WHO-CHOICE

Generalised Cost-Effectiveness Analysis for Priority Setting

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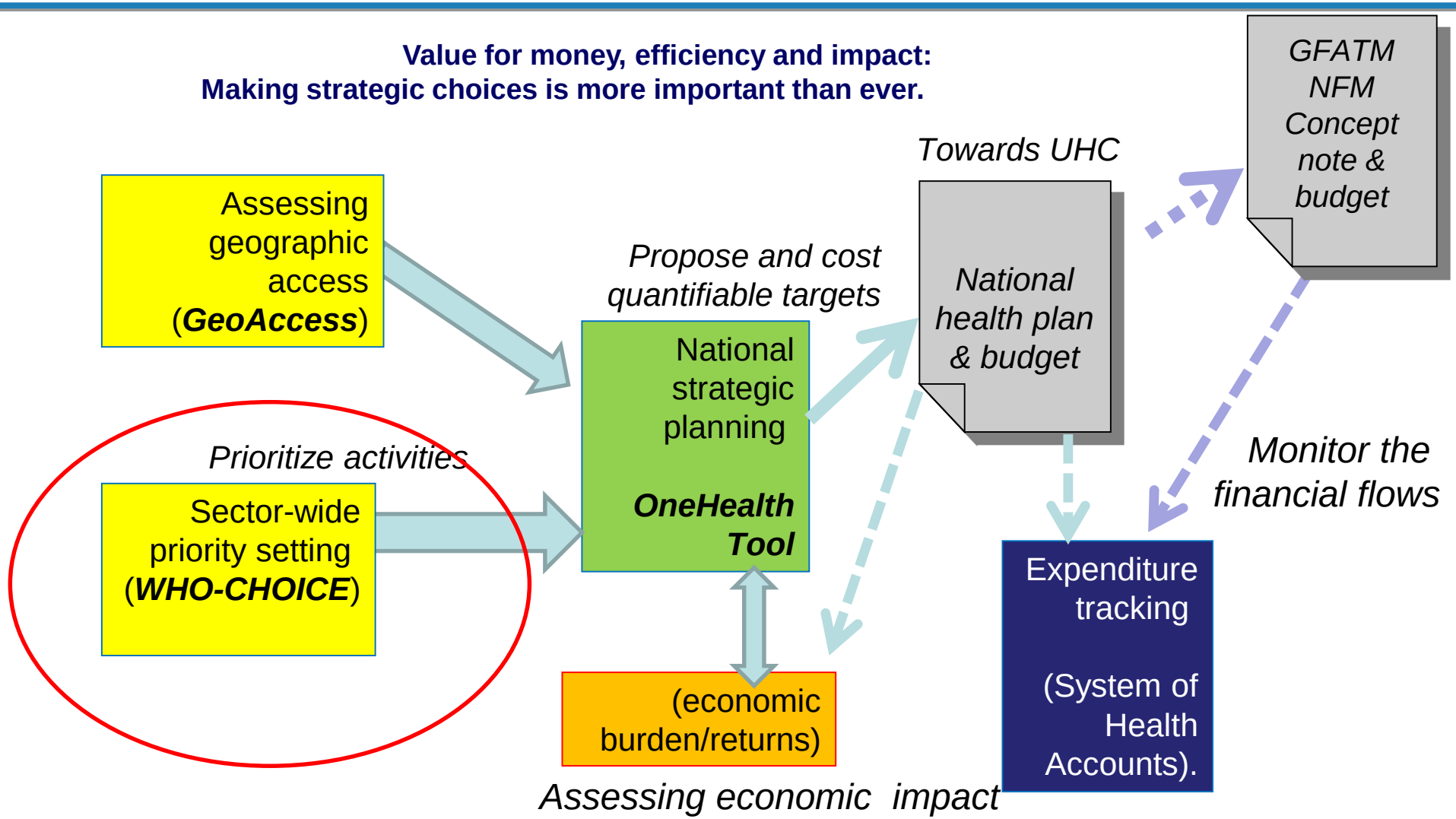
Health Financing Tools



WHO-CHOICE (what to do)

- WHO-CHOICE provides tools to facilitate the country-level cost-effectiveness analysis of interventions related to a wide range of health outcomes.
  - intended for use mainly by national-level decision makers,
- In parallel, WHO-CHOICE has published and disseminated on line a vast knowledge base of regional-level cost-effectiveness information.
  - responds primarily to the needs of actors in the donor community and UN agencies.

WHO CHOICE

- Standardized methodology
  - Generalised cost-effectiveness analysis
  - Comparator
  - Impact modelling assumptions
  - Costing methodology
  - Price database
  - Discounting

WHO-CHOICE: Generalized Cost-Effectiveness Analysis

- In GCEA we use a “null” scenario as a common comparator
  - Model the removal of the health impacts of all currently implemented interventions
- This enables cost-effectiveness results for interventions for different diseases to be combined
  - As all have “doing nothing” as a comparator
- Differs from many CEA studies which look at incremental analysis only

GCEA- Why?

- Promotes the use of CEA for “priority setting”
- Differentiated from the use of CEA for “decision making”
- Priority setting:
  - *What is the best that can be done, all things considered?*
- Decision making
  - *What is the best thing to do now?*

WHO-CHOICE: *Generalized* Cost-effectiveness Analysis

- Acknowledges budget constraints
- Allows the comparison of interventions within and outside the health sector (e.g. food policy)
- Identifies the mix of interventions that generates the largest health gain (allocative efficiency)
- Improves the transferability of results across settings, due to null comparator

