

# Visualising malaria intervention prioritisation pathways with uncertainty.

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M3CPI pre-brief

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# Modelling impact and cost

Let's consider a single setting

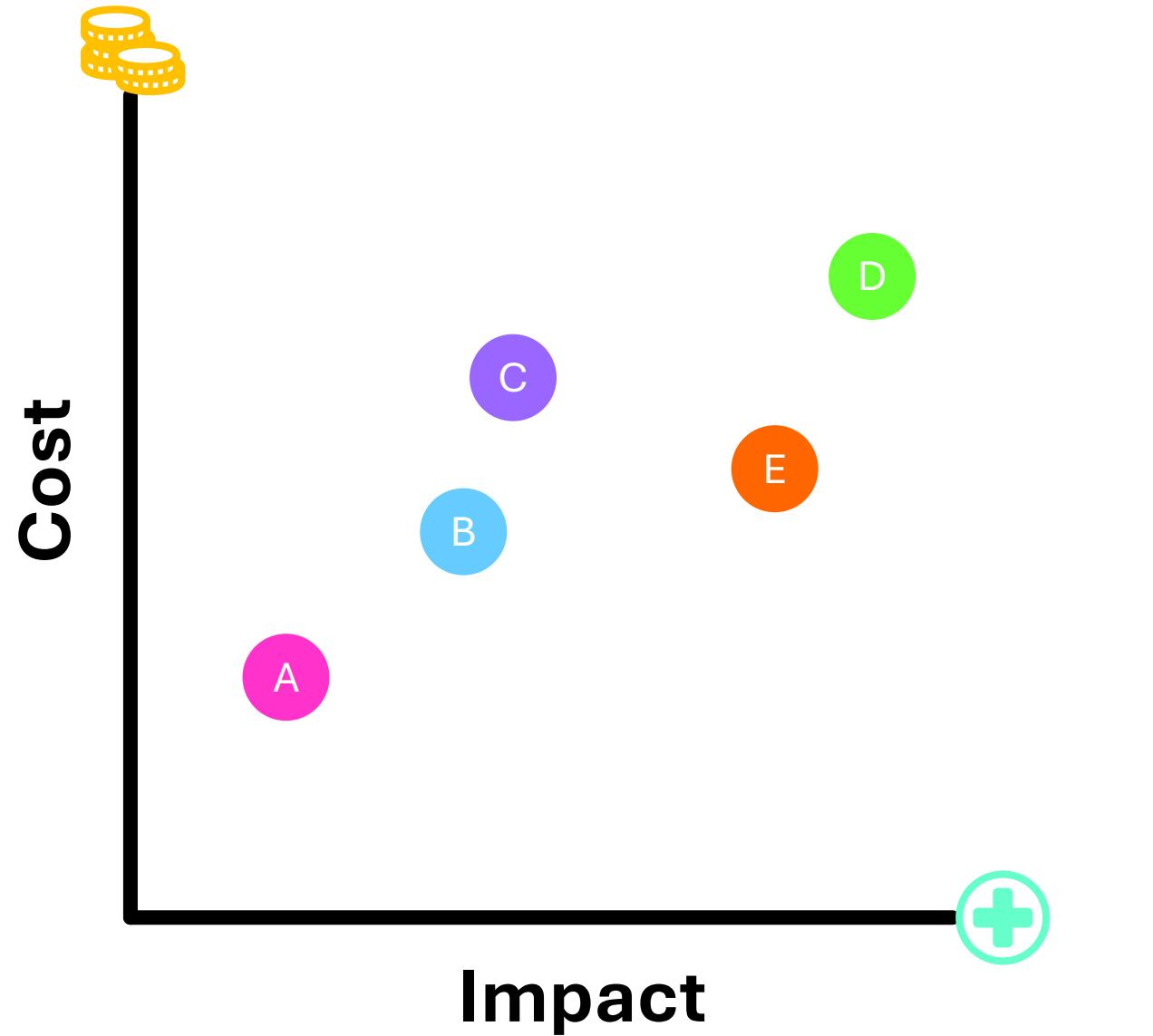
We have 5 different packages of interventions:



For each we can model the:

**Impact**

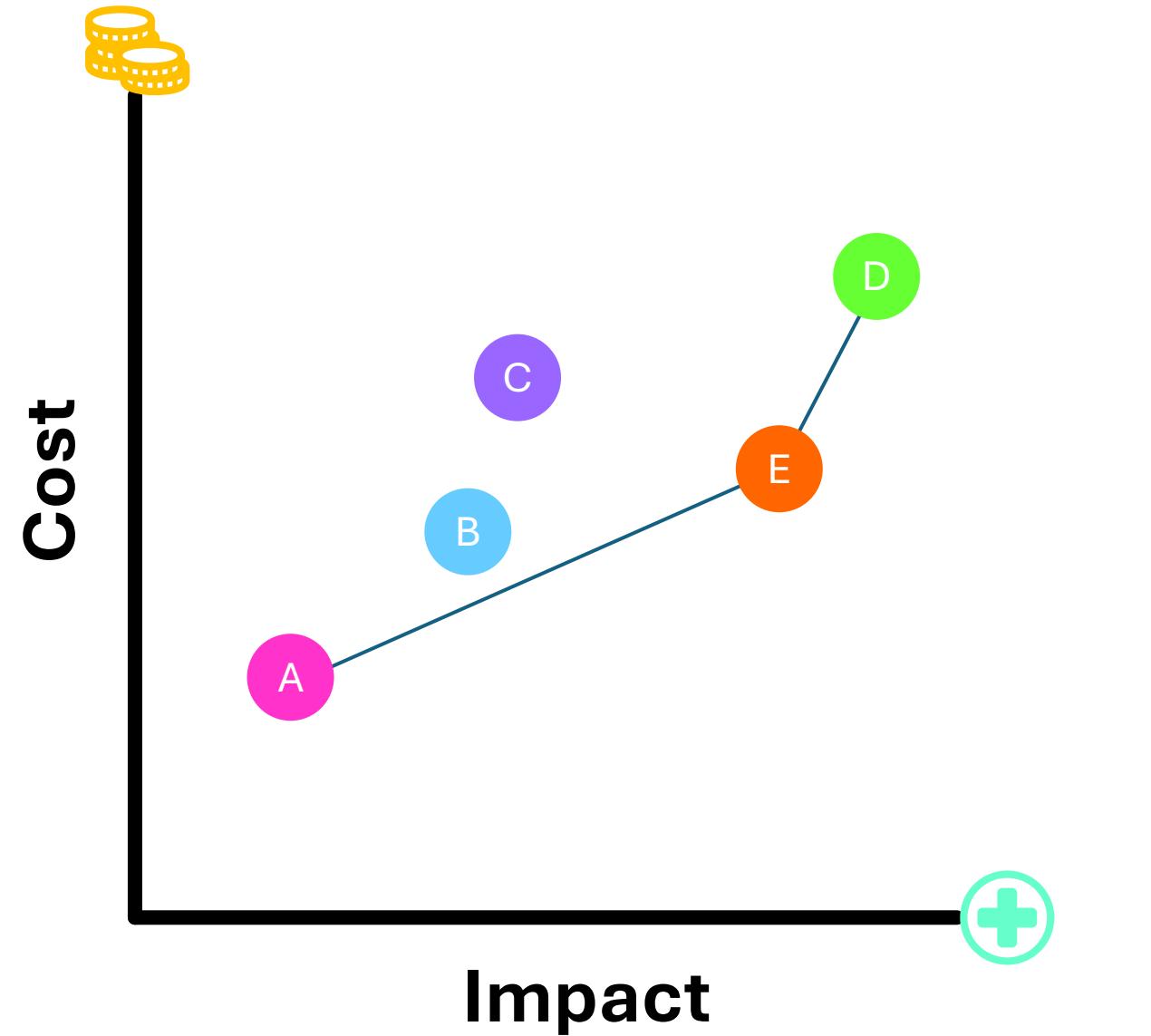
**Cost**



# Modelling impact and cost

We can estimate the cost-effectiveness frontier, asking *for a given spend which package maximises our health impact?*

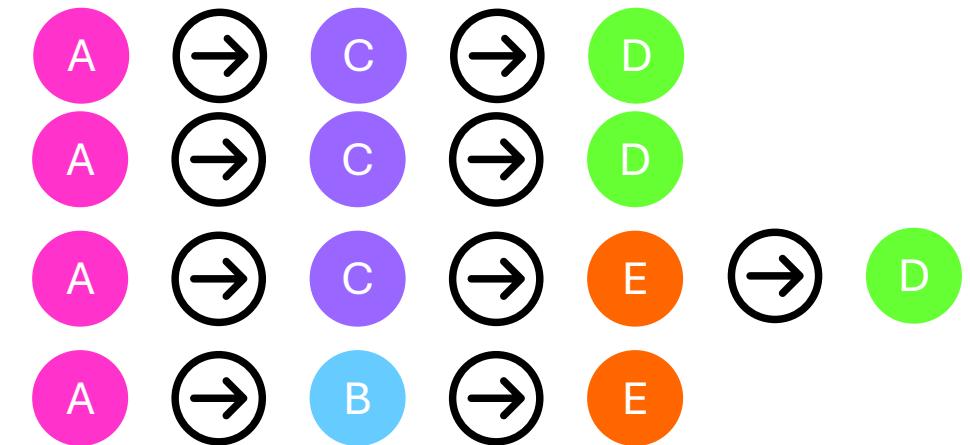
This gives us an answer of how to scale up (or down) interventions as our budget changes:



# Prioritisation pathways with uncertainty

For each setting we obtain many estimates of the most cost-effective prioritisation pathway because:

- **Uncertainty** in inputs, model structure, parameterisation and costs produces multiple plausible outcomes.
- **Each package has a range** of cost and impact estimates, not a single value.
- **Different WTP thresholds** shift which pathways appear optimal.
- **Non-linear intervention effects** mean small changes can lead to different next steps.
- **Current strategies constrain** which transitions are feasible.
- **Contextual differences** (epidemiology, ecology, delivery conditions) drive further variation.

