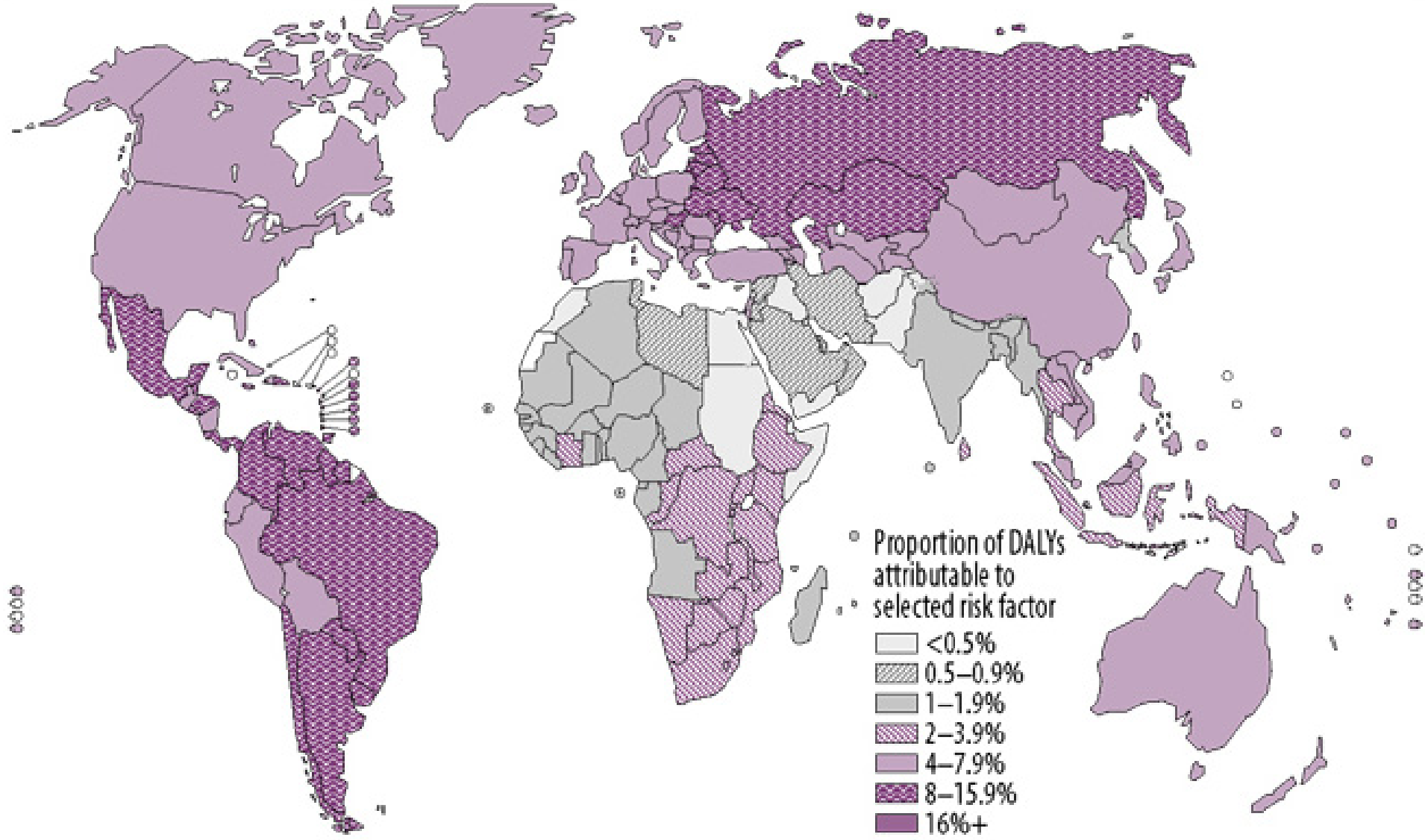
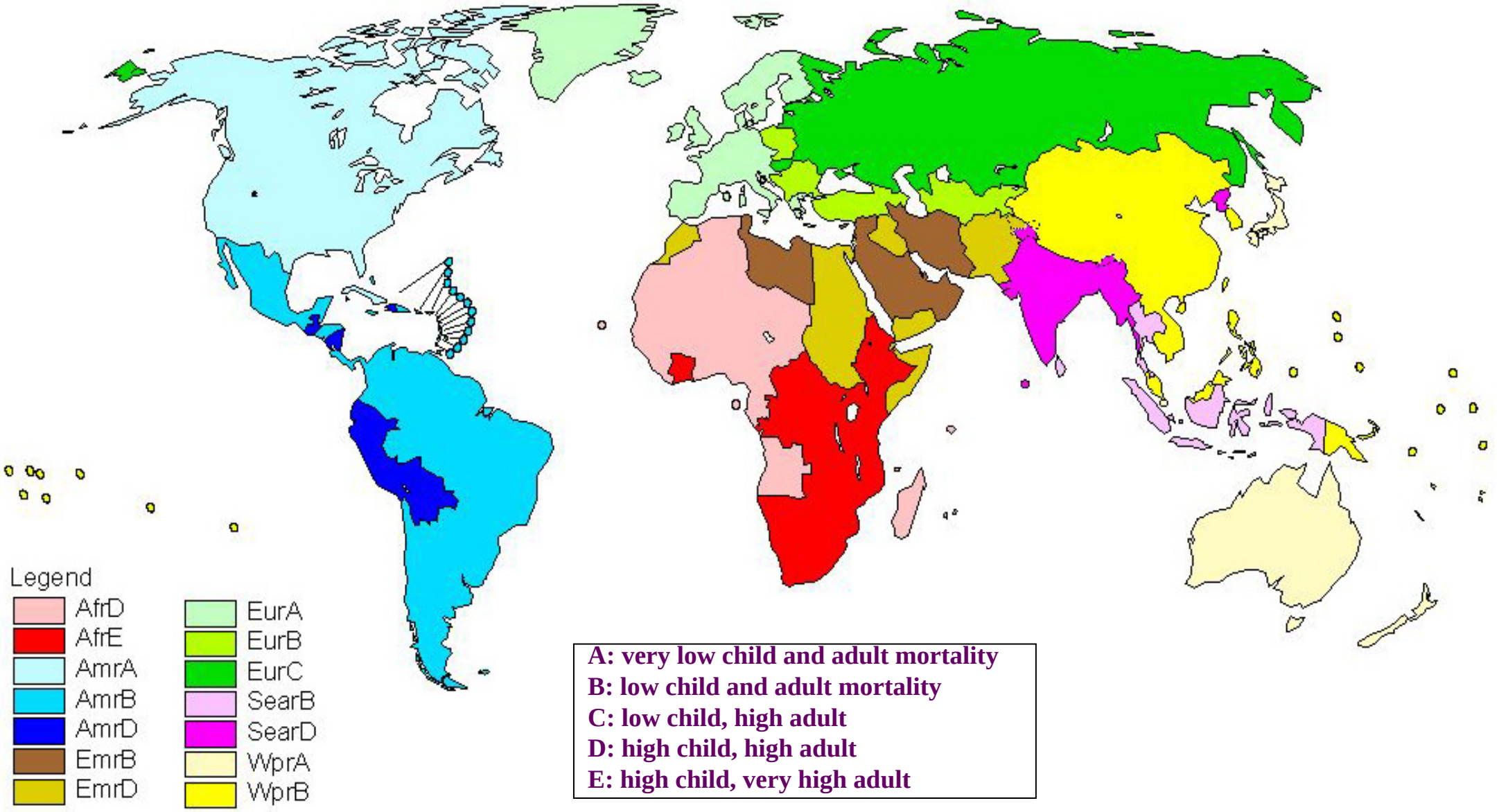
Policy and research context

