The Potential Impact of Investments in Supply Chain Strengthening

(Retrospective analysis)

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Representation of consumable availability in the TLO model

- Consumable availability is measured as the probability that a consumable is available during a health system interaction
- Estimates of consumable availability are based on facility reports which record the number of days of stock-outs of consumables recorded each month (OpenLMIS, 2018).

Our analysis focuses on two levels of care where most Health care is delivered

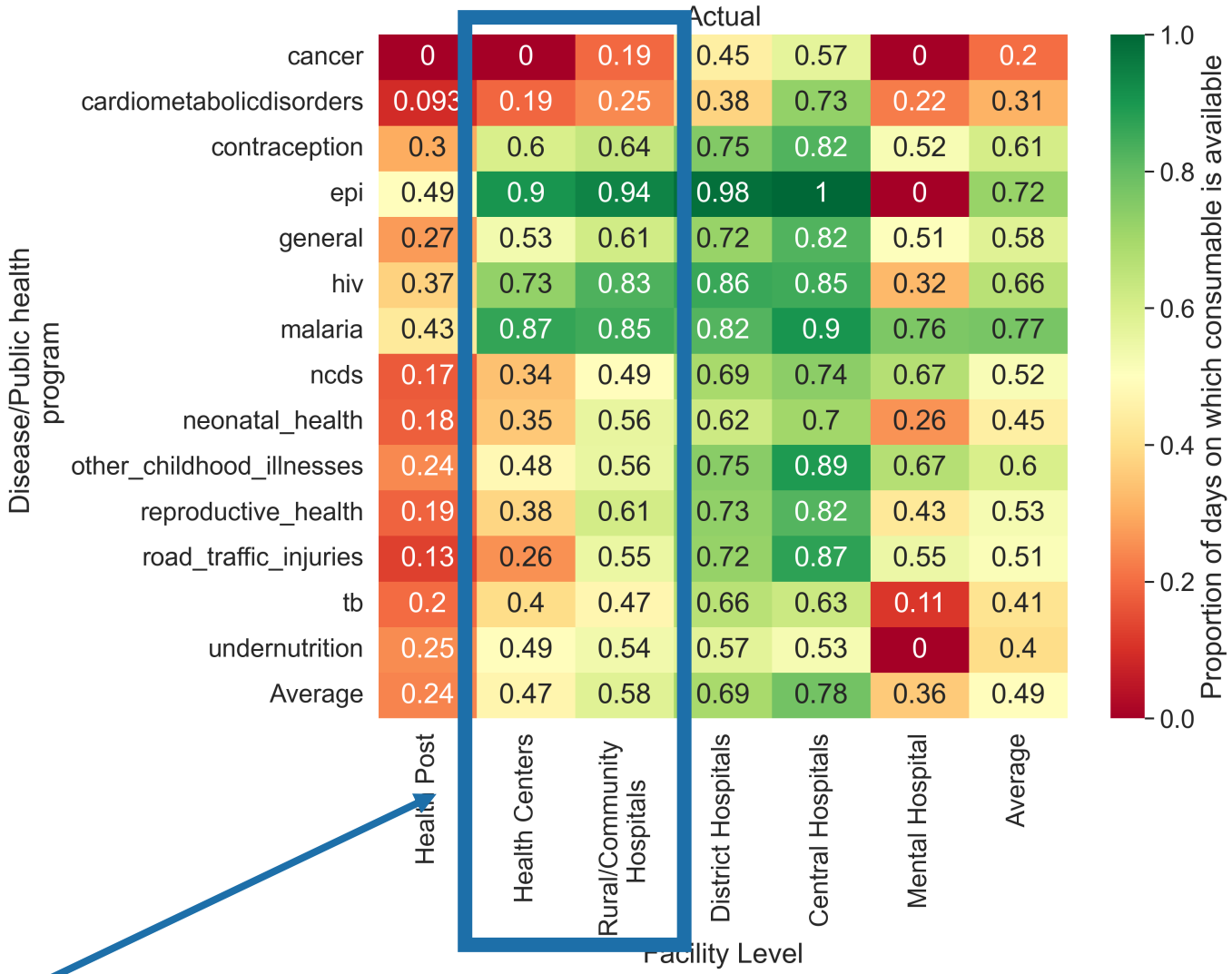
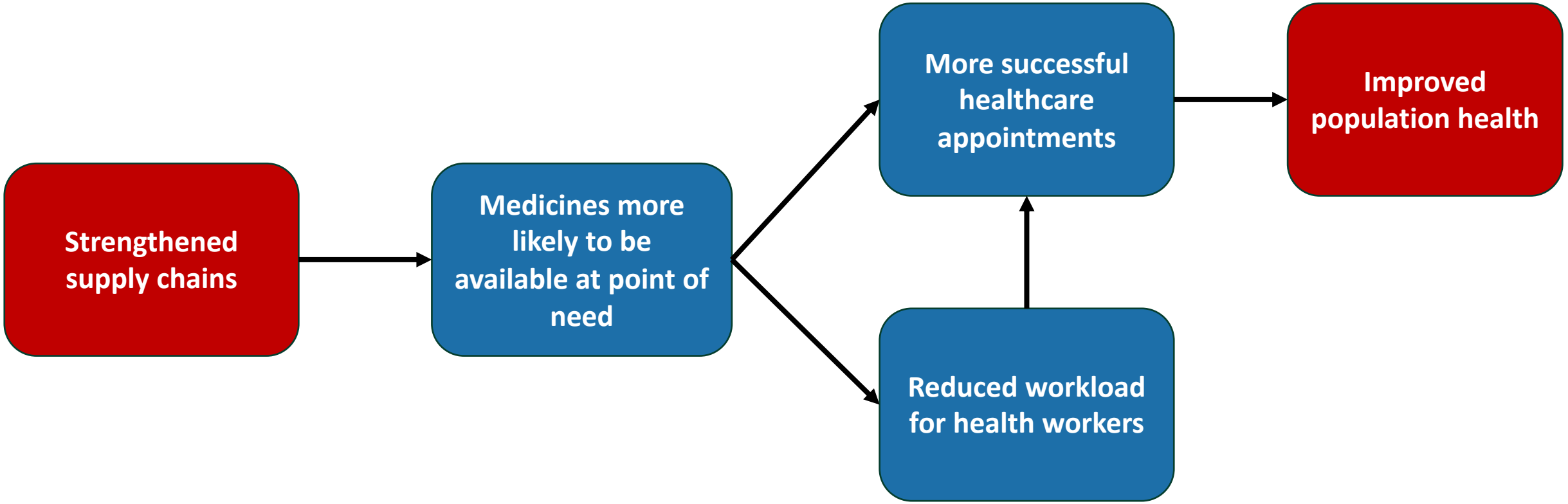