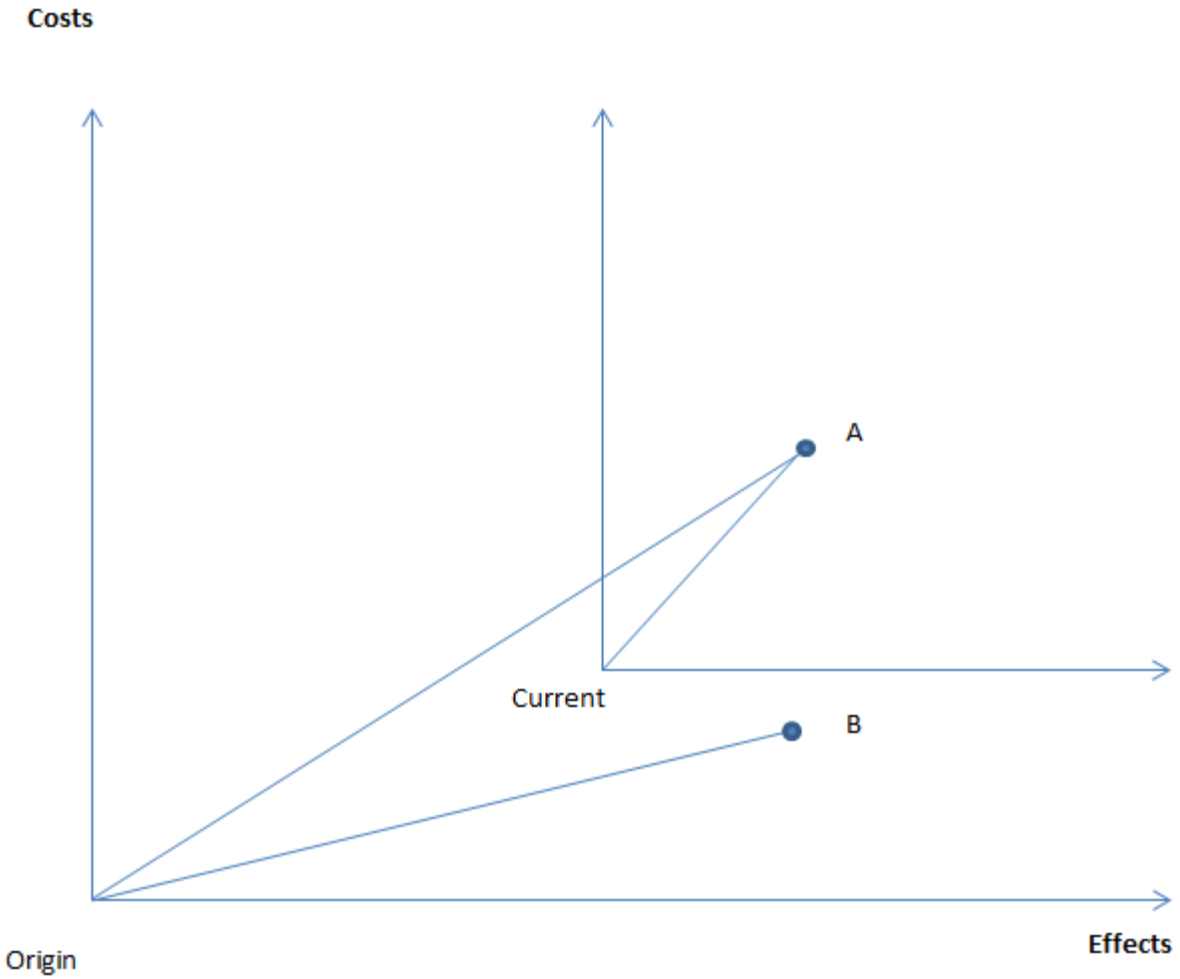
Marginal (incremental) CEA

- Concerned with the marginal (next) dollar.
- Legitimate when we are already optimized.
- No explicit budget constraint.
- Uses a threshold decision rule.
- Rests on false assumptions (in most settings).

The origin and the current position

- Only generalized CEA determines the cost-effectiveness of the portfolio of current activities.
- Only generalized CEA doesn't confuse the origin with the current position.

Generalized CEA: the picture



Calculating the Null

- Identify the current mix of interventions
  - What do they impact?
    - Incidence
    - Remission
    - Case-fatality
    - Disability weight
  - What is the magnitude of the impact?
    - Measured as a % reduction
  - What is the current coverage of the intervnention?

Calculating the null - example

- The current under 1 mortality rate in country X is 63/1,000

	Effect size	Coverage	Impact on Mort rate
KMC	**0.5**	**0.05**	**2.5%**
Sepsis	0.7	0.2	**14.0%**
Null			16.15%

- In the absence of these two interventions, mortality in under 1s would increase by 16.85%

- This would make mortality 76/1,000

Modelling health outcomes due to an intervention

- Models impact of interventions over a 10-year implementation period
- Interventions can impact any transition (incidence, remission, case-fatality) or the health state valuation (i.e. improve morbidity)
- Health impacts projected for 100 years
- Health impacts are measured as “healthy life years”(DALYs), incorporating a morbidity and a mortality component

Combination interventions

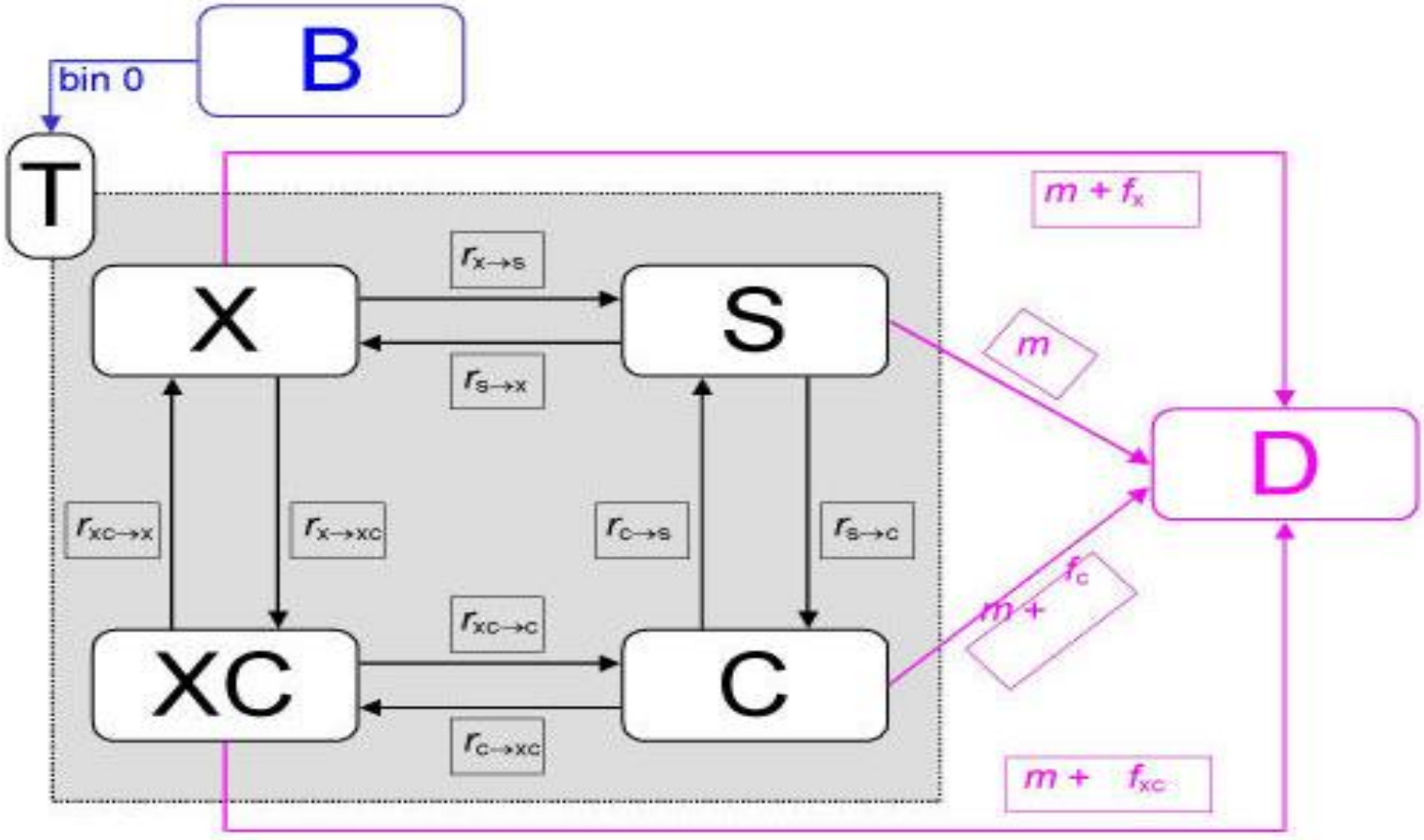
- Use a multiplicative function so that effect sizes are bound to 100%
- If intervention x impacts incidence by 30% and intervention y impacts incidence by 40% the combined impact is calculated as:

$$\text{Effect} = 1-((1-0.3)*(1-0.4))$$

$$\text{Effect} = 58\%$$

- Not simply the addition…

Popmod modelling platform



Department of Health Systems Financing

Better Financing for Better Health

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CHOICE of outcome measure: DALY

- Disability Adjusted Life Year
  - Measured prospectively, rather than cross-sectionally as in GBD work

- Why DALY not QALY?
  - DALY weights all from the same source
  - Not context specific as per QALY weights
  - Comparability with GBD
  - Simplification of common metric in communication with policy

Efficacy vs Effectiveness

- Take efficacy from trial results
- Apply adherence rates
  - Provider
  - Patient
- Generally don't have the required information to ensure we are replicating real life
- This is our way of trying to account for this

Costing approach in WHO CHOICE

- Costing templates
  - We model both “programme” and “patient” level costs
  - Programme costs include costs involved in the running of a health programme
    - Administrative support, training, media, law enforcement, cold chain, building costs, electricity, water etc
  - Patient level costs include the costs at the point of delivery
    - Hospital bed days, health centre visits, diagnostic tests, drugs etc
  - Excel spreadsheets with quantity assumptions and estimated sub-regional level unit prices are developed by WHO-HQ staff

Costing approach in WHO CHOICE

- Use an ingredients approach
- Use a normative costing approach
  - Quantity assumptions and prices are based on guidelines rather than on individual country experiences
- We assume there is a well functioning health system with the capacity to support the interventions
  - Fair to all interventions
  - No bias against introduction of new interventions

Health system capacity

- CHOICE costs facility visits based on an assumption that the system is running at 80% capacity
- In reality in many countries the system is running at a much lower capacity level (i.e. is not running efficiently)
- So, WHY assume this?
- We do not want to disadvantage any intervention due to an inefficient system

Data requirements

- Meta-data on WHO member states – population, GDP, exchange rate, deflators, administrative division, health care facilities
- International salaries
- Facility visit prices
- Travel allowance and per-diem
- Vehicle costs

- Fuel prices
- Cold chain storage equipment
- Generators
- Electricity
- Water
- Construction
- Office supplies

Costing database

- Data from disparate sources
- Econometric modelling used
- Regional level database containing all the prices required in the CHOICE analyses
- Baseline data 2000

Discounting

- All costs and health benefits discounted at 3%
- Option of no discounting available in software
- No age weighting used

The CHOICE approach

Strengths

- ✓ Locates broad position of strategies in sector-wide framework
- ✓ Methodological consistency, standardised tools
- ✓ Data sources available on web-site, ability to adapt to local contexts

Limitations

- ❖ Sub-regional level of analysis - hides variation at country-level
- ❖ Extrapolation of efficacy data to different health contexts / systems
- ❖ Time costs of patients & families (travel, informal care) not estimated

Applications of WHO-CHOICE

- By disease / risk factor:
  - Communicable diseases: HIV, TB, malaria, childhood diseases
  - Non-communicable diseases: cancer, cardiovascular disease, diabetes, respiratory disorders, mental disorders, sensory loss disorders
  - Risk factors: alcohol and tobacco use, unsafe water, unsafe sex, under-nutrition etc.
- By geographical setting
  - Regional assessments: 14 epidemiologically-defined WHO sub-regions
  - Country applications: Argentina, Chile, Colombia, Costa Rica, Mexico, Peru, Estonia, Ghana, Guatemala, India, Kyrgyzstan, Spain, Sri Lanka, Thailand, Viet Nam, and many others...

CURRENT WORK AND UPDATES

Why update WHO CHOICE

- Some analyses were undertaken ±10 years ago
  - New epidemiology available from GBD 2010 and other sources
  - Costing needs updating (e.g. outdated technology included)
- Interest from WHO regions and countries in new analyses
- Role of CEA within Universal Health Coverage planning
- Resolutions on Health Technology Assessment within multiple WHO Regions highlight the relevance of CHOICE-type analyses to the current political climate

What is being updated?