- Alcohol use is a leading risk factor for disease (4% of global disease burden; CRA 2000: Rehm et al, 2004)
- A range of personal and non-personal interventions have been shown to be effective in reducing alcohol use, e.g. taxation, brief interventions (APPG: Edwards et al, 1994; Babor et al, 2003)
- There is a shortage of information on the costs and cost-effectiveness of these interventions in different socio-cultural settings and populations

Burden of disease attributable to alcohol (% DALYs in each subregion)



WHO reporting regions (by level of mortality)



A: very low child and adult mortality
B: low child and adult mortality
C: low child, high adult
D: high child, high adult
E: high child, very high adult

Prevalence of heavy alcohol use, by WHO region

(women: >20g pure alcohol daily average; men: >40g)

Region	Sub-region [1]	Mortality: Child	Mortality: Adult	Sex	Prevalence (by adult age group) [2]: 15-29	30-44	45-59	60-69	70-79	80+
Africa	**Afr D**	High	High	Male	7.0%	9.1%	9.0%	8.1%	6.0%	6.0%
	(e.g. Nigeria, Senegal)			Female	2.0%	3.7%	3.9%	1.7%	1.3%	1.3%
	Afr E	High	Very high	Male	13.7%	19.5%	16.9%	14.9%	11.1%	11.1%
	(e.g. Botswana, Kenya)			Female	4.2%	5.8%	6.4%	4.8%	3.1%	3.1%
The Americas	**Amr A**	Very low	Very low	Male	23.8%	19.6%	15.5%	10.1%	7.0%	7.0%
	(e.g. Canada, USA)			Female	7.7%	4.9%	4.3%	3.3%	3.0%	3.0%
	Amr B	Low	Low	Male	10.9%	12.3%	11.7%	8.7%	3.7%	3.7%
	(e.g. Brazil, Mexico)			Female	7.4%	8.1%	7.0%	6.2%	3.3%	3.3%
	Amr D	High	High	Male	2.5%	2.4%	2.4%	1.7%	0.9%	0.9%
	(e.g. Ecuador, Peru)			Female	3.3%	3.4%	2.9%	2.4%	1.6%	1.6%
Europe	**Eur A**	Very low	Very low	Male	17.8%	20.4%	20.6%	13.8%	9.7%	9.7%
	(e.g. France, Norway)			Female	16.4%	13.6%	16.5%	10.6%	8.2%	8.2%
	Eur B	Low	Low	Male	11.0%	11.0%	9.1%	7.1%	4.0%	4.0%
	(e.g. Armenia, Poland)			Female	8.4%	9.0%	7.4%	5.7%	4.7%	4.7%
	Eur C	Low	Low	Male	31.1%	25.0%	30.6%	20.7%	11.2%	11.2%
	(e.g. Estonia, Russia)			Female	14.1%	11.6%	14.2%	9.2%	6.2%	6.2%
South East Asia	**Sear B**	Low	Low	Male	0.9%	3.0%	0.4%	0.3%	0.0%	0.0%
	(e.g. Indonesia, Thailand)			Female	1.1%	0.8%	0.8%	0.5%	0.0%	0.0%
	Sear D	High	High	Male	0.8%	2.5%	0.3%	0.1%	0.0%	0.0%
	(e.g. India, Nepal)			Female	1.2%	0.4%	0.4%	0.0%	0.0%	0.0%
Western Pacific	**Wpr A**	Very low	Very low	Male	7.0%	5.6%	6.9%	4.6%	3.1%	3.1%
	(e.g. Australia, Japan)			Female	3.1%	2.5%	3.1%	1.9%	1.4%	1.4%
	Wpr B	Low	Low	Male	7.7%	8.5%	8.5%	7.7%	6.0%	6.0%
	(e.g. China, Vietnam)			Female	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%

Context / rationale for sectoral CEA (WHO-CHOICE)