Figure: Average probability of consumables being available by program and Facility level

Data Sources: OpenLMIS 2018, Harmonised Health Facility Assessment 2018/19

Theory of Change



This analysis uses the TLO model to propagate this series of consequences to quantify the health impact of realistic/achievable levels of improvement in the availability of medical consumables at the point of care

Method

- We defined *realistic* alternative scenarios of consumable availability in Malawi based on –
  1. Previous regression analysis on the factors associated with higher consumable availability in Malawi
  2. Benchmark facilities in the country (75^{th}, 90^{th}, 99^{th} percentile)
  3. The performance of parallel supply chains (HIV, EPI)

1. Scenarios based on regression analysis

- Mohan et al (2024) demonstrated that:

1. Drugs had a 79% lower odds of being available than **medical disposables and diagnostics/non-therapeutic supplies** (eg. gloves, syringes, tests)
2. Consumables which were classified as **'Vital'** in the Ministry of Health's *Essential Medicines List* as had 225% higher odds of being available than other consumables
3. Consumable supply being managed by **pharmacists** led to 85% higher odds of consumables being available

1. 'General consumables'

2. 'Vital medicines'

3. 'Pharmacist-managed'

(applied cumulatively)

Source: Mohan et al. Factors associated with consumable stock-outs in Malawi: Evidence from a facility census. Lancet Global Health, 2024. DOI: 10.1016/S2214-109X(24)00095-0

2. Scenarios based on benchmark health facilities

- For each consumable modelled, we found the benchmark facility which represented the n^{th} percentile in terms of the probability of availability of that consumable.

4. Matching consumable availability to that of the facility at the **75^{th} percentile** (corresponding to the same facility level)
5. Matching consumable availability to that of the facility at the **90^{th} percentile** (")
6. Matching consumable availability to that of the **best facility** in the country

4. '75^{th} percentile facility'

5. '90^{th} percentile facility'

6. 'Best facility'

3. Scenarios based on parallel supply chains

- These scenarios will update the availability of consumables to match that of programs with parallel vertically managed HIV/EPI supply chain

7. Matching consumable availability to that of the average availability of consumables in the **HIV program** (corresponding to the same district and facility level)

8. Matching consumable availability to that of the average availability of consumables in the **EPI* program** (corresponding to the same district and facility level)

9. For comparison, we also include a final scenario which assumes 100% availability of all consumables at all facilities

7. 'HIV supply chain'

8. 'EPI supply chain'

9. 'Perfect'

