WHO-CHOICE

Generalised Cost-Effectiveness Analysis for Priority Setting

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Value for money, efficiency and impact: Making strategic choices is more important than ever.

Assessing geographic access (*GeoAccess*)

*Propose and cost quantifiable targets*

*Assessing economic impact*

*OneHealth Tool*

*National strategic planning*

*National health plan & budget*

*Expenditure tracking (System of Health Accounts)*

Towards UHC

Monitor the financial flows

GFATM NFM Concept note & budget

Prioritize activities

*Sector-wide priority setting (WHO-CHOICE)*

Making strategic choices is more important than ever.
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 online 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 intervention?
Calculating the null - example

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

<table>
<thead>
<tr>
<th>Effect size</th>
<th>Coverage</th>
<th>Impact on Mort rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMC</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Sepsis</td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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:

\[ \text{Effect} = 1 - ((1 - 0.3) \times (1 - 0.4)) \]

\[ \text{Effect} = 58\% \]
- Not simply the addition…
Popmod modelling platform
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

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
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<tbody>
<tr>
<td>✓ Locates broad position of strategies in sector-wide framework</td>
<td>❖ Sub-regional level of analysis - hides variation at country-level</td>
</tr>
<tr>
<td>✓ Methodological consistency, standardised tools</td>
<td>❖ Extrapolation of efficacy data to different health contexts / systems</td>
</tr>
<tr>
<td>✓ Data sources available on web-site, ability to adapt to local contexts</td>
<td>❖ Time costs of patients &amp; families (travel, informal care) not estimated</td>
</tr>
</tbody>
</table>
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

How to Chart a path

Distribution for Allocative Efficiency (Cost Effectiveness)

- CVD
- Cancers
- Respiratory Conditions
- Diabetes

How to Chart a path

- 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
Figure 2. WHO/ISH risk prediction chart for AFR E. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, total blood cholesterol, smoking status and presence or absence of diabetes mellitus.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
<th>SBP (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>Non-smoker</td>
<td>Smoker</td>
<td>180</td>
</tr>
<tr>
<td>60</td>
<td>Non-smoker</td>
<td>Smoker</td>
<td>160</td>
</tr>
<tr>
<td>50</td>
<td>Non-smoker</td>
<td>Smoker</td>
<td>140</td>
</tr>
<tr>
<td>40</td>
<td>Non-smoker</td>
<td>Smoker</td>
<td>120</td>
</tr>
</tbody>
</table>

Risk Level:
- <10%
- 10% to <20%
- 20% to <30%
- 30% to <40%
- ≥40%
Diabetes – modelling of sequelae

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

This then gives an average DW based on the combination of existing health states that is used in PopMod.
Cost-effectiveness results: CVD

- Incremental CE
- Average CE

<table>
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<tr>
<th>Scenario</th>
<th>Incremental CE</th>
<th>Average CE</th>
</tr>
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<tbody>
<tr>
<td>No prevention &amp; Diuretics (CHF)</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Pop Salt 30% &amp; No treatment</td>
<td>96</td>
<td>90</td>
</tr>
<tr>
<td>Indiv Hyper160 &amp; No treatment</td>
<td>101</td>
<td>99</td>
</tr>
<tr>
<td>25%TRF Threshold &amp; No treatment</td>
<td>674</td>
<td>260</td>
</tr>
<tr>
<td>15%TRF Threshold &amp; No treatment</td>
<td>898</td>
<td>341</td>
</tr>
<tr>
<td>5%TRF Threshold &amp; No treatment</td>
<td>1,640</td>
<td>532</td>
</tr>
</tbody>
</table>
Cost-effectiveness expansion path: Diabetes

DIB-1: Intensive Glycemic control
DIB-2: Screening for retinopathy (retinal camera) and photocoagulation
DIB-3: Screening for retinopathy (slit lamp camera) and photocoagulation
DIB-4: Combination (DIB1 + DIB2)
DIB-5: Combination (DIB1 + DIB3)
DIB-6: Screening for neuropathy and preventive foot care
DIB-7: Combination (DIB1 + DIB6)

ICER = I$ 430 per DALY averted
ICER = I$ 794 per DALY averted
ICER = I$ 512 per DALY averted

Healthy years of life gained per 1m population per year
Cost per 1m population per year (International dollars)