



The Alliance for
Malaria Prevention

ITN allocation website: A decision-making tool for mass campaign strategies

AMP monthly call

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Tropical Health

23 October 2025



Introduction



The Alliance for
Malaria Prevention

Expanding the ownership and use of mosquito nets

Introduction



ITN Distribution Planning in a Resource-Constrained Context

Thursday 19 June 2025

ITN allocation

- ITN allocation should be aligned to your targets (which may need to change in the context of limited resources)
- If there are not sufficient nets for 1:2, you can adjust the allocation to align with the nets available
- ITN allocation may vary throughout the country – for example:
 - Peri-urban areas – fixed at 2 nets per HH
 - Rural low burden areas – 1 net to 3 people
 - Rural high burden areas – 1 net to 2 people rounding down
- Allocation decisions should be taken within the context of maximizing impact on malaria with available ITNs

How do we quantify an ITN allocation strategy?

$$\text{ITN need} = \frac{\text{Population}}{\text{Quantification factor}}$$

Participants:

**What quantification factor
is most commonly used?**

The origins of 1.8 for universal coverage

Kilian et al. *Malaria Journal* 2010, 9:330
<http://www.malariajournal.com/content/9/1/330>



OPINION

Open Access

How many mosquito nets are needed to achieve universal coverage? Recommendations for the quantification and allocation of long-lasting insecticidal nets for mass campaigns

Albert Kilian^{1*}, Marc Boulay², Hannah Koenker³, Matthew Lynch³

[Link](#)

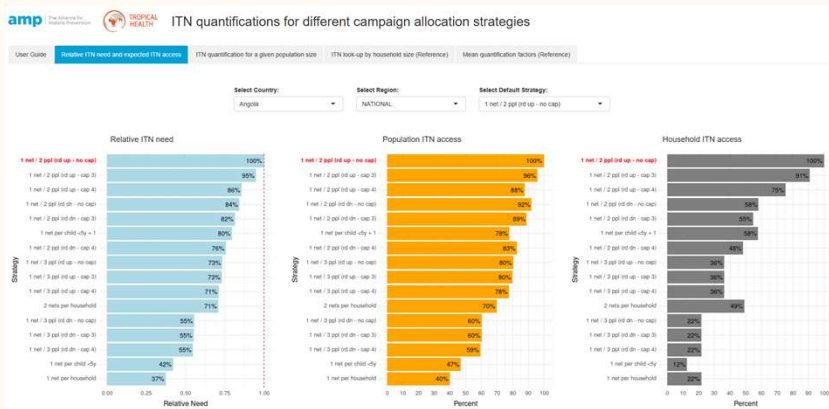
- Based on analysis from 12 DHS and 6 other surveys
- Simulating ITN distribution to households using four allocation strategies, assuming perfect distribution:
 - 1 ITN for 2 people, rounding up
 - 1 ITN for 2 people, rounding down
 - 2 ITNs per household / 3 ITNs per household
- **1 ITN for 2 people, rounding up** was the best strategy for providing at least one ITN for every 2 people in the household
- Had a median **quantification factor of 1.8** (range: 1.6-1.9)
- Authors also discussed bale rounding and logistics considerations and recommended a factor of 1.6 for universal coverage.

What about factors for other allocation strategies?

$$\text{ITN need} = \frac{\text{Population}}{\text{Quantification factor}}$$



ITN allocation website



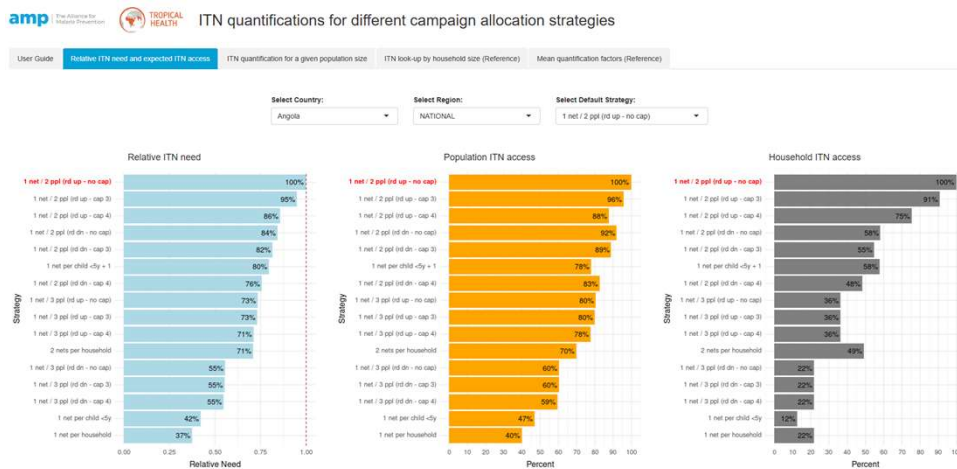
Strategies included

- 1 ITN for 2 people / 1 ITN for 3 people
 - Rounding up / Rounding down
 - No cap / cap at 3 / cap at 4
- Fixed 1 ITN per HH / 2 ITNs per HH
- 1 ITN per HH + 1 ITN per child under five
- 1 ITN per child under five
- 16 strategies in total (including UC)