- 20 disease/risk factor analyses
- Epidemiological information and cost data to 2010
- Programme cost unit prices
  - Facility level costs updated now
  - Unit prices for other inputs being collected
- Quantity assumptions in programme costing
- Intervention selection will move into line with current WHO treatment and prevention guidelines and new technologies

Changes in new CHOICE work

- Analyses will be run in the Spectrum platform
  - This is the same platform used by the OneHealth Tool, our health system costing and strategic planning tool
  - Same interface → two different tools
  - Country users should develop more familiarity and skills
  - Where required we will use dynamical models (HIV, TB) or transmission models (malaria), allowing more accurate modelling but still with comparable results
  - NCDs and RMNCH will follow the more traditional PopMod style model
  - Conceptual basis will remain the same

Major advances

- New database of estimated prices for programme costs at the country level
  - Data collection undertaken to identify databases which cover as many countries as possible
  - Missing countries estimated using two main methods – missing data imputation and econometric analyses
- Complete sectoral analysis will be calculated
  - Tool will be available for countries

Strategic Planning

Distribution of Current Activities

CVD

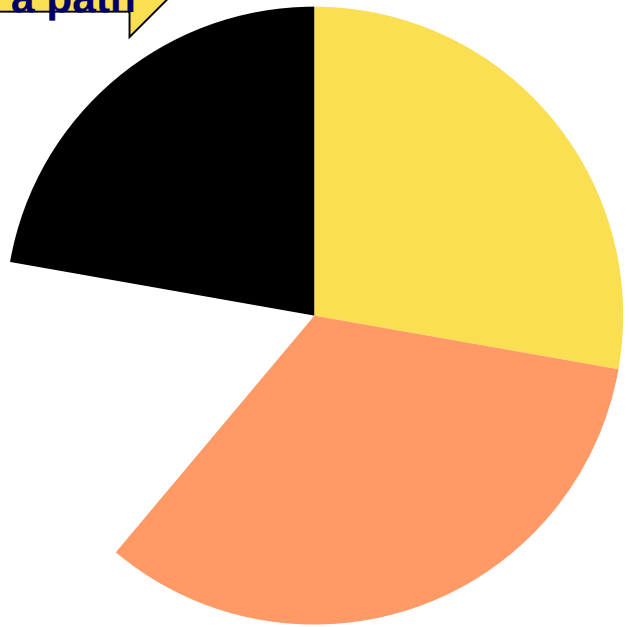
Cancers

Respiratory Conditions

Diabetes

How to Chart a path

Distribution for Allocative Efficiency (Cost Effectiveness)



CVD

Cancers

Respiratory Conditions

Diabetes

Linking priority setting to strategic planning

- decision making that takes account of our priorities in forming objectives: e.g. OneHealth Tool
- Strategic planning involves decision making at the margin: different calculations are required.
- But without priority setting, strategic planning is not strategic (and its objectives are not objectives).

Strategic planning in practice

- Provide a clear frame for the question: Why are there differences?
- Can we explain the variation by appealing to:
  - Fairness
  - Financial Protection or
  - Other legitimate Health System Goals.
- How much can we explain?: We should be able to put bounds on the question.

Why use CHOICE before the OHT? What are the main differences

- CHOICE analyses the implementation of interventions over the lifetime of the cohort
  - The time frame used in OHT (3-5 years) will bias against interventions with long term outcomes, e.g. vaccinations
- Economic costs versus financial costs
  - Amortized capital costs – financial costing can bias against interventions with high upfront costs
  - Discounting
  - Assumption of functionality of health system
- Allows economic evaluation for use in priority setting

CASE STUDY: NON-COMMUNICABLE DISEASE

Which NCDs?

- Focus on the 4 main contributors to the disease burden
- CVD (inc. IHD + Stroke and risk factors)
- Diabetes (also as RF for CVD)
- Lung diseases
- Cancers (Breast, CRC, CVC)

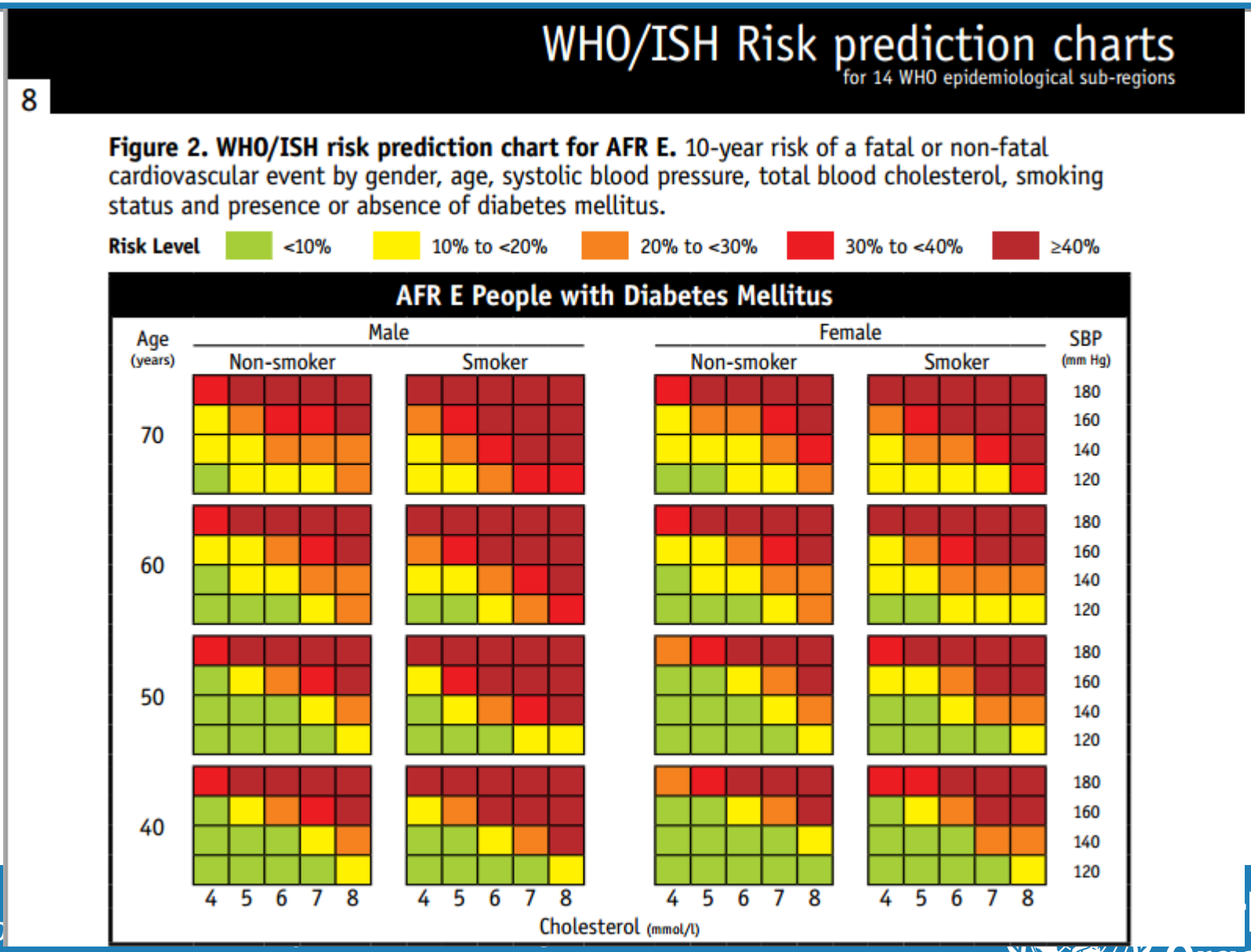
Intervention selection

- Initially used an inclusive list of all potentially available interventions
- The results of this work contributed to the development of the WHO “best buys” for the prevention and control of NCDs
- Current updates using a smaller list of interventions focusing on those relevant to low-resource settings