WHO-CHOICE

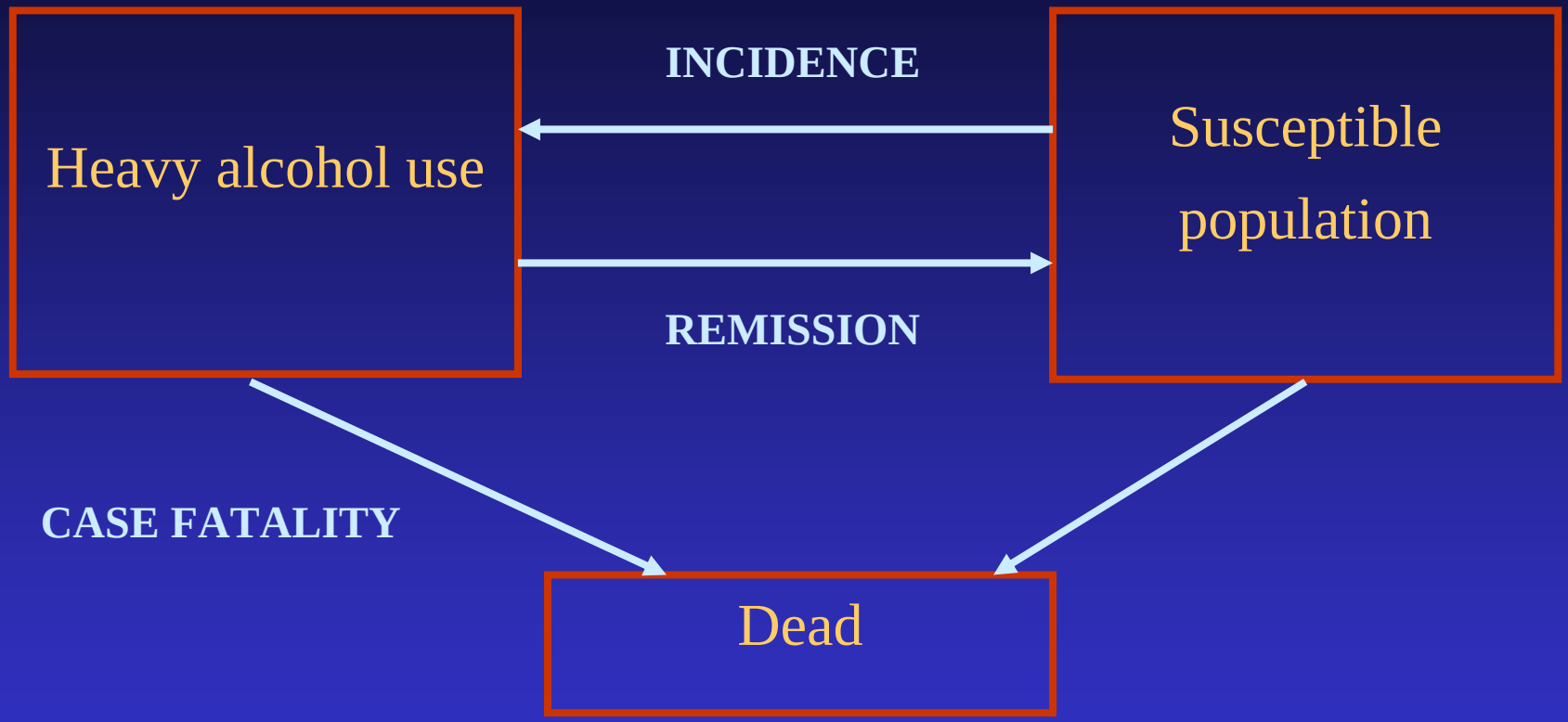
CHOosing Interventions that are Cost-Effective

- Paucity of global data on the costs & effects of different health care interventions with which to support investment decisions
- Not feasible or affordable to generate all evidence needed via empirically-based CEA trials
- Limitations of conventional, 'incremental' modes of economic analysis (context-bound; heterogeneous)

WHO CHOICE

- Sectoral, population-level CEA
  - effectiveness: healthy years gained / DALYs averted (adjusted for intervention coverage & adherence)
  - resource costs: patient + programme level (international $)
- Evaluation of interventions relative to 'doing nothing' (null):
  - enables evaluation of current as well as new interventions (i.e. addresses *allocative* efficiency - what is the approp. mix?)
- Use of a common set of tools and methods
  - enhances comparability between diseases / transferability of findings
- Results summarised in WHO regional C-E databases
  - available for country-level adaptation / analysis

Population-level disease model (PopMod)



Calculates total disability-adjusted life years over a defined period

Cost-effectiveness of brief interventions….compared to what?

- Compared to doing nothing
- Compared to 'usual care' of heavy drinkers (typical RCT)
- Compared to doing something else for heavy drinkers
- Compared to doing something else for other health conditions

Interventions for reducing heavy alcohol use
(Ludbrook et al, 2001)

Strategy	Examples	Works on
Policy & legislative interventions	• Taxation on alcohol sales	Incidence
	• Drink-driving laws	Fatal / non-fatal injuries
	• Licensing outlets	Incidence
	• Advertising control	Incidence
Law enforcement	• Random breath testing	Fatal / non-fatal injuries
Mass media / awareness campaigns	• School-based awareness campaigns	Incidence
Brief interventions	• Physician advice in primary care	Duration / remission

Population-level effectiveness of brief interventions (% improvement over no intervention)