*EPI: Expanded programme on immunization

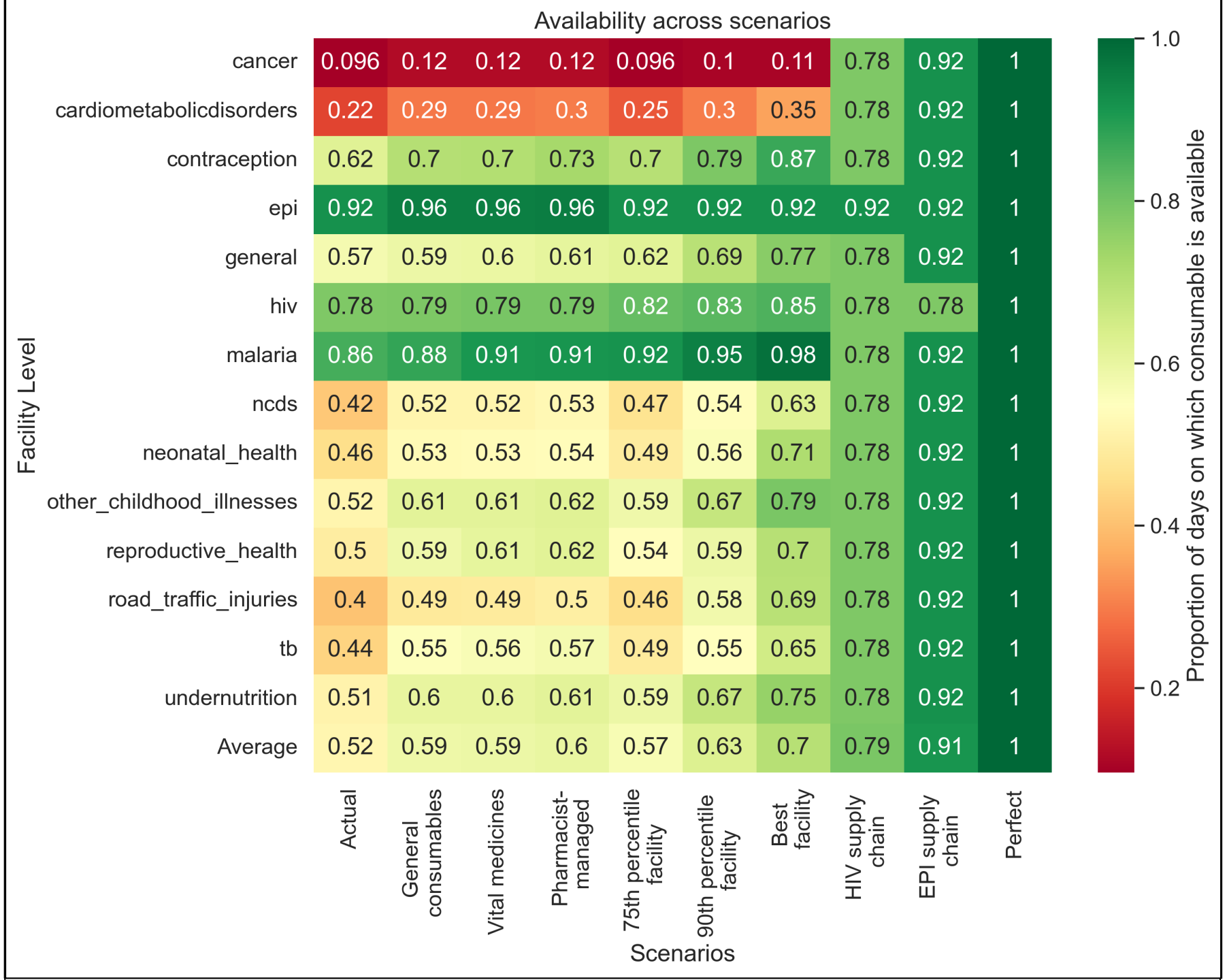
Average consumable availability by program for health centers and rural/community hospitals