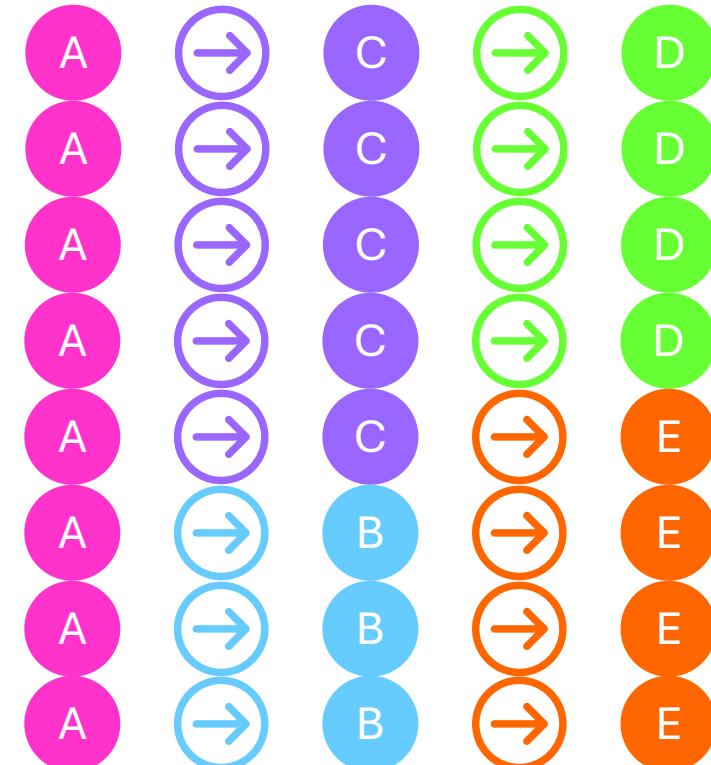


# Combining outputs

We want to summarise cost-effective options whilst being transparent about *uncertainty*.

If we stack up all our options, we can start to get a sense for which options occur and how often.

Let's assume we're prioritising (increasing budget) and our current intervention package is A



# Sankey diagram

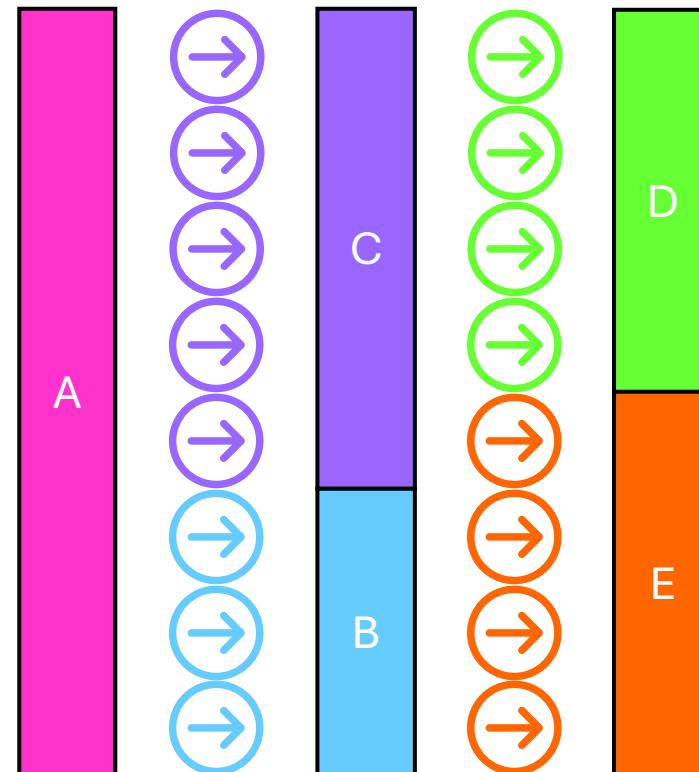
We want to summarise cost-effective options whilst being transparent about *uncertainty*.

We can stack up all of the options and summarise them with a [Sankey Diagram](#).

Bars represent our intervention packages.

- Taller bars indicate that a given intervention package was chosen more often in our outputs

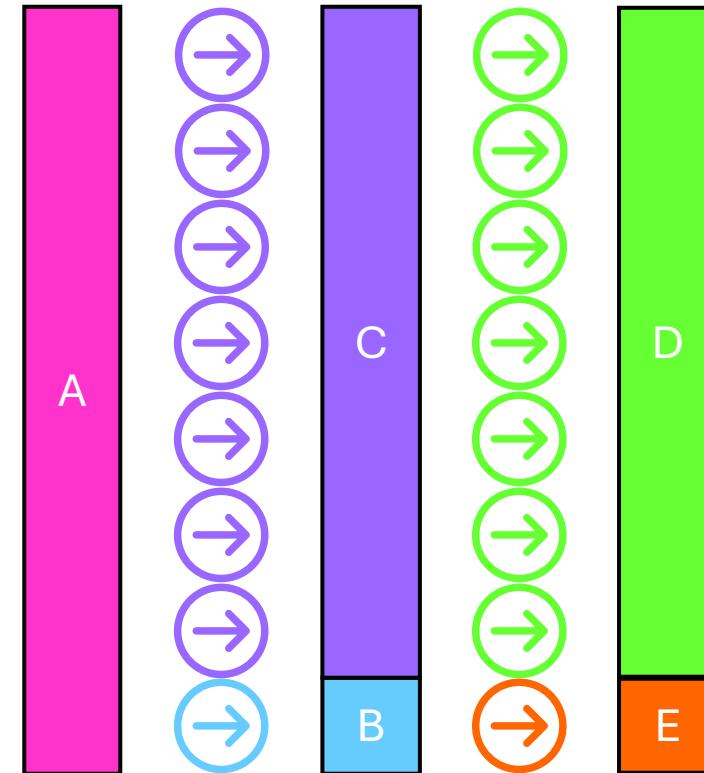
Flows (arrows) represent our next steps.



# Certain findings

For some settings, the conclusion might be **very certain**, showing little variation.

Even when we include many sources of uncertainty, the best decisions are very clear and stable.