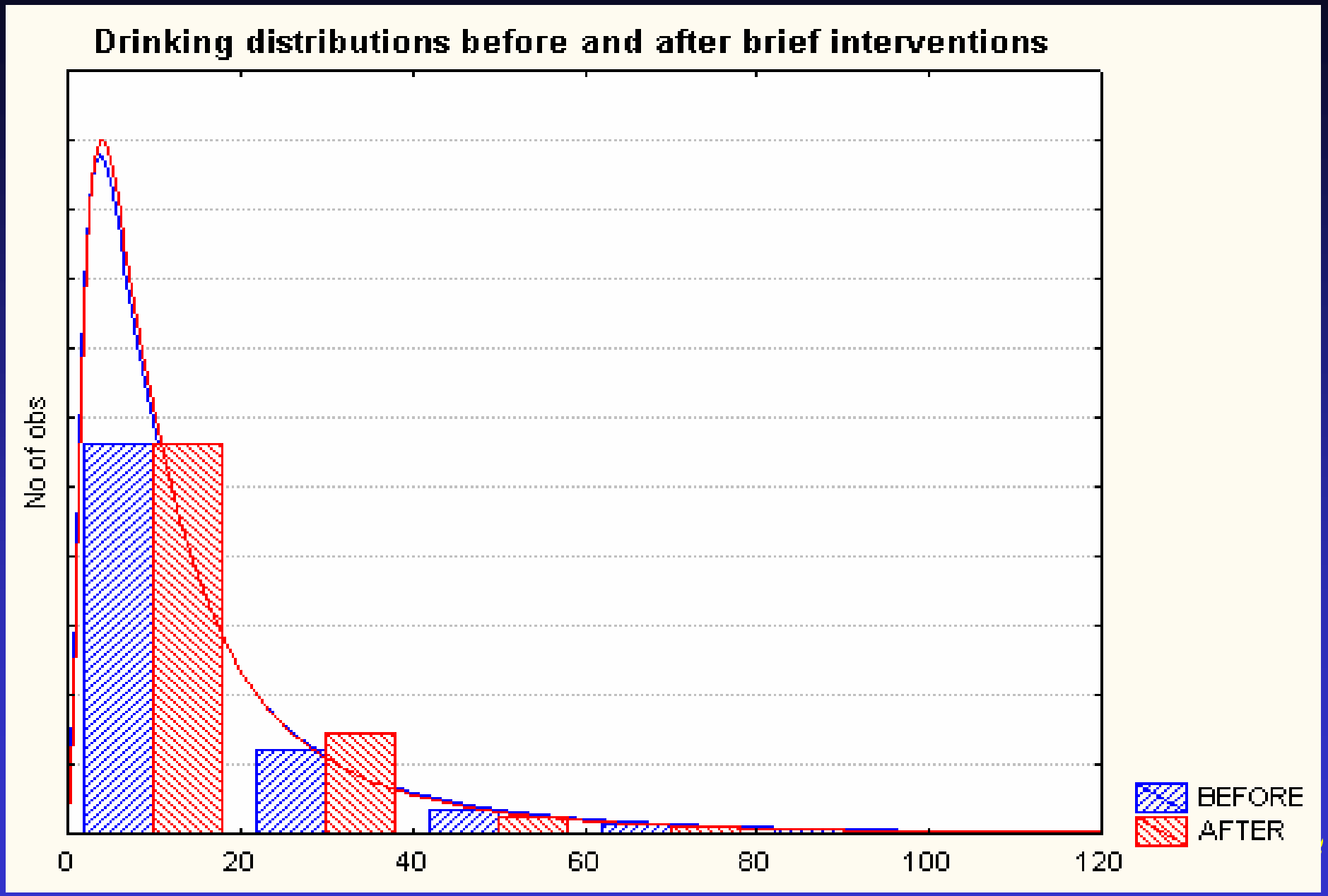
	Efficacy			Modifiers		Effectiveness	
Region	Prevalence[1]	Remission[2]	Disability	Coverage	Adherence	Remission	Disability
Afr E	35%	14.1%	3.9%	50%	70%	4.9%	1.4%
Amr B	40%	15.3%	3.9%	50%	70%	5.3%	1.4%
Eur C	35%	14.1%	3.9%	50%	70%	4.9%	1.4%
Sear B	40%	15.3%	3.9%	50%	70%	5.3%	1.4%
Wpr B	50%	18.3%	3.9%	50%	70%	6.4%	1.4%

Notes:

[1] % reduction in prevalence of heavy alcohol use if all heavy drinkers reduced consumption by 22%

[2] % improved remission if all heavy drinkers reduced consumption by 22% ([1/(1-prevalence change)]* % null remission)

Data sources: Higgins-Biddle & Babor (1996); Moyer et al (2002)


Drinking distributions before and after brief interventions
No of obs
0
20
40
60
80
100
120
BEFORE
AFTER

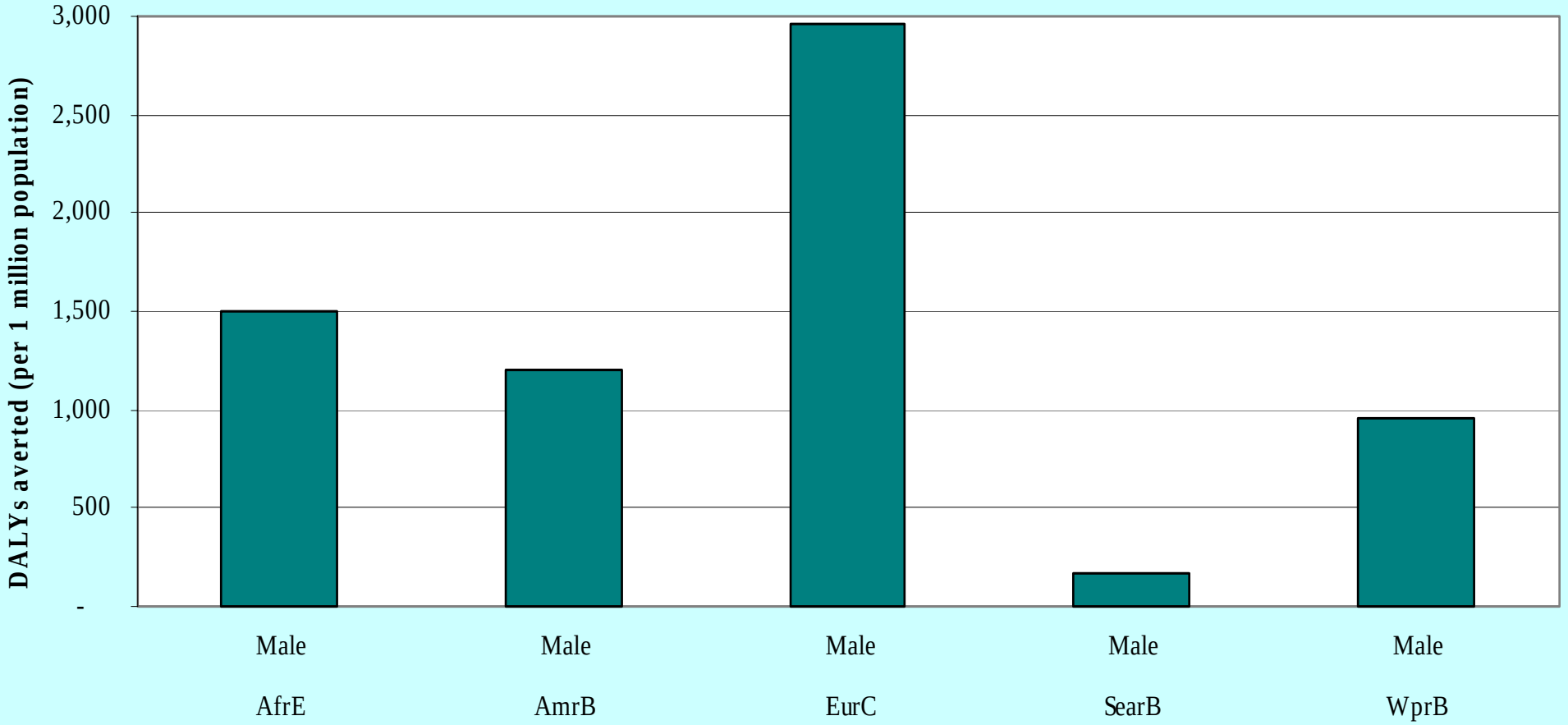
Effect of tax on incidence of heavy drinking

