

Notes on Givewell's Cost Effectiveness Analysis on Deworming

29 May, 2019

```
# Do not run data set on git/github until privacy has been cleared
#####
#### Data
#####
#####
#### Research
#####
#####
#### Guess work
#####
#####
#### Notes:
#####
### Source ----> Input ----> Model ----> Policy Estimates (output)
### (_so)      (_in)      (_mo)      (_pe)
### values     functions  functions  values
###           & values   & values
### arguments in functions should used "_var" and functions should "_f"
#invisible( list2env(call_params_f(),.GlobalEnv) )
```

Key policy estimates for policy makers

Methodology

Main Equation (the model)

$$CEA = \frac{B(1 + F_0)}{C} \quad (1)$$

- C is the costs per person dewormed.
- B is the benefits per person dewormed.
- F_0 is a factor to account for leverage/fudging [not reviewed in this exercise]

Sub components:

We begin by describing the underlying analysis behind the costs. Through this exercise we use the following notation the letters F, P, Q denote components in percentages, monetary units (US dollars and local currency) and quantities respectively. Each new element will be tracked using a sub-index, and supra-indexes will be used to track groups, like geographies, time, and other categories. For example Q_2^i represents the second quantity described in this analysis (total adjusted number children dewormed per year) in location i . At

the end of each description we will show in parenthesis the original location of the parameter in GiveWell's spreadsheets (using the notation **file, sheet number, cell**¹).

Costs (“C”)

Here is a description of costs

Additional narrative of cost

Additional edits from Grace this will be an issue

This comments are great.

```
# - inputs: tax_rev_init_mo, top_tax_base_in
# - outputs: total_rev_pe
```

$$C = \sum_{i \in G_1(\text{countries})} F_1^i P_1^i \text{More edits} \quad (2)$$

- F_1^i : Weight for the weighted average (F1, 2, H16).
- P_1^i : Total cost per child, per year in region i (F1, 2, C:G16).

$$F_1^i = \frac{F_2^i Q_1^i}{\sum_{j \in G_1} F_2^j Q_1^j} \quad (3)$$

- F_2^i : is the proportion of the costs that are paid by the Deworm the World initiative (DtW from now on) (F1, 2, C:G6).
- Q_1^i : estimated number of treatments delivered and committed (F1, 2, C:G7).

$$P_1^i = (P_3^i + P_4^i + P_5^i + P_6^i + P_7^i) \frac{1}{Q_2^i} \quad (4)$$

- P_3^i : Total cost of DtW across all years (F1, 1, Z39).
- P_4^i : Cost of donated drugs per year (F1, 1, Z13).
- P_5^i : Additional partner costs (other than drugs) (F1, 1, Z50).
- P_6^i : Government financial costs per year (F1, 1, X41).
- P_7^i : Government staff value time (F1, 2, N42).
- Q_2^i : total adjusted children dewormed per year (F1, 1, Z15).

¹F1 = GiveWell's estimates of Deworm the World's cost per child dewormed per year [2018]

F2 = 2019 GiveWell Cost-effectiveness Analysis - Version 3

F3 = 2018 Worm Intensity Workbook - Version 1 Sheets are named the first time and numbered thereafter.

P_2^i and F_2^i are defined in terms of some of the previous elements.

$$F_2^i = \frac{P_2^i}{P_1^i} P_2^i = \frac{P_3^i}{Q_2^i} \quad (5)$$

- P_2^i : DtW costs per children per year (F1, 2, C:G14).