The ITN allocation website

[Link](#)

ITN allocation website: Overview



Users can...

- Enter population data and quantify ITN need by strategy
- Explore trade-offs between ITNs needed and expected ITN access
- Support choice of ITN allocation strategy
- Work at national and admin-1 (region/province) level

User guide



ITN quantifications for different campaign allocation strategies

[User Guide](#)[Relative ITN need and expected ITN access](#)[ITN quantification for a given population size](#)[ITN look-up by household size \(Reference\)](#)[Mean quantification factors \(Reference\)](#)

Overview

Background to the site

The purpose of this website is to support the strategy design of insecticide-treated net (ITN) mass distribution campaigns.

A key decision in mass campaign planning is the choice of **ITN allocation strategy**.

National malaria programmes and their partners can use this site to assess the trade-offs between number of ITNs needed and expected levels of population ITN access for different allocation strategies. Users can enter population data and generate custom ITN quantifications based on applying different allocation strategies in different areas. Results are available for **national** and **sub-national (admin-1)** levels for malaria-endemic countries in sub-Saharan Africa. Summary quantification factors for each ITN allocation are also presented, so calculations can be repeated offline.

Analyses are based on the latest available national data from [The DHS Program](#). See below for a full list of data sources.

What the site is not

The results on this site do not consider ITN longevity.

Estimates of population ITN access and household ITN access represent levels that can theoretically be reached immediately following campaign distribution, assuming perfect campaign performance.

National malaria programmes should consider a multi-channel approach to ITN distribution, with channel mixes determined based on disease burden, ITN durability and retention data, costs, operational feasibility and other factors to maintain consistent, optimal ITN access for populations in need. Further guidance on channel selection is available on the [AMP website](#).

Instructions

Tab 1: Relative ITN need and expected ITN access

This tab shows how the **relative number of ITNs required** and the **expected levels of ITN access** vary under different allocation strategies.

Users can:

- Select a **country** and an admin-1 **region** (set the region to "NATIONAL" for national-level outputs).
- Choose a **default allocation strategy**. All results are shown relative to this choice.
- Review three outputs side by side:
 - **Relative ITN need** (the ITN quantification (number of nets required) compared to default strategy).
 - **Population-level ITN access** (percentage of people with access to an ITN, assuming one ITN covers two people).
 - **Household-level ITN access** (percentage of households with one ITN per two people).

Tab 2: ITN quantification for a given population size

This tab allows users to quantify absolute ITN need for a specified population under different allocation strategies.



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Expanding the ownership and use of mosquito nets

Tab 1: Relative ITN need and ITN access by strategy

Select Country:

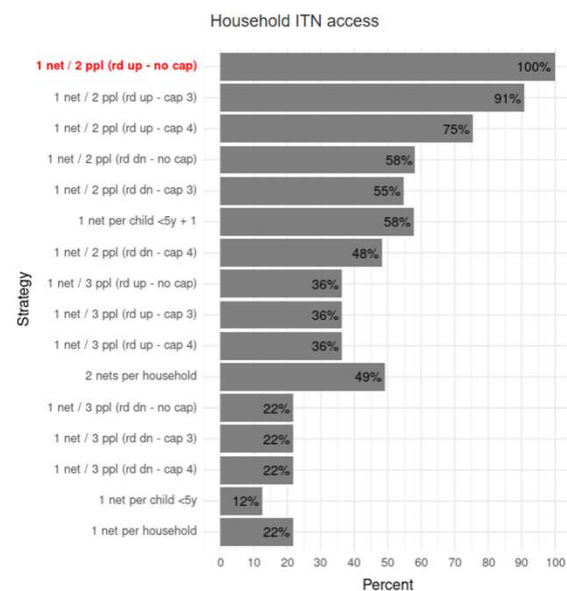
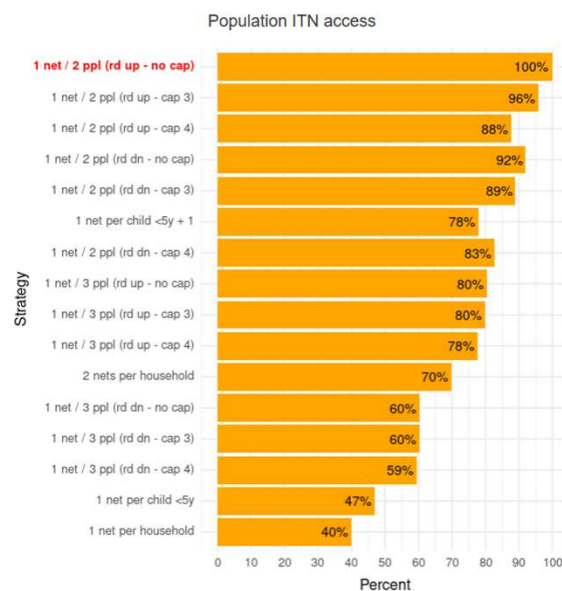
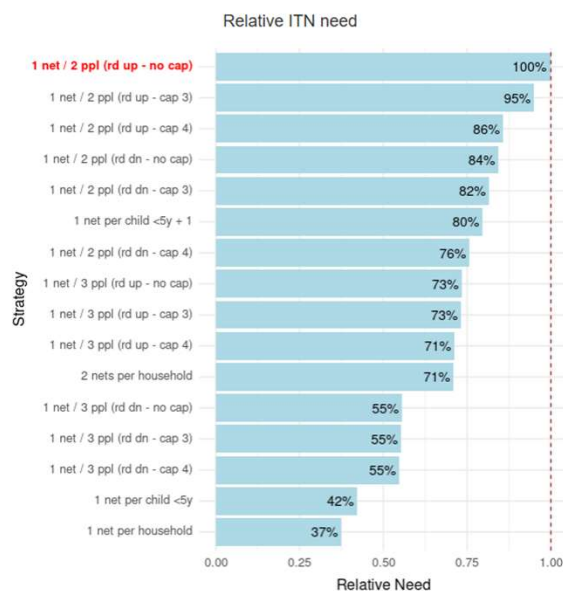
Angola

Select Region:

NATIONAL

Select Default Strategy:

1 net / 2 ppl (rd up - no cap)



Relative ITN need (relative to the selected strategy)

Select Country:

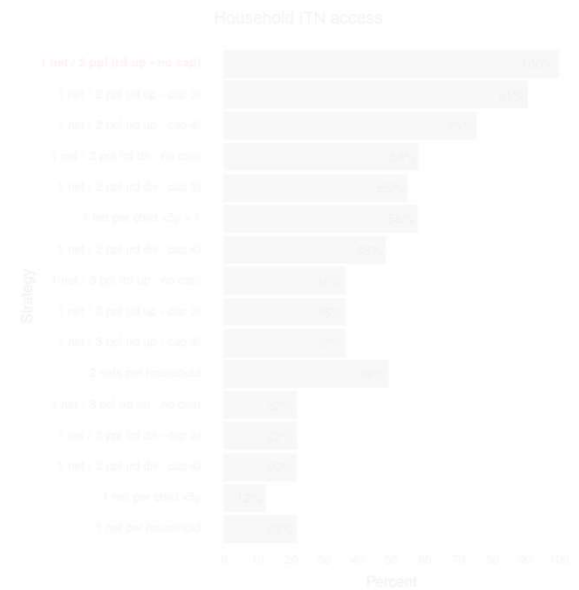
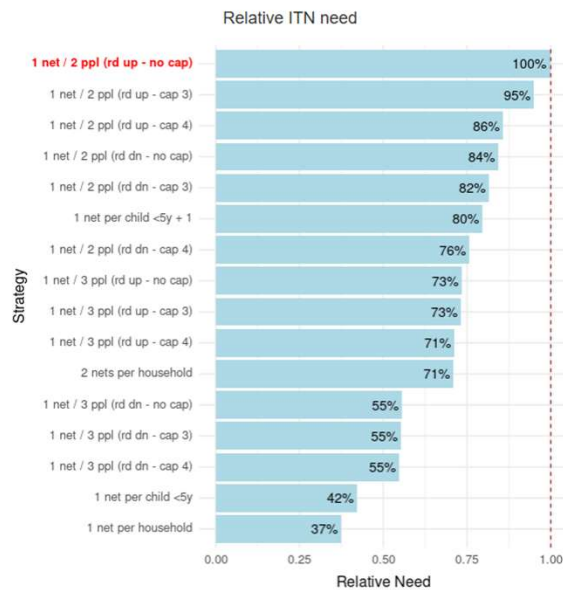
Angola