Cardiovascular disease

- Cardiovascular disease prevention interventions are based on an “absolute risk” approach to prevention
- Acknowledges that risk factors do not work in isolation
- Includes a prediction of risk of incident CVD event over the next 10 years based on a combination of
  - SBP
  - Cholesterol
  - BMI
  - Diabetes
  - Tobacco use

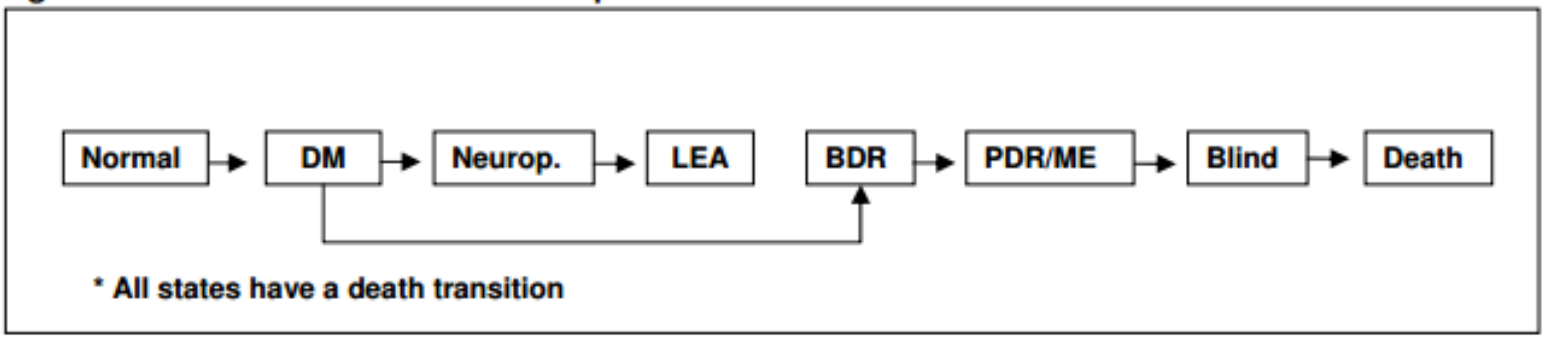
Risk prediction chart



Diabetes – modelling of sequelae

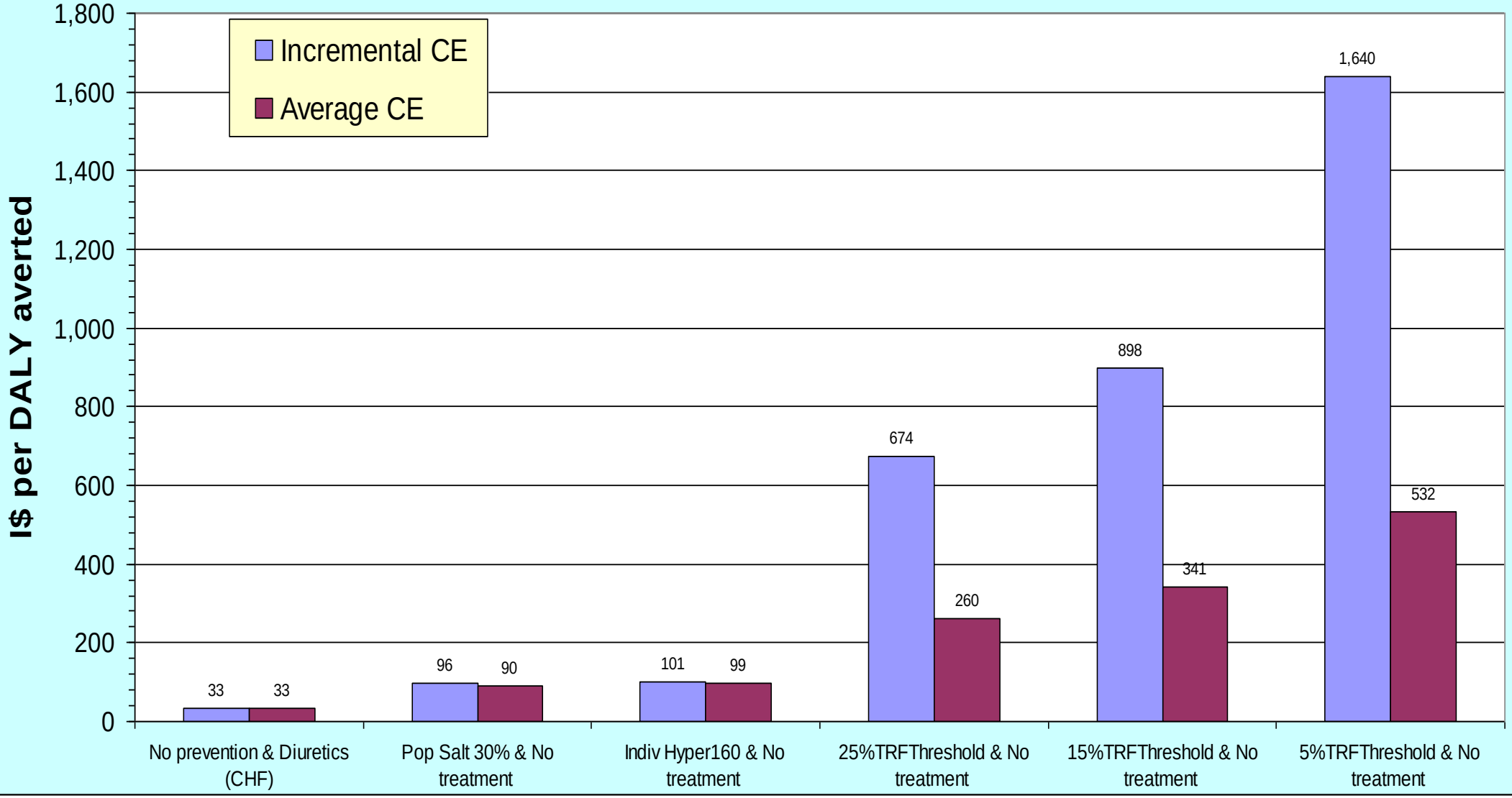
- Many potential sequelae
- Uses “minimod” to explicitly model these transitions