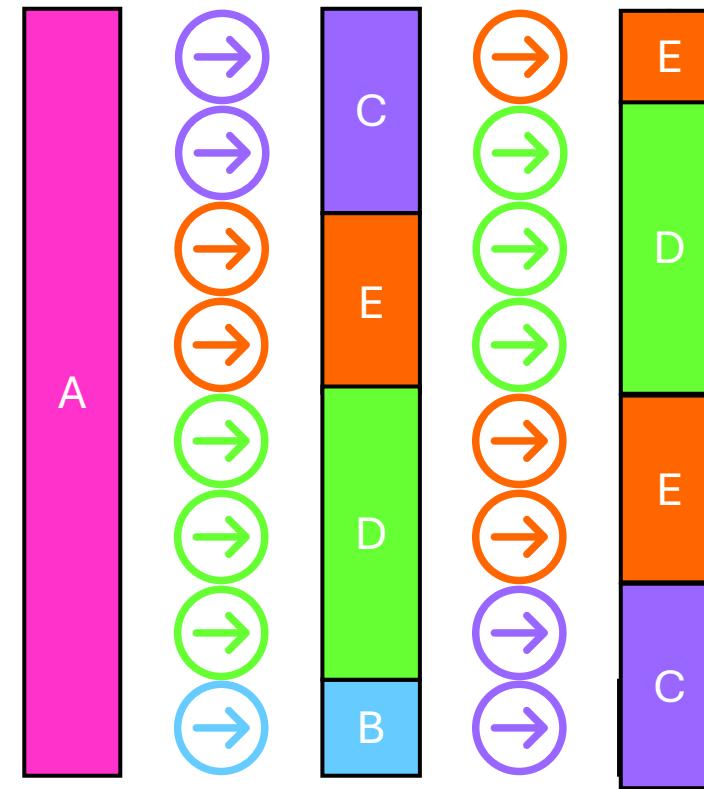
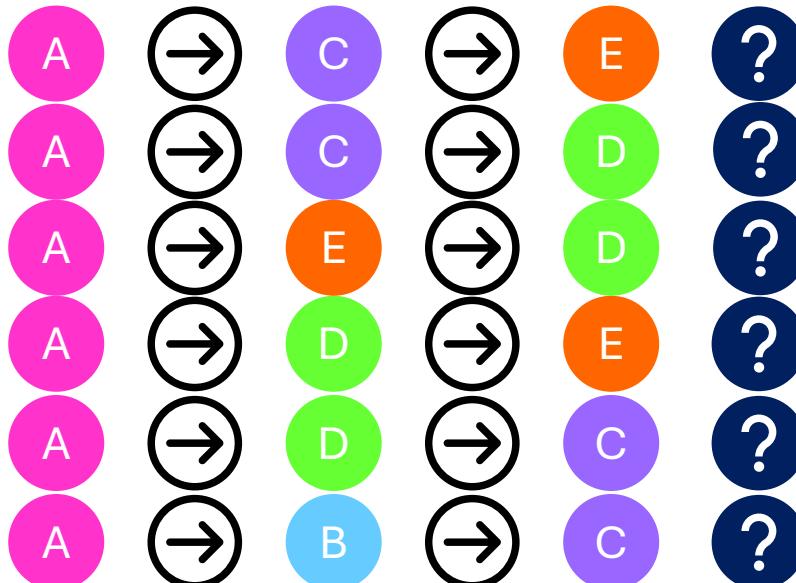


# Uncertain findings

For others, the conclusion might be **very uncertain**.

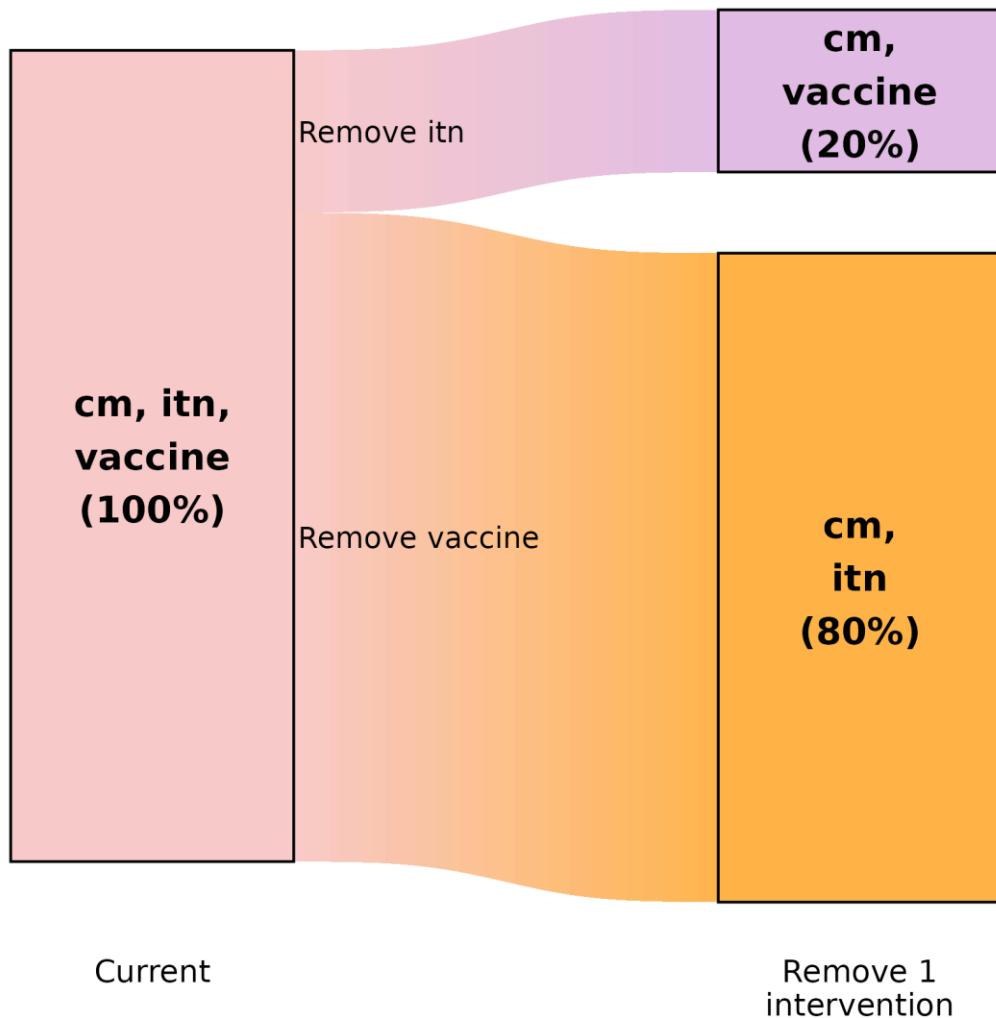
This may indicate that multiple options have similar cost-effectiveness, and additional decision-making layers will be the decisive ones.