Select Region:

NATIONAL

Select Default Strategy:

1 net / 2 ppl (rd up - no cap)



Population ITN access



ITN quantifications for different campaign allocation strategies

User Guide

Relative ITN need and expected ITN access

ITN quantification for a given population size

ITN look-up by household size (Reference)

Mean quantification factors (Reference)

Select Country:

Angola

Select Region:

NATIONAL

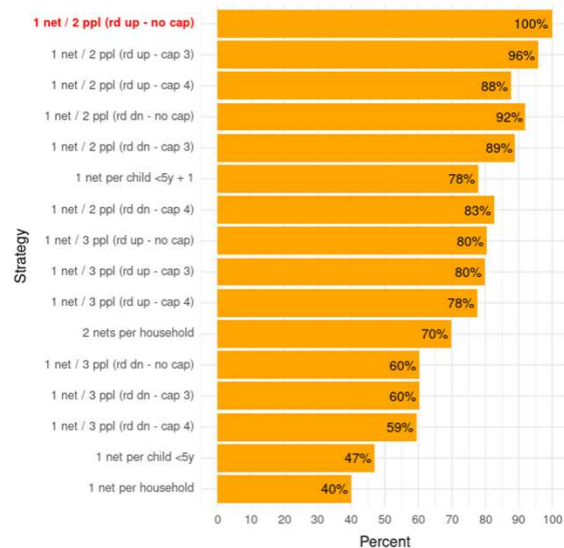
Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

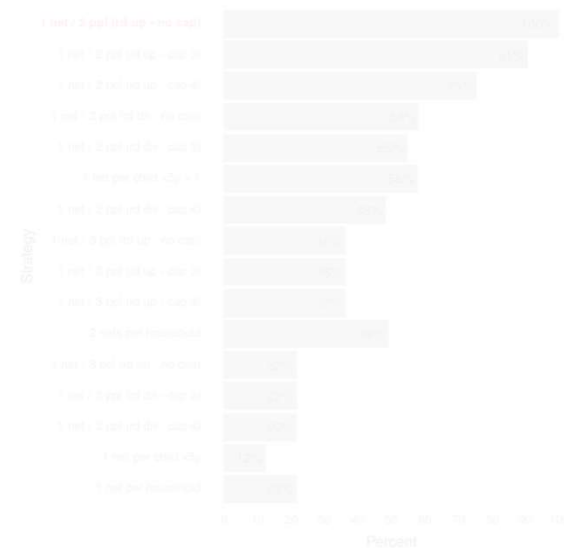
Relative ITN need



Population ITN access



Household ITN access



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Household ITN access (for historic comparisons)

Select Country:

Angola

Select Region:

NATIONAL

Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

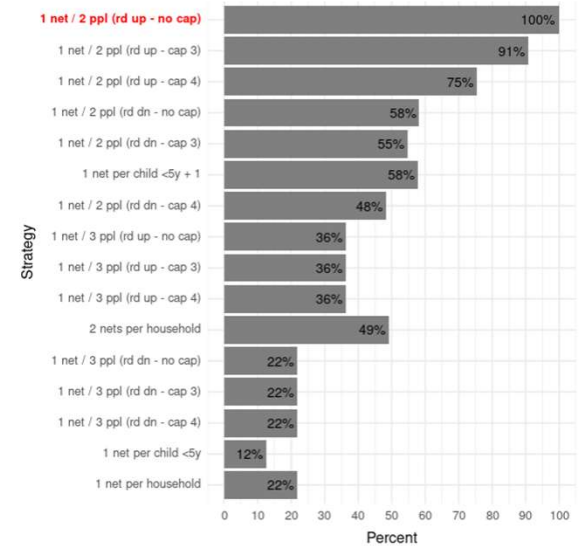
Relative ITN need



Population ITN access



Household ITN access



Tab 2: ITN quantification for user-entered populations

User Guide

Relative ITN need and expected ITN access

ITN quantification for a given population size

ITN look-up by household size (Reference)

Mean quantification factors (Reference)

Select Country:

Angola

Select Region:

NATIONAL

Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

Enter Total Population:

1000000

Write selected output to table

Download as Excel

Clear table entries

Absolute ITN quantification for user-specified population

Strategy	Quantifier	ITN need
1 net / 2 ppl (rd up - no cap)	1.80	555,000
1 net / 2 ppl (rd up - cap 3)	1.90	527,000
1 net / 2 ppl (rd up - cap 4)	2.10	476,000
1 net / 2 ppl (rd dn - no cap)	2.14	468,000
1 net / 2 ppl (rd dn - cap 3)	2.21	452,000
1 net per child <5y + 1	2.26	442,000
1 net / 2 ppl (rd dn - cap 4)	2.38	420,000
1 net / 3 ppl (rd up - no cap)	2.46	407,000
1 net / 3 ppl (rd up - cap 3)	2.47	405,000
1 net / 3 ppl (rd up - cap 4)	2.54	394,000
2 nets per household	2.55	393,000
1 net / 3 ppl (rd dn - no cap)	3.25	307,000
1 net / 3 ppl (rd dn - cap 3)	3.26	307,000
1 net / 3 ppl (rd dn - cap 4)	3.30	303,000
1 net per child <5y	4.27	234,000
1 net per household	4.82	208,000

Saved Entries

Country	Region	Strategy	Population	ITNs	Access (%)
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Tab 2: ITN quantification for user-entered populations

User Guide

Relative ITN need and expected ITN access

ITN quantification for a given population size

ITN look-up by household size (Reference)

Mean quantification factors (Reference)

Select Country:

Ghana

Select Region:

Western

Select Default Strategy:

1 net / 2 ppl (rd up - cap 3)

Enter Total Population:

2000000

Write selected output to table

Download as Excel

Clear table entries

Save default strategy output

Saves the current default strategy output for the selected country and region. You may need to scroll down to see the preview table, below.

Absolute ITN quantification for user-specified population

Strategy	Quantifier	ITN need
1 net / 2 ppl (rd up - cap 3)	1.68	1,192,000
1 net / 2 ppl (rd up - no cap)	1.66	1,203,000
1 net / 2 ppl (rd up - cap 4)	1.75	1,142,000
2 nets per household	1.82	1,099,000
1 net / 2 ppl (rd dn - no cap)	2.00	999,000
1 net / 2 ppl (rd dn - cap 3)	2.01	994,000
1 net / 2 ppl (rd dn - cap 4)	2.06	972,000
1 net per child <5y + 1	2.07	965,000
1 net / 3 ppl (rd up - no cap)	2.13	940,000
1 net / 3 ppl (rd up - cap 3)	2.13	940,000
1 net / 3 ppl (rd up - cap 4)	2.14	935,000
1 net / 3 ppl (rd dn - no cap)	2.68	747,000
1 net / 3 ppl (rd dn - cap 3)	2.68	747,000
1 net / 3 ppl (rd dn - cap 4)	2.68	747,000
1 net per household	3.08	650,000
1 net per child <5y	6.35	315,000

Saved Entries

Country	Region	Strategy	Population	ITNs	Access (%)
Ghana	Central	1 net / 2 ppl (rd up - no cap)	1,000,000	581,000	100%
Ghana	Volta	1 net / 3 ppl (rd up - no cap)	1,000,000	455,000	84%
Ghana	Western	1 net / 2 ppl (rd up - cap 3)	2,000,000	1,192,000	99%

Tab 3: ITN look-up chart

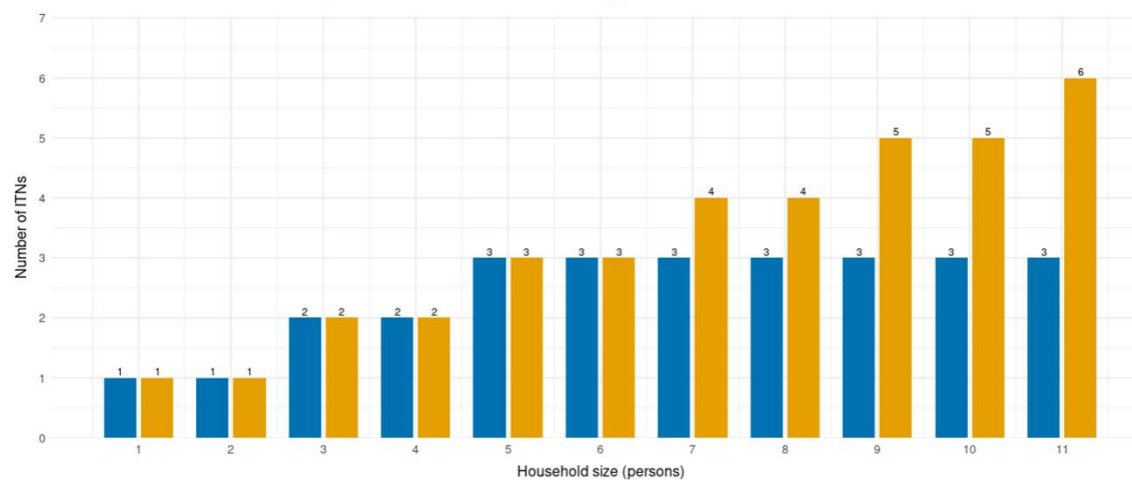
Select Strategy:

1 net / 2 ppl (round up - cap 3)

ITNs needed for different household sizes, by allocation strategy

1 net / 2 ppl (round up - cap 3)

■ ITNs allocated to household under strategy ■ ITNs required for full coverage in household



Tab 4: Quantification factors

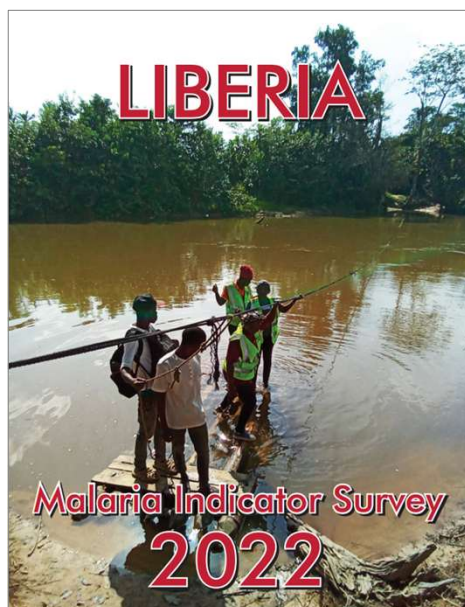
Population quantifiers (mean values from 32 national surveys)

Allocation Strategy	Quantifier (mean)
1 net / 2 ppl (round up - no cap)	1.80
1 net / 2 ppl (round down - no cap)	2.13
1 net / 3 ppl (round up - no cap)	2.46
1 net / 3 ppl (round down - no cap)	3.23
1 net / 2 ppl (round up - cap 4)	2.22
1 net / 2 ppl (round down - cap 4)	2.51
1 net / 2 ppl (round up - cap 3)	2.66
1 net / 2 ppl (round down - cap 3)	3.41
1 net / 3 ppl (round up - cap 4)	1.99
1 net / 3 ppl (round down - cap 4)	2.31
1 net / 3 ppl (round up - cap 3)	2.54
1 net / 3 ppl (round down - cap 3)	3.31
1 net per household	5.16
2 nets per household	2.71
1 net per child <5y	5.42
1 net per child <5y + 1 net	2.58

Use case 1: Macroplanning

Use case 1: Liberia macroplanning

Consider the six regions used in the MIS 2022 report



And rough population estimates informed by the 2022 census

Region	Population (est)
Greater Monrovia	1,800,000
North Central	1,500,000
North Western	410,000
South Central	760,000
South Eastern A	460,000
South Eastern B	410,000

NOTE: This example has been developed for the ITN allocation website webinar. The population figures and allocation strategies do not represent programme plans.

Use case 1: Liberia macroplanning

User Guide

Relative ITN need and expected ITN access

ITN quantification for a given population size

ITN look-up by household size (Reference)

Mean quantification factors (Reference)

Select Country:

Liberia

Select Region:

South Eastern B

Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

Enter Total Population:

410000

Write selected output to table

Download as Excel

Clear table entries

Download results

Allows you to download the table below as an Excel file.

Absolute ITN quantification for user-specified population

Strategy	Quantifier	ITN need
1 net / 2 ppl (rd up - no cap)	1.81	226,000
1 net / 2 ppl (rd up - cap 4)	1.93	212,000
1 net / 2 ppl (rd up - cap 3)	2.14	191,000
1 net / 2 ppl (rd dn - no cap)	2.16	189,000
1 net / 2 ppl (rd dn - cap 4)	2.28	180,000
1 net / 2 ppl (rd dn - cap 3)	2.45	167,000
1 net / 3 ppl (rd up - no cap)	2.49	164,000
1 net / 3 ppl (rd up - cap 4)	2.53	162,000
1 net / 3 ppl (rd up - cap 3)	2.61	157,000
2 nets per household	2.66	154,000
1 net per child <5y + 1	2.69	152,000
1 net / 3 ppl (rd dn - no cap)	3.36	122,000
1 net / 3 ppl (rd dn - cap 4)	3.39	121,000
1 net / 3 ppl (rd dn - cap 3)	3.46	119,000
1 net per household	5.15	80,000
1 net per child <5y	5.65	73,000

Saved Entries

Country	Region	Strategy	Population	ITNs	Access (%)
Liberia	Greater Monrovia	1 net per household	1,800,000	384,000	42%
Liberia	North Central	1 net / 2 ppl (rd up - cap 3)	1,500,000	658,000	81%
Liberia	North Western	1 net / 2 ppl (rd up - no cap)	410,000	229,000	100%
Liberia	South Central	1 net / 2 ppl (rd up - cap 3)	760,000	358,000	87%
Liberia	South Eastern A	1 net / 2 ppl (rd up - no cap)	460,000	255,000	100%
Liberia	South Eastern B	1 net / 2 ppl (rd up - no cap)	410,000	226,000	100%

Use case 2: Addressing ITN gaps after microplaning

Use case 2: Addressing ITN gaps after microplanning

Consider some regions included in Cameroon's 2025-2026 mass campaign.