Actual Scenario

1. Regression analysis scenarios

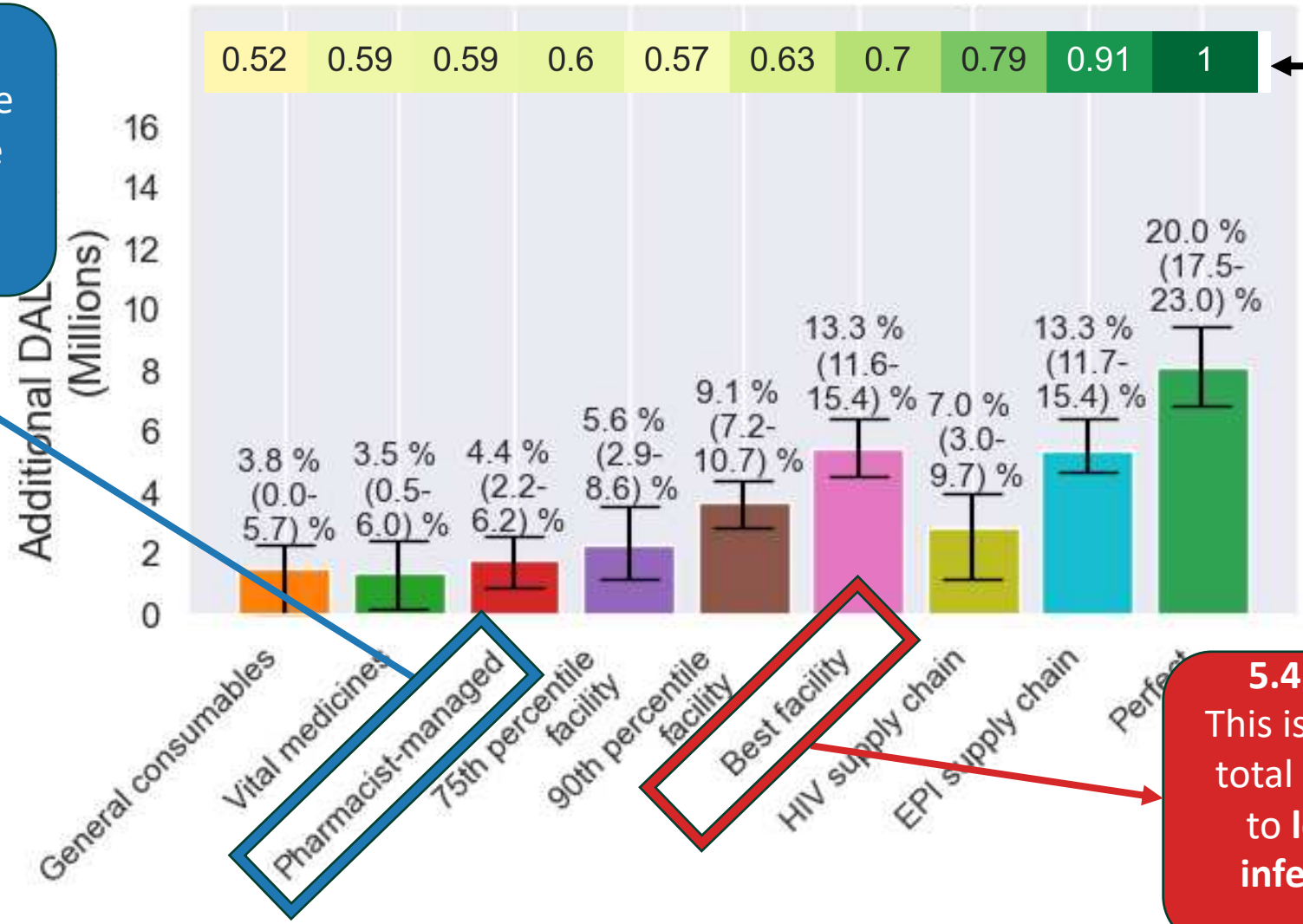
2. Benchmark facility scenarios

3. Parallel supply chain scenarios



Result: Health impact of consumable availability scenarios

Figure: Additional DALYs averted versus 'Actual' scenario (2015-2019)



Average availability of consumables *at health centres and rural/community hospitals*

1.8m DALYs averted
This is comparable to the total DALYs accrued due to **malaria** during the same period

5.4m DALYs averted
This is comparable to the total DALYs accrued due to **lower respiratory infections** during the same period

Result: Monetary value of consumable availability scenarios

$$Net\ monetary\ value_i = \Delta H_i * k - \Delta C_i$$

This gives us the maximum ability to pay to achieve various levels of consumable availability

ΔH_i = Incremental health impact of a scenario
ΔC_i = Incremental cost of a scenario
k = Cost-effectiveness threshold *(assumed to be $61, Ochalek et al (2018))*

The maximum ability of pay for the 'Pharmacist-managed scenario' with an incremental health benefit of 1.8 million DALYs is **USD 109 million**

Summary

- **3.8% - 13.3% DALYs** could have been averted through realistic improvements in consumable availability between 2015 and 2019.
- Given the current health system productivity, Malawi had the ability to pay **$109 million** for modest improvements in consumable availability over 5 years (~3-4% of the total health sector budget during the 5 year period)

Limitations

- We do not model the exact **supply chain interventions** which will allow Malawi to reach various levels of availability under alternative scenarios considered.
- Therefore, we are unable to calculate the incremental cost-effectiveness ratio (ICER) of these interventions.

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The TLO Model

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