It may also highlight gaps in our understanding, the data or differences between the models or modelling approaches.



# Examples of the types of Sankey diagrams we will present: De-prioritisation (scaling down)

# Step 1: Remove 1 intervention



## Current intervention package:

- Case-management, ITNs and vaccine

## Options:

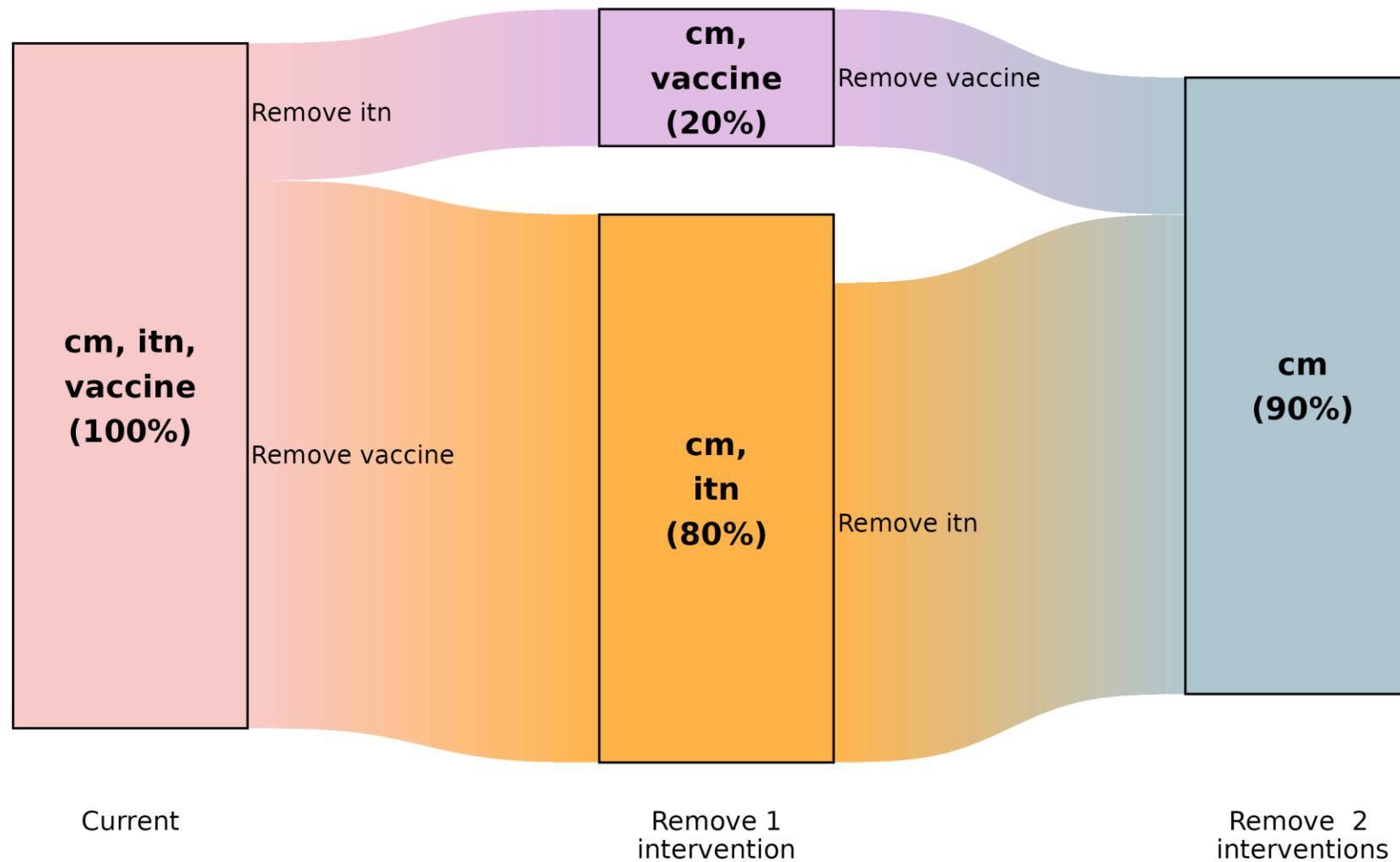
- Remove ITNs
- Remove vaccine

## Result:

- In 80% of pathways, vaccine is removed