Figure 1. MiniMod states and transition paths

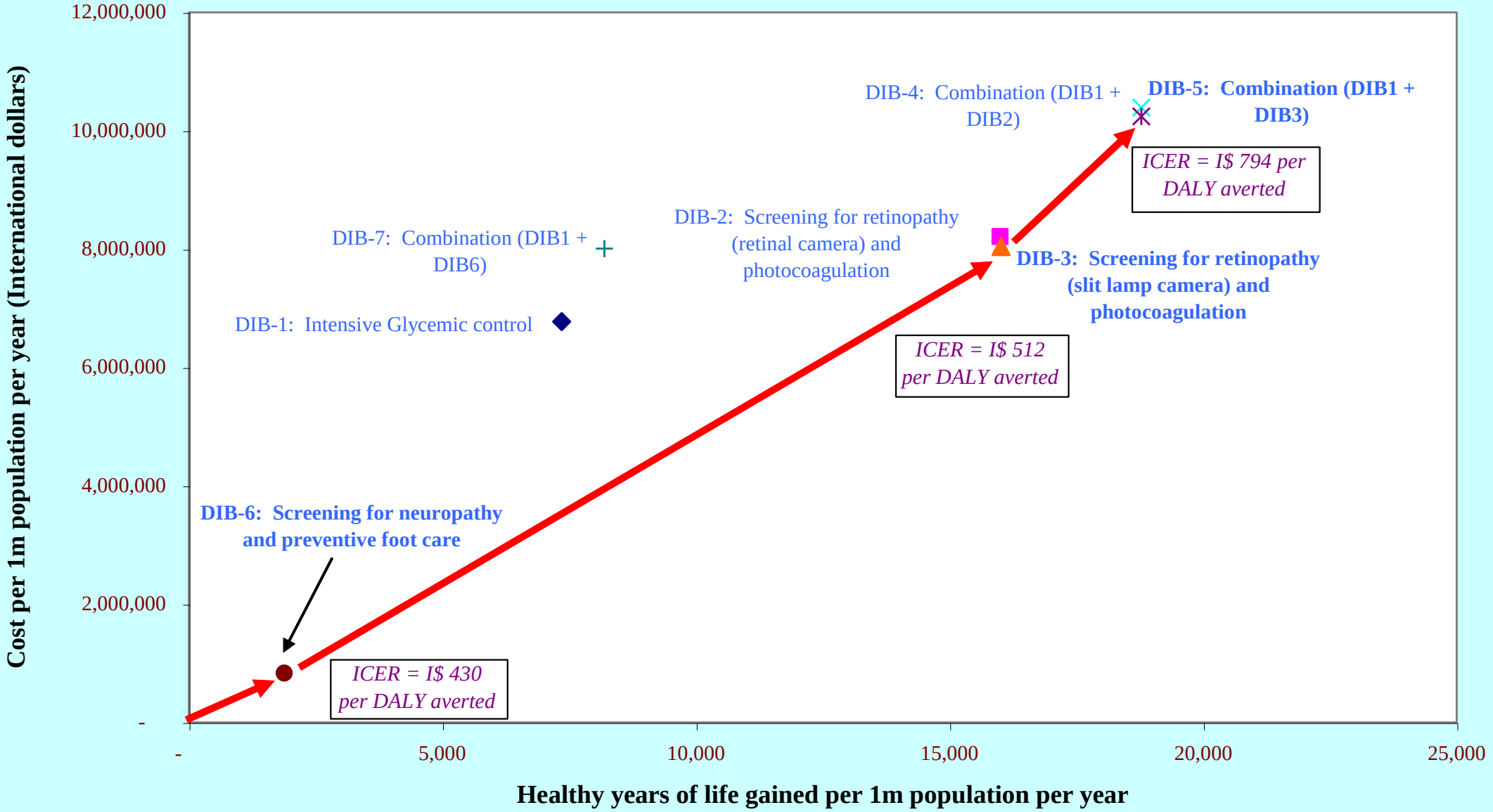


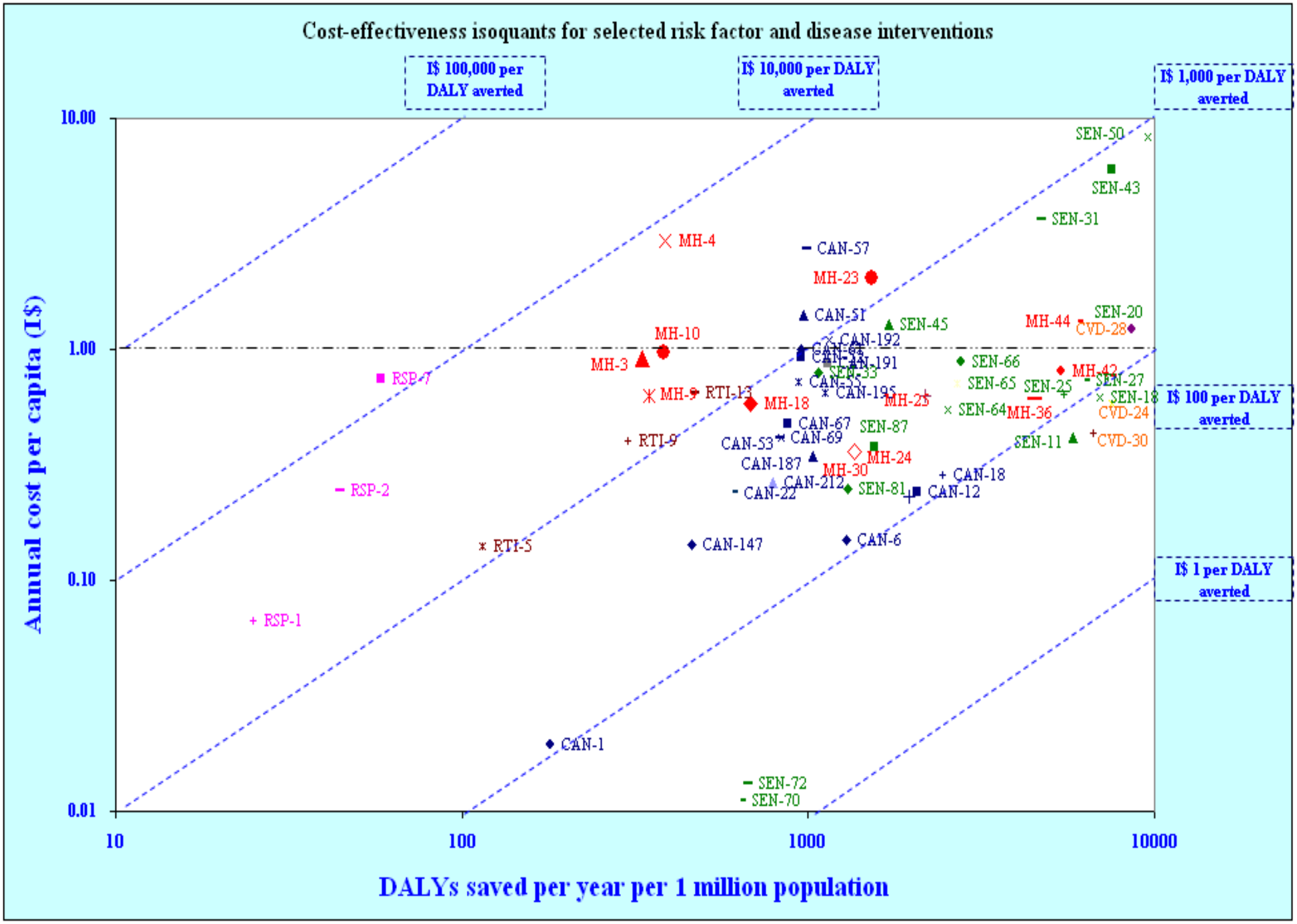
- This then gives an average DW based on the combination of existing health states that is used in PopMod

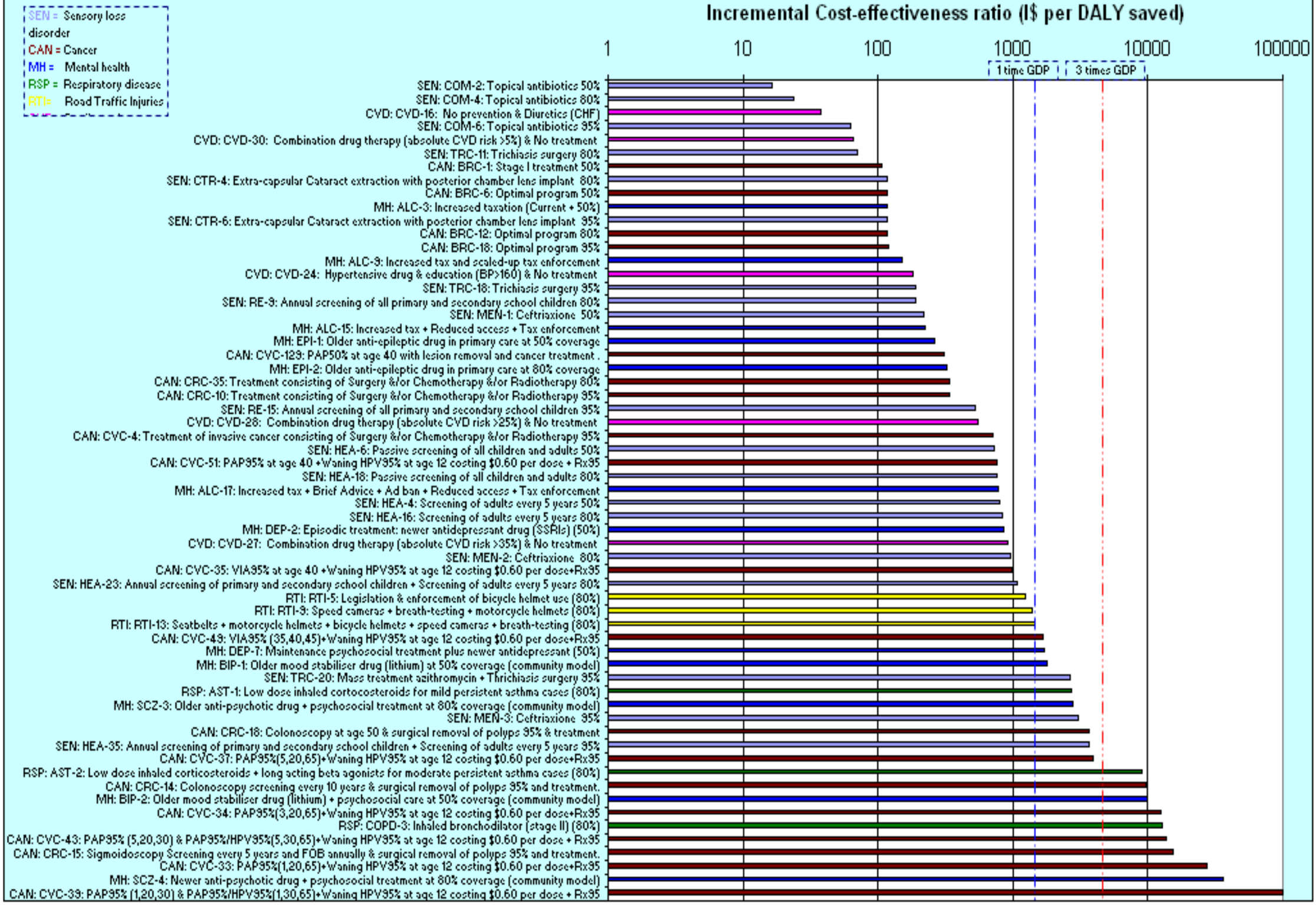
Cost-effectiveness results: CVD



Cost-effectiveness expansion path: Diabetes




Cost-effectiveness isoquants for selected risk factor and disease interventions
I$ 100,000 per DALY averted
I$ 10,000 per DALY averted
I$ 1,000 per DALY averted
I$ 100 per DALY averted
I$ 1 per DALY averted
Annual cost per capita (I$)
10.00
1.00
0.10
0.01
10
100
1000
10000
DALYs saved per year per 1 million population
SEN-50
SEN-43
SEN-31
MH-4
CAN-57
MH-23
CAN-51
SEN-45
SEN-20
MH-44
CVD-28
MH-10
CAN-192
MH-3
CAN-191
SEN-66
MH-42
SEN-27
RSP-7
SEN-65
SEN-25
SEN-18
MH-9
RTI-13
CAN-195
MH-25
MH-18
SEN-64
MH-36
CVD-24
CAN-67
SEN-87
RTI-9
CAN-53
CAN-69
SEN-11
CVD-30
MH-24
CAN-187
MH-30
CAN-18
CAN-212
SEN-81
CAN-12
RSP-2
CAN-22
RTI-5
CAN-147
CAN-6
RSP-1
CAN-1
SEN-72
SEN-70