The total costs of DtW across all years (P_3^i) is aggregated across years, regions (within country), type of cost activity (policy & advocacy, prevalence surveys, drug procurement & management, training & distribution, public mobilization & community sensitization, monitoring & evaluation, program management, giveWell added costs²) and month (February or August)

$$P_3^i = \sum_{t \in \text{years}(G_2)} \sum_{r \in \text{region}(G_3)} \sum_{a \in \text{activ}(G_4)} \sum_{m \in \text{month}(G_5)} P_3^{\text{itram}} \quad (6)$$

- P_3^{itram} : costs by year, location, region, activity, and month. (F1, [r+m+y], E15:21)

Total number of adjusted children (Q_2^i) is computed as follows:

$$Q_2^i = \sum_{t \in G_2} \sum_{r \in G_3} Q_2^{\text{itr}} Q_2^{\text{itr}} = \frac{\tilde{Q}_2^{\text{itr, Feb}} - \tilde{Q}_2^{\text{itr, Aug}}}{Q_3^{\text{itr}}} \tilde{Q}_2^{\text{itr, m}} = \sum_{s \in \text{sch.age}(G_6)} \left(\sum_{e \in \text{enr.st}(G_7)} \tilde{Q}_2^{\text{itrms,e}} \right) Q_4^{\text{itrm}} \quad (7)$$

- Q_2^{itr} , and Q_2^{itrm} (F1, 4, B19 and F1, [country] num of children (C), AB:AC34)
- Q_3^{itr} : Actual treatment rounds per year (F1, 4, D[crt])
- Q_4^{itrm} : Adjustment factor (F1, C, [rmt]25)

$$Q_4^{\text{itrm}} = 1 - \left(\frac{Q_2^{\text{itrms,en}}}{Q_5^{\text{itrms,en}}} - F_3^{\text{itrm}} F_4^{\text{itrm}} F_5^{\text{itrm}} \right) / \left(\frac{Q_2^{\text{itrms,en}}}{Q_5^{\text{itrms,en}}} \right) \quad (8)$$

- $Q_5^{\text{itrms,en}}$: Total enrolled school-aged children targeted (F1, C, [rtm]13)
- F_3^{itrm} : Percentage of schools visited during coverage validation (and/or during process monitoring) that distributed deworming tablets on deworming day and/or mop-up day (F1, C, [rtm]22).
- F_4^{itrm} : Percentage of enrolled school-aged children attending school on deworming day or mop-up day, according to attendance registers viewed in schools visited during coverage validation (and/or during process monitoring) (F1, C, [rtm]23).
- F_5^{itrm} : Of children enrolled in a school that distributed deworming tablets on deworming day and/or mop-up day and who attended school on deworming day and/or mop-up day, percentage who reported consuming deworming tablets (according to student interviews during coverage validation and/or process monitoring) (F1, C, [rtm]24).

$$P_4^i = \sum_t \sum_r \sum_m P_4^{\text{itrm}} \quad (9)$$

²to account for several high-level activities Deworm the World does not include in its cost per treatment analyses, as they are not directly related to any particular program

- P_4^{itrm} : Cost of donated drugs in country, location, year, month (F1, [crtm], E18).

$$P_5^i = \sum_t \sum_r \sum_m \tilde{P}_5^{itrm} - P_4^i \tilde{P}_5^{itr} = \sum_m \tilde{P}_5^{itrm} \quad (10)$$

- P_4^{itrm} : Cost of donated drugs in country, location, year, month (F1, [crtm], E18).
- \tilde{P}_5^{itrm} : Total partner costs (incl. drugs) (F1, [crtm], E23).

$$P_5^i = \sum_t \sum_r \tilde{P}_6^{itr} \tilde{P}_6^{itr} = P_8^{itr} - (\tilde{P}_5^{itr} + P_3^{itr}) \quad (11)$$

- P_4^{itrm} : Cost of donated drugs in country, location, year, month (F1, [crtm], E18).
- \tilde{P}_5^{itrm} : Total partner costs (incl. drugs) (F1, [crtm], E23).

Benefits (“B”)

```
# - inputs: tax_rev_init_mo, top_tax_base_in
# - outputs: total_rev_pe
```

Main results

```
# - inputs: tax_rev_init_mo, top_tax_base_in
# - outputs: total_rev_pe
```

Montecarlo simulations

```
# Draws
# Compute inputs
# Compute model
# Run sims
```

Sensitivity Analysis