- In 20% of pathways ITNs are removed

Illustrative only: not real results

# Step 2: Remove a 2nd intervention



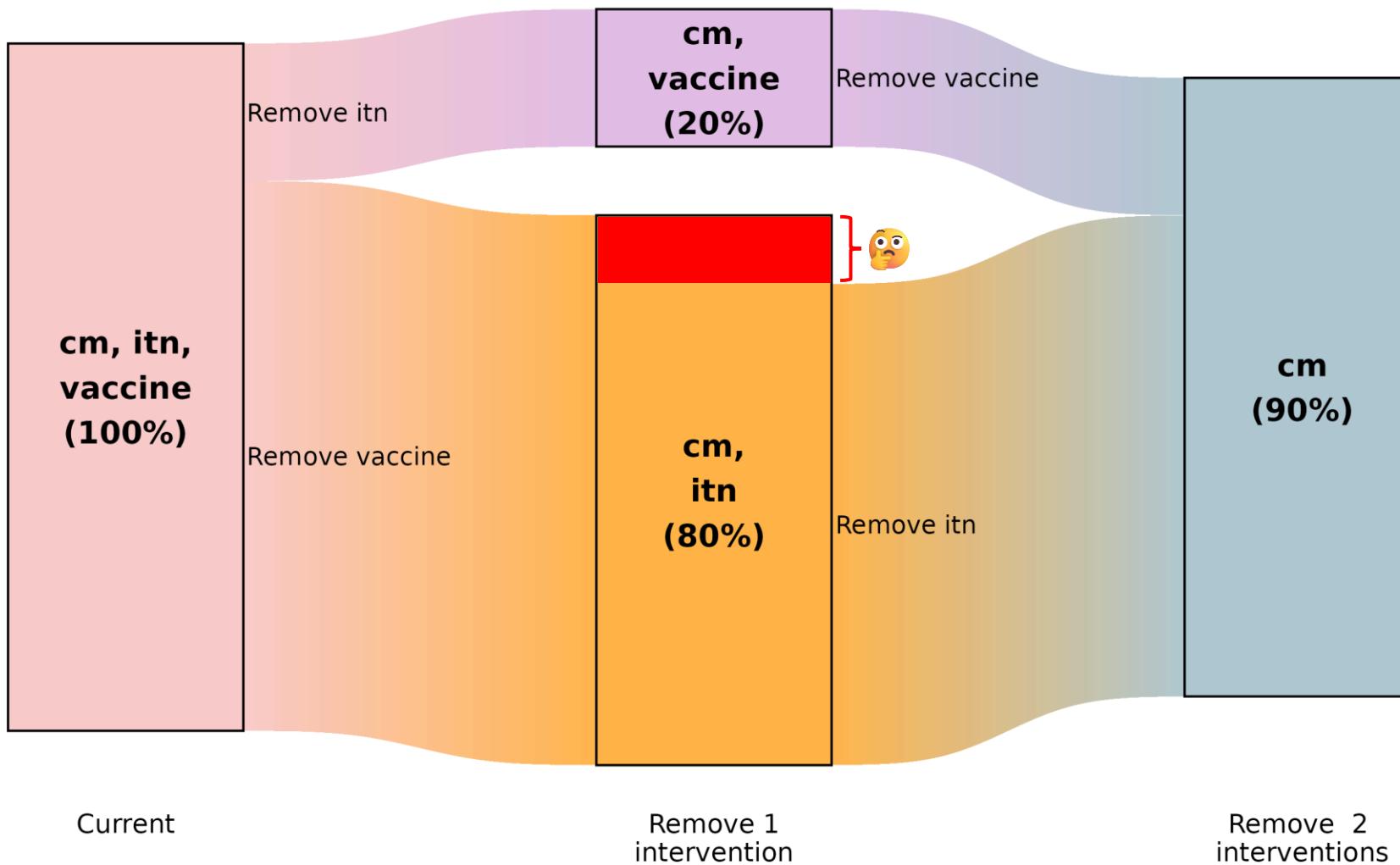
## 2<sup>nd</sup> step options:

- Remove vaccine
- Remove ITNs

## Result:

- 90% of pathways remove vaccine or ITNs, finishing with case management only.

# Step 2: Remove a 2nd intervention



Note that 10% of pathways don't go any further than case management and ITNs.