Elasticity	Prevalence (preferred drink) -0.3 *Most*	-1.0	-1.5 *Least*	Tax rate *Most*		*Least*		Reference countries	% non- recorded		Effect on incidence[2]
Afr E	49%	30%	21%	28%	50%	38%	(Current)	CAR, Namibia, SA	47.4%	(Current)	-7.68%
	Beer	*Spirits*	*Wine*	35%	63%	48%	(Current + 25%)		52.1%	(Current + 10%)	-8.13%
				42%	75%	57%	(Current + 50%)		54.5%	(Current + 15%)	-8.69%
Amr B	53%	30%	17%	16%	49%	22%	(Current)	Chile, Colombia	29.2%	(Current)	-7.86%
	Beer	*Spirits*	*Wine*	20%	61%	28%	(Current + 25%)	Mexico	32.1%	(Current + 10%)	-8.84%
				24%	74%	33%	(Current + 50%)		33.6%	(Current + 15%)	-9.79%
Eur C	68%	21%	11%	65%	13%	25%	(Current)	Estonia, Hungary	36.2%	(Current)	-5.85%
	Spirits	*Beer*	*Wine*	81%	16%	31%	(Current + 25%)	Latvia, Russia	39.8%	(Current + 10%)	-6.42%
				98%	20%	38%	(Current + 50%)	Ukkraine	41.6%	(Current + 15%)	-7.00%
Sear B	88%	12%	0%	30%	40%	0%	(Current)	Thailand	35.7%	(Current)	-4.08%
	Spirits	*Beer*	*Wine*	38%	50%	0%	(Current + 25%)		39.3%	(Current + 10%)	-4.53%
				45%	60%	0%	(Current + 50%)		41.1%	(Current + 15%)	-4.99%
Wpr B	88%	11%	1%	17%	9%	11%	(Current)	Cambodia, China	26.8%	(Current)	-2.39%
	Spirits	*Beer*	*Wine*	21%	11%	14%	(Current + 25%)	Vietnam	32.2%	(Current + 10%)	-2.68%
				26%	14%	17%	(Current + 50%)		30.8%	(Current + 15%)	-3.18%

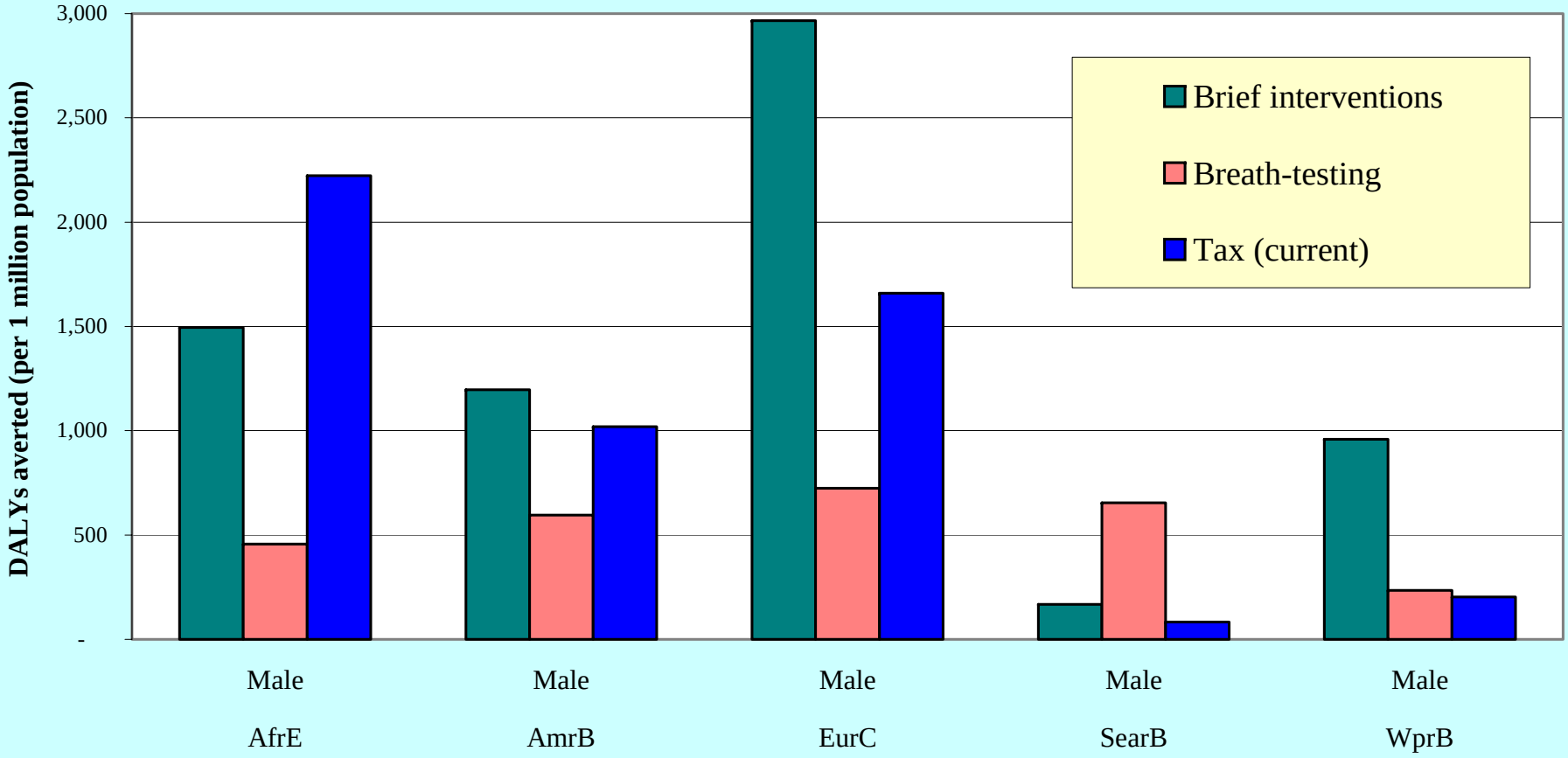
Effectiveness of drink-driving laws (DD law) and random breath-testing of drivers (RBT)