SEN = Sensory loss disorder
CAN = Cancer
MH = Mental health
RSP = Respiratory disease
RTI = Road Traffic Injuries
Incremental Cost-effectiveness ratio (I$ per DALY saved)
1
10
100
1000
10000
100000
1 time GDP
3 times GDP
SEN: COM-2: Topical antibiotics 50%
SEN: COM-4: Topical antibiotics 80%
CVD: CVD-16: No prevention & Diuretics (CHF)
SEN: COM-6: Topical antibiotics 95%
CVD: CVD-30: Combination drug therapy (absolute CVD risk >5%) & No treatment
SEN: TRC-11: Trichiasis surgery 80%
CAN: BRC-1: Stage I treatment 50%
SEN: CTR-4: Extra-capsular Cataract extraction with posterior chamber lens implant 80%
CAN: BRC-6: Optimal program 50%
MH: ALC-3: Increased taxation (Current + 50%)
SEN: CTR-6: Extra-capsular Cataract extraction with posterior chamber lens implant 95%
CAN: BRC-12: Optimal program 80%
CAN: BRC-18: Optimal program 95%
MH: ALC-9: Increased tax and scaled-up tax enforcement
CVD: CVD-24: Hypertensive drug & education (BP>160) & No treatment
SEN: TRC-18: Trichiasis surgery 95%
SEN: RE-9: Annual screening of all primary and secondary school children 80%
SEN: MEN-1: Ceftriaxione 50%
MH: ALC-15: Increased tax + Reduced access + Tax enforcement
MH: EPI-1: Older anti-epileptic drug in primary care at 50% coverage
CAN: CVC-129: PAP50% at age 40 with lesion removal and cancer treatment .
MH: EPI-2: Older anti-epileptic drug in primary care at 80% coverage
CAN: CRC-35: Treatment consisting of Surgery &/or Chemotherapy &/or Radiotherapy 80%
CAN: CRC-10: Treatment consisting of Surgery &/or Chemotherapy &/or Radiotherapy 95%
SEN: RE-15: Annual screening of all primary and secondary school children 95%
CVD: CVD-28: Combination drug therapy (absolute CVD risk >25%) & No treatment
CAN: CVC-4: Treatment of invasive cancer consisting of Surgery &/or Chemotherapy &/or Radiotherapy 95%
SEN: HEA-6: Passive screening of all children and adults 50%
CAN: CVC-51: PAP95% at age 40 +Waning HPV95% at age 12 costing $0.60 per dose + Rx95
SEN: HEA-18: Passive screening of all children and adults 80%
MH: ALC-17: Increased tax + Brief Advice + Ad ban + Reduced access + Tax enforcement
SEN: HEA-4: Screening of adults every 5 years 50%
SEN: HEA-16: Screening of adults every 5 years 80%
MH: DEP-2: Episodic treatment: newer antidepressant drug (SSRIs) (50%)
CVD: CVD-27: Combination drug therapy (absolute CVD risk >35%) & No treatment
SEN: MEN-2: Ceftriaxione 80%
CAN: CVC-35: VIA95% at age 40 +Waning HPV95% at age 12 costing $0.60 per dose+Rx95
SEN: HEA-23: Annual screening of primary and secondary school children + Screening of adults every 5 years 80%
RTI: RTI-5: Legislation & enforcement of bicycle helmet use (80%)
RTI: RTI-9: Speed cameras + breath-testing + motorcycle helmets (80%)
RTI: RTI-13: Seatbelts + motorcycle helmets + bicycle helmets + speed cameras + breath-testing (80%)
CAN: CVC-49: VIA95% (35,40,45)+Waning HPV95% at age 12 costing $0.60 per dose+Rx95
MH: DEP-7: Maintenance psychosocial treatment plus newer antidepressant (50%)
MH: BIP-1: Older mood stabiliser drug (lithium) at 50% coverage (community model)
SEN: TRC-20: Mass treatment azithromycin + Thrichiasis surgery 95%
RSP: AST-1: Low dose inhaled cortocosteroids for mild persistent asthma cases (80%)
MH: SCZ-3: Older anti-psychotic drug + psychosocial treatment at 80% coverage (community model)
SEN: MEN-3: Ceftriaxione 95%
CAN: CRC-18: Colonoscopy at age 50 & surgical removal of polyps 95% & treatment
SEN: HEA-35: Annual screening of primary and secondary school children + Screening of adults every 5 years 95%
CAN: CVC-37: PAP95%(5,20,65)+Waning HPV95% at age 12 costing $0.60 per dose+Rx95
RSP: AST-2: Low dose inhaled corticosteroids + long acting beta agonists for moderate persistent asthma cases (80%)
CAN: CRC-14: Colonoscopy screening every 10 years & surgical removal of polyps 95% and treatment.
MH: BIP-2: Older mood stabiliser drug (lithium) + psychosocial care at 50% coverage (community model)
CAN: CVC-34: PAP95%(3,20,65)+Waning HPV95% at age 12 costing $0.60 per dose+Rx95
RSP: COPD-3: Inhaled bronchodilator (stage II) (80%)
CAN: CVC-43: PAP95% (5,20,30) & PAP95%/HPV95%(5,30,65)+Waning HPV95% at age 12 costing $0.60 per dose + Rx95
CAN: CRC-15: Sigmoidoscopy Screening every 5 years and FOB annually & surgical removal of polyps 95% and treatment.
CAN: CVC-33: PAP95%(1,20,65)+Waning HPV95% at age 12 costing $0.60 per dose+Rx95
MH: SCZ-4: Newer anti-psychotic drug + psychosocial treatment at 80% coverage (community model)
CAN: CVC-39: PAP95% (1,20,30) & PAP95%/HPV95%(1,30,65)+Waning HPV95% at age 12 costing $0.60 per dose + Rx95