Initial allocation strategy: 1 ITN for every 2 people, rounding up, no cap

Region	ITNs available	ITNs required based on microplan	Gap	Percentage of ITN need met
Ouest (West)	1,240,500	1,351,767	111,267	91.8%
Sud (South)	492,077	576,075	83,998	85.4%
Est (East)	665,026	937,617	272,591	70.9%

NOTE: This example has been developed for the ITN allocation website webinar.
The figures and allocation strategies do not represent programme plans.

Ouest (West)

1,240,500

1,351,767

111,267

91.8%

Select Country:

Cameroon

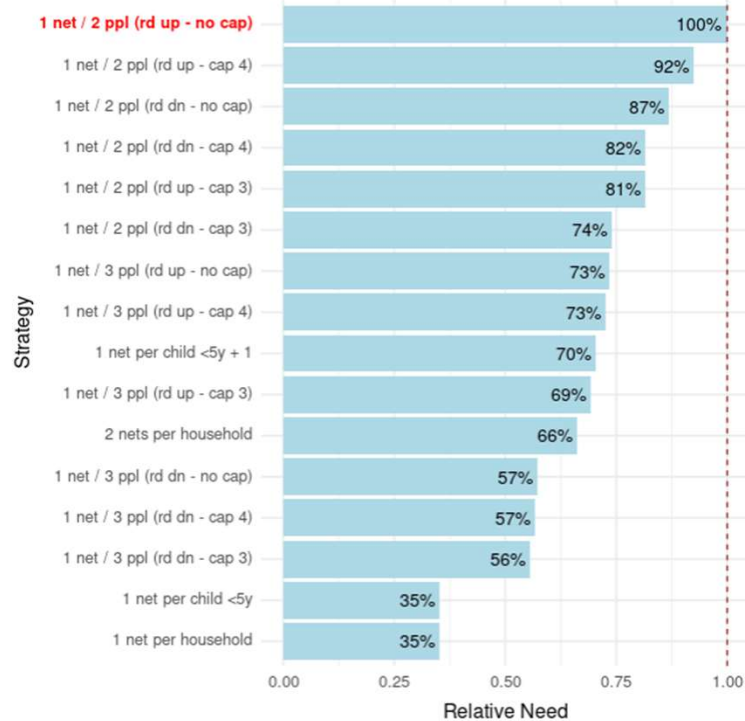
Select Region:

West

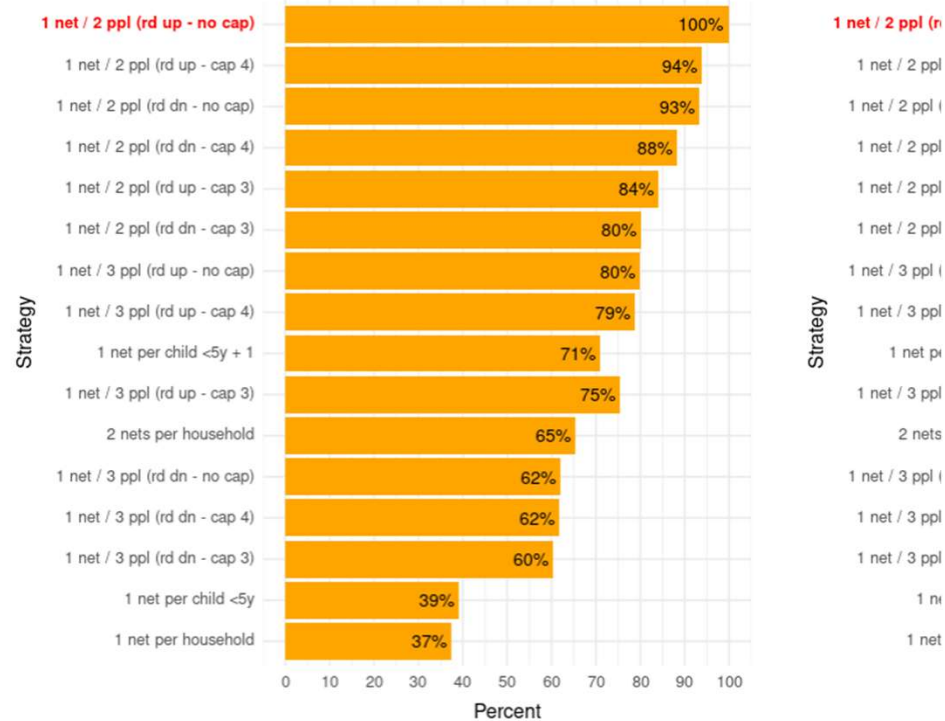
Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