Region	Gender	Attributable fractions		Full enforcement (effectiveness)		
		% deaths attrib. to traffic accidents [1]	% of traffic deaths attrib. to alcohol use [2]	Averted traffic deaths [4] *(DD law+RBT)*	% deaths avertable by DD / RBT [6]	Non-fatal traffic injury multiplier [7]
Afr E	Male	2.1%	38.7%	7% + 18%	0.19%	1.12
	Female	1.0%	11.9%		0.03%	1.13
Amr B	Male	4.4%	47.1%	7% + 18%	0.49%	1.14
	Female	1.5%	14.5%		0.05%	1.15
Eur C	Male	2.2%	63.6%	7% + 18%	0.34%	1.14
	Female	0.8%	27.9%		0.05%	1.14
Sear B	Male	7.8%	25.5%	7% + 18%	0.48%	1.11
	Female	2.3%	5.4%		0.03%	1.11
Wpr B	Male	3.6%	19.9%	7% + 18%	0.17%	1.14
	Female	1.8%	8.8%		0.04%	1.14

Effectiveness of brief interventions in 5 WHO sub-regions
(healthy life years gained per 1 million male population)



Intervention effectiveness in 5 WHO sub-regions
(healthy life years gained per 1 million male population)



Brief intervention costs

- Summary measure = International Dollars (I$, 2000)
  [reflect differences in the relative price of health care inputs]

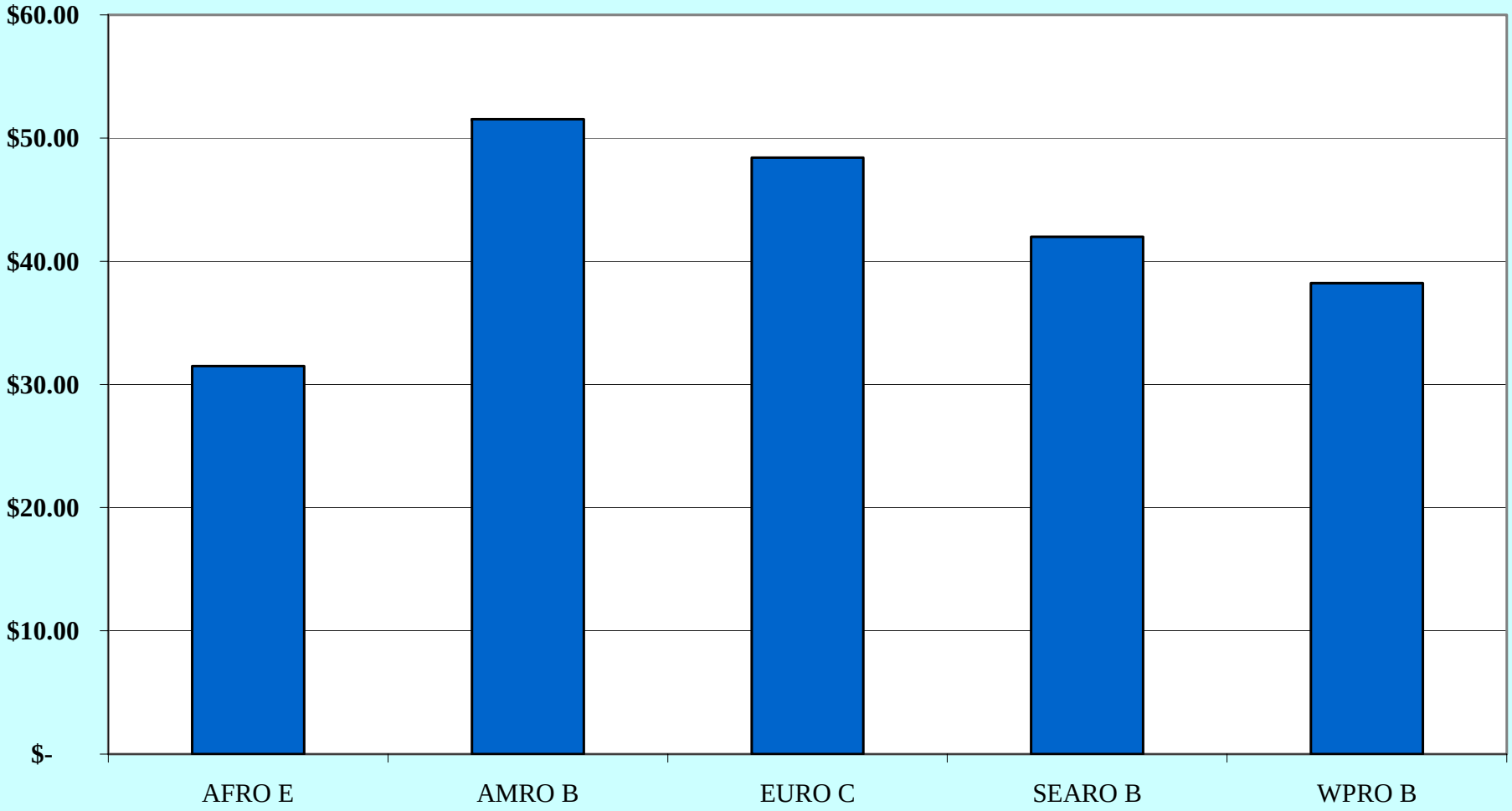
- Patient-level and programme-level resource inputs / costs:
  - PATIENT: primary care visits (4 in all: assess, treat, follow-up)
    outpatient attendances (20% of cases, mean 1.67 visits)
  - PROGRAMME: administration, training (2 days initial, 1 day follow-up)
    (Tax and RBT: legislation and enforcement)