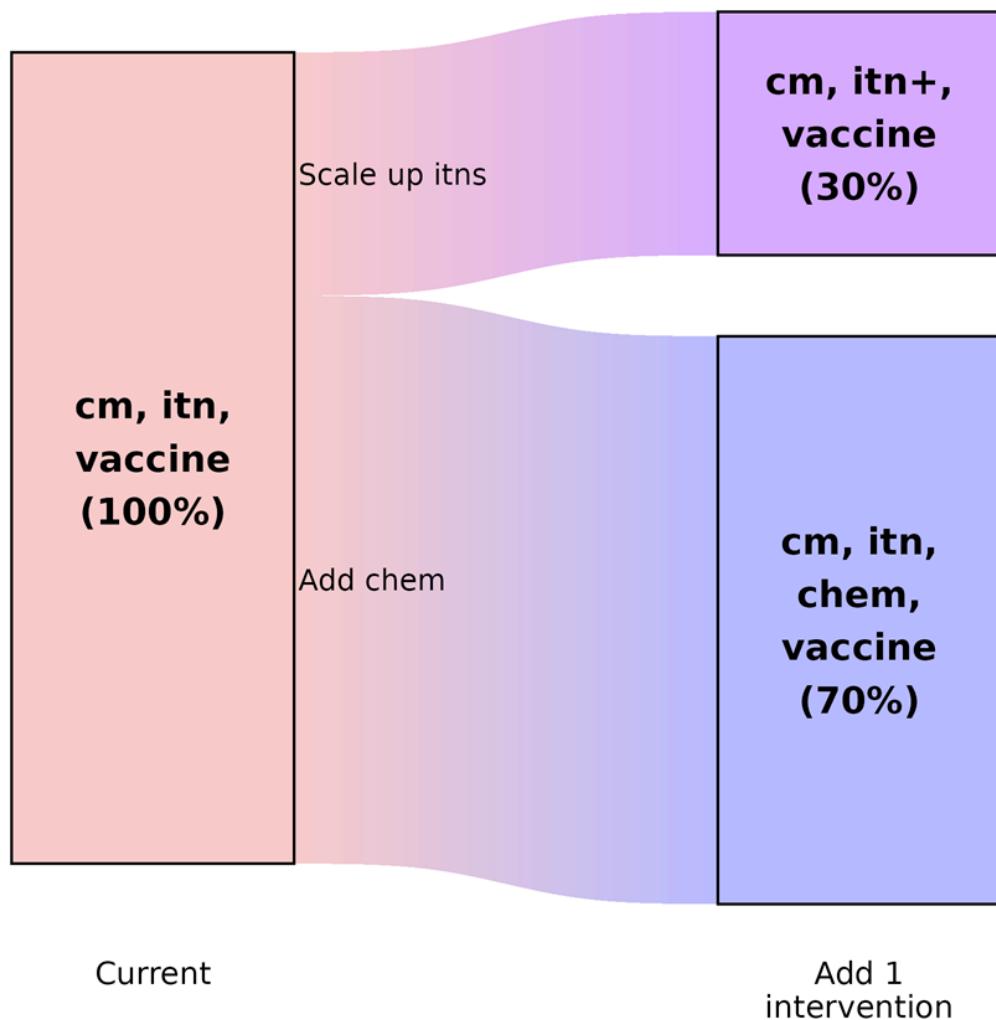
## Why?

For these settings, **removing ITNs would increase total costs**, so the pathway cannot proceed further.

Even though prevention costs fall when ITNs are removed, the resulting rise in case-management costs can more than offset this, making the overall outcome net more expensive.

# Examples of the types of Sankey diagrams we will present: Prioritisation (scaling up)

# Step 1: Add 1 intervention



## Current intervention package:

- Case-management, ITNs and vaccine

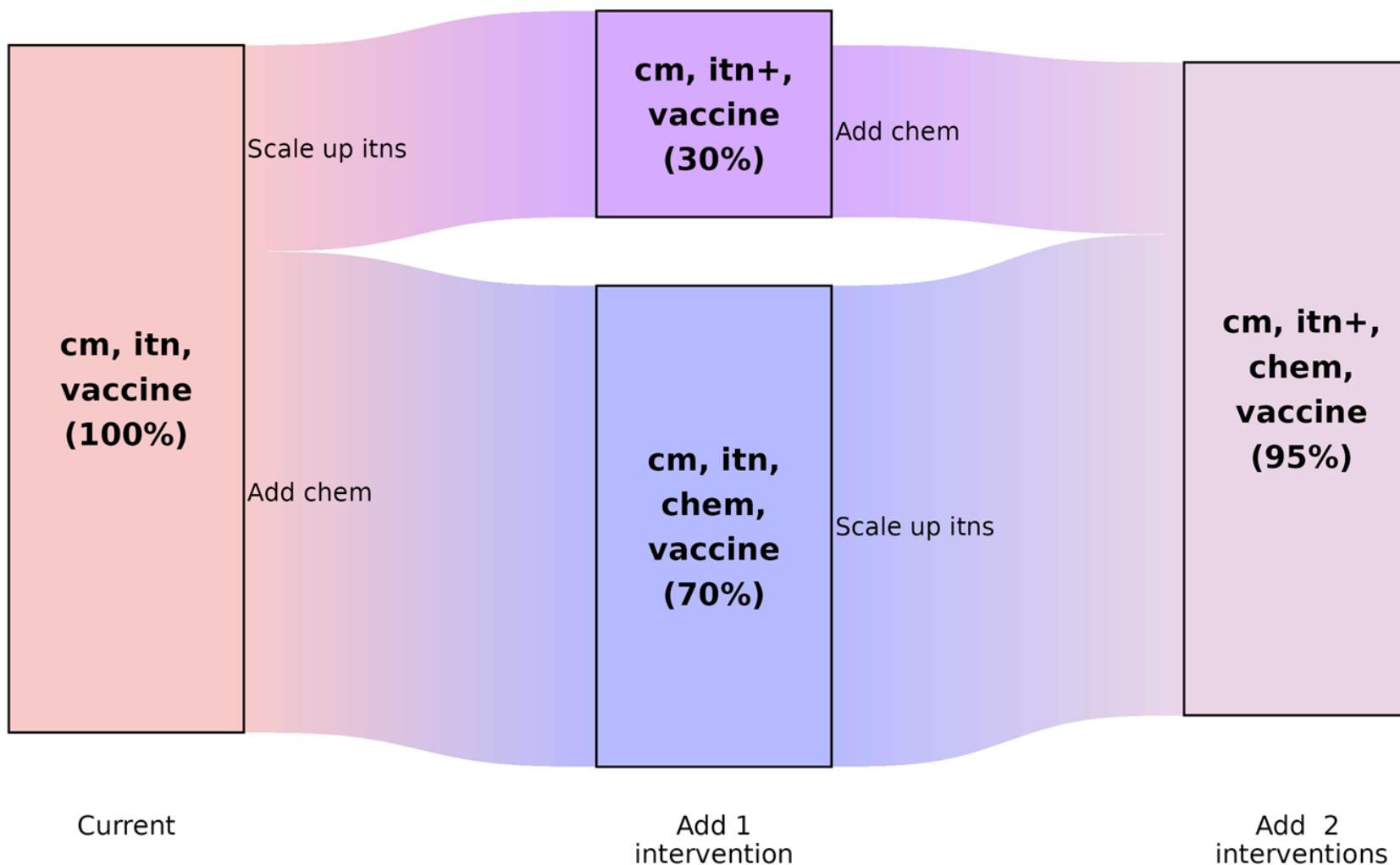
## Options:

- Scale up ITNs
- Add chemoprevention

## Result:

- In 30% of pathways ITNs are scaled up
- In 70% of pathways chemoprevention is introduced

# Step 2: Add a 2nd intervention



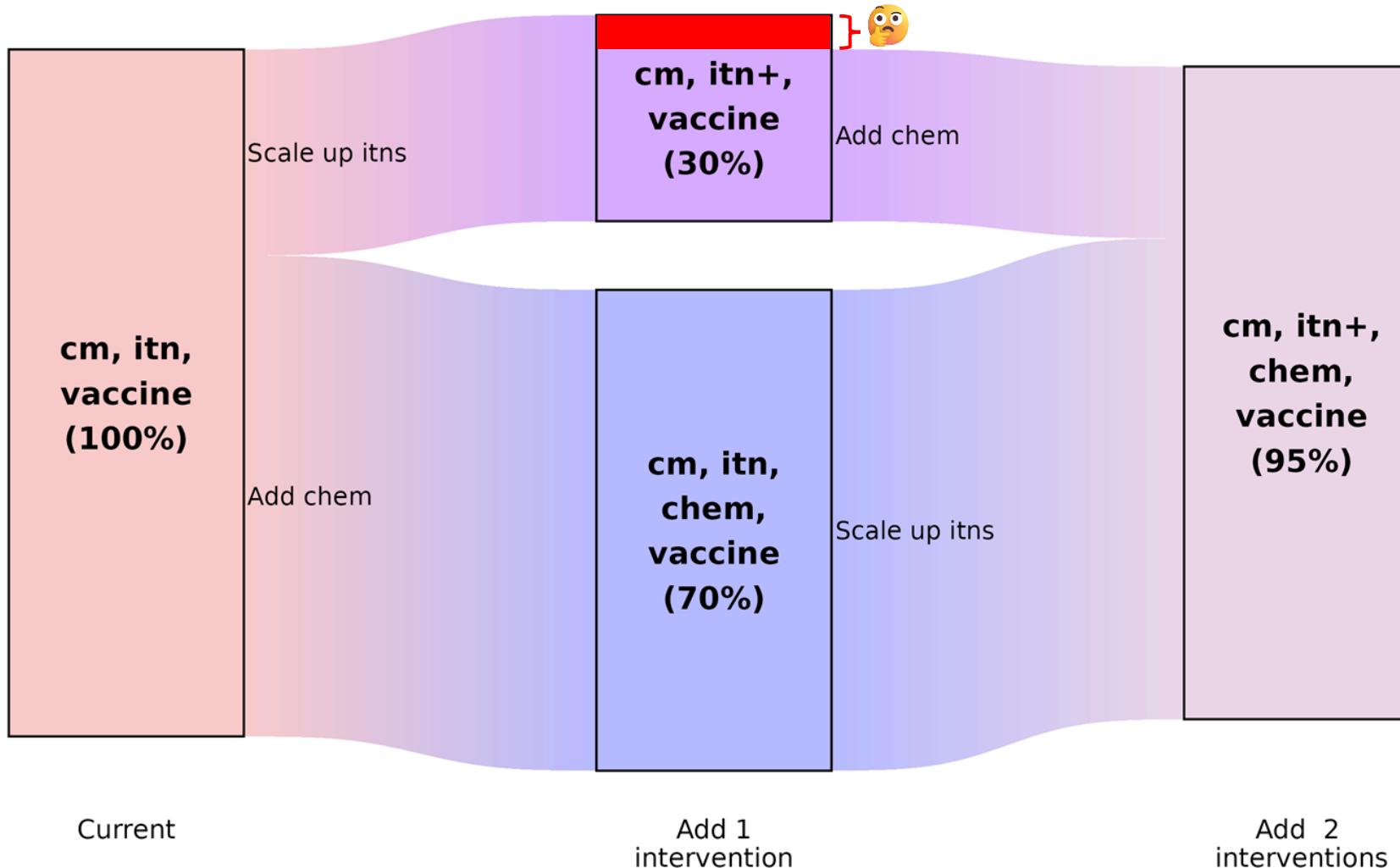
## 2<sup>nd</sup> step options:

- Introduce chemoprevention
- Scale up ITNs

## Result:

- 95% of pathways introduce chemoprevention or scale up ITNs, finishing with case management, ITNs+, chemoprevention and vaccine.

# Step 2: Add a 2nd intervention



Note that 5% of pathways don't go any further than Case management, ITN+ and vaccine.

## Why?

For these settings, adding additional interventions does not increase the modelled impact, or falls under the willingness to pay threshold, so the pathway cannot proceed further.