Relative ITN need



Population ITN access



Ouest (West)

1,240,500

1,351,767

111,267

91.8%

Strategy: 1 ITN for every 2 people, rounding up (cap at 4 ITNs)

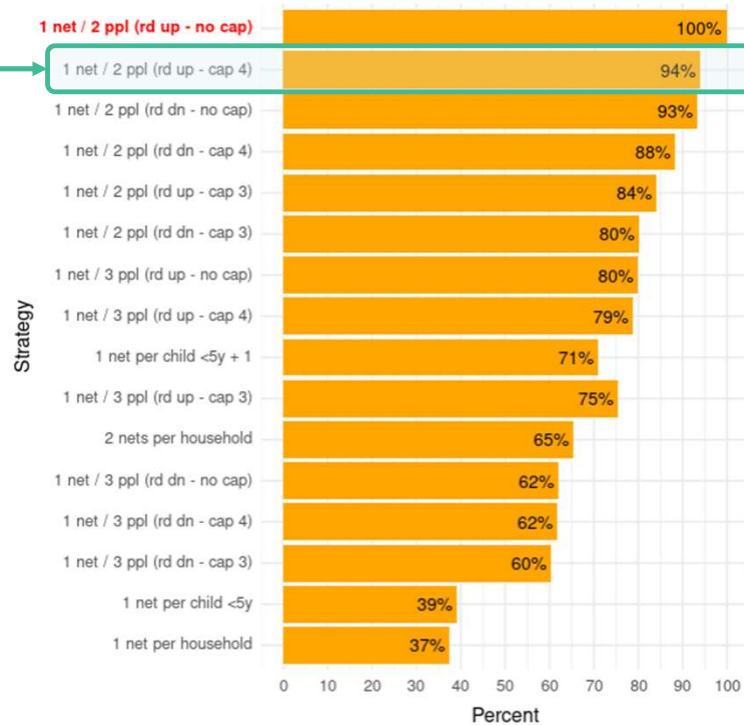
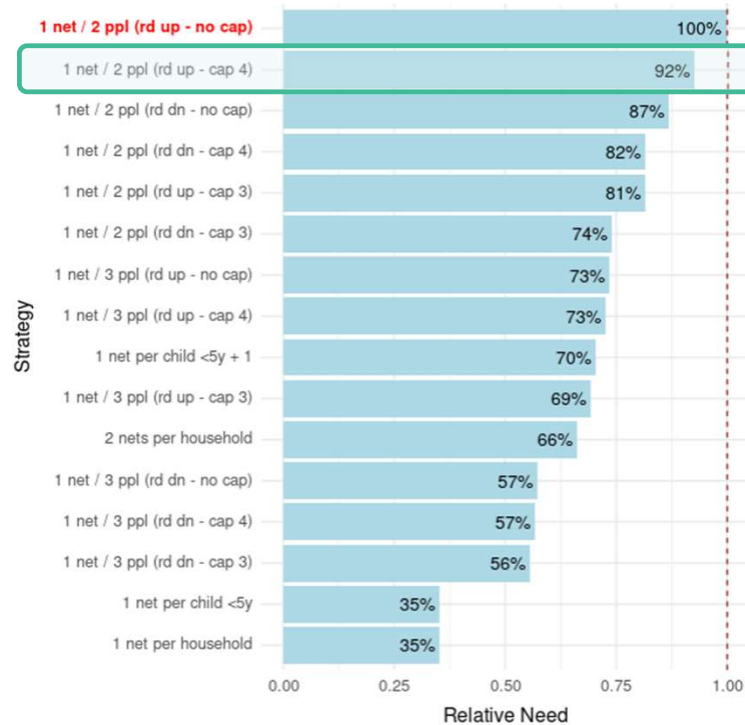
Ouest (West)

1,240,500

1,243,626

3,126

99.7%



Sud (South)

492,077

576,075

83,998

85.4%

Select Country:

Cameroon