- Ingredients approach [separate specification of Qs and Ps]

- Baseline costs discounted at 3%

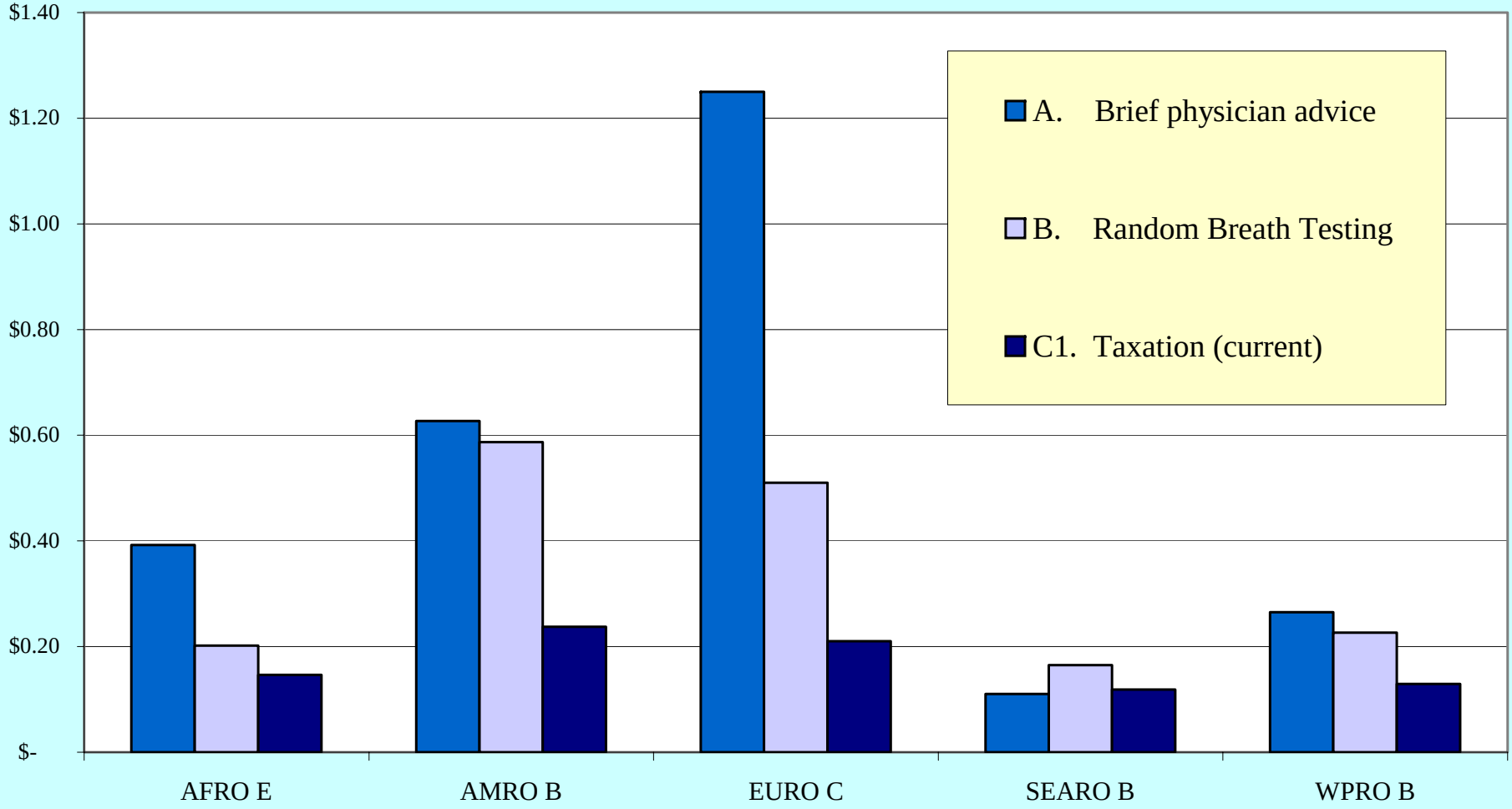
Brief intervention costs

(I$ per treated case)



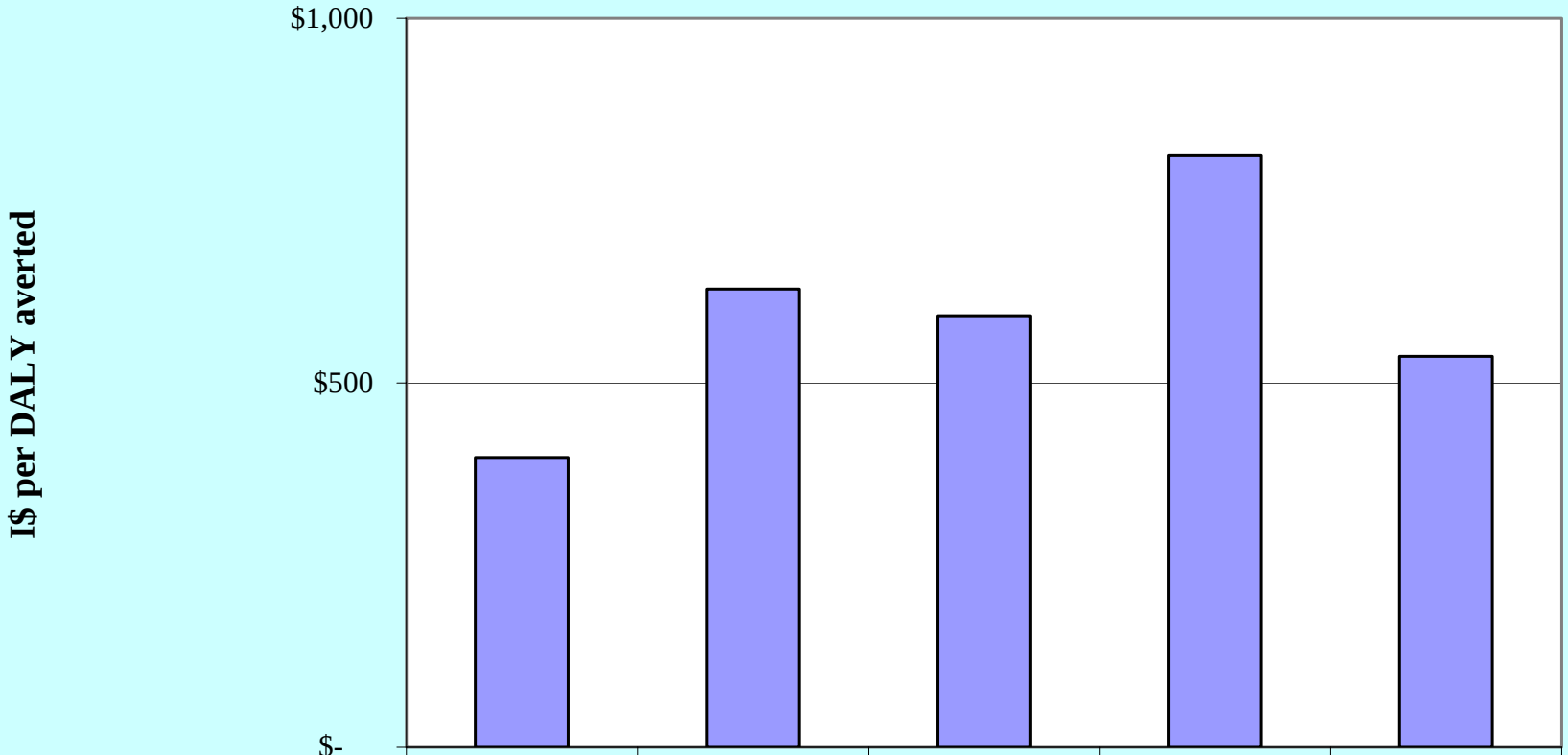
Intervention costs

(I$ million per one million population, i.e. per capita)



Intervention cost-effectiveness

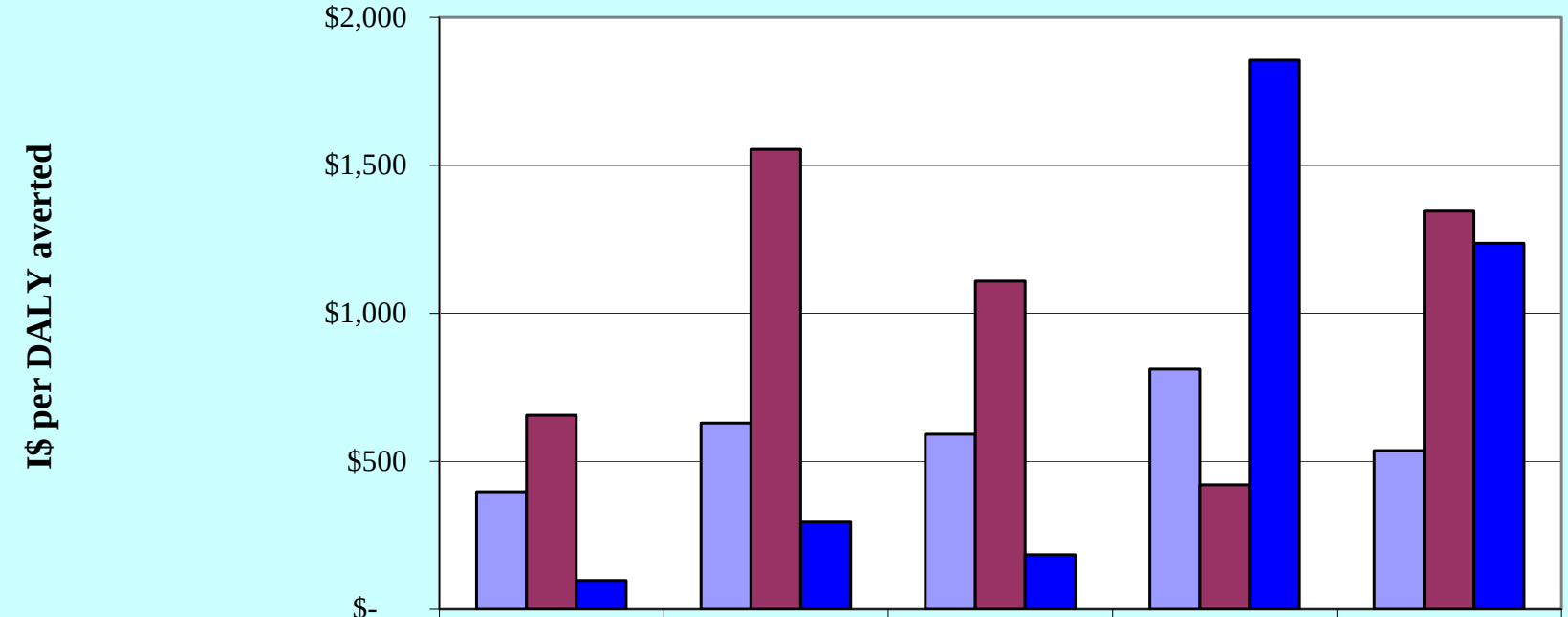
(I$ per DALY averted)



	AfrE	AmrB	EurC	SearB	WprB
A. Brief physician advice	$398	$629	$592	$812	$536

Intervention cost-effectiveness

(I$ per DALY averted)



	AfrE	AmrB	EurC	SearB	WprB
A. Brief physician advice	$398	$629	$592	$812	$536
B. Random Breath Testing	$656	$1,554	$1,108	$421	$1,345
C1. Taxation (current)	$97	$295	$185	$1,855	$1,237

Heavy alcohol use and avertable burden

- Costs: Brief advice & breath-testing campaigns are the most costly interventions to implement. Preventive interventions such as tax & ad bans are less costly.

- Effectiveness: The most effective interventions in high-prevalence populations are taxation and brief advice. In low-prevalence populations, roadside interventions and restrictions on supply and promotion are more effective than tax.

- Cost-effectiveness:
  - Regions with higher levels of drinking: taxation represents the most efficient public health response to the burden of heavy alcohol use (ICER < I$500).

  - Regions with lower rates of heavy drinking: in South Asia, breath-testing was most cost-effective (due to high rate of traffic injuries); in Western Pacific (e.g. China), however, restrictions on supply and promotion appeared to be most cost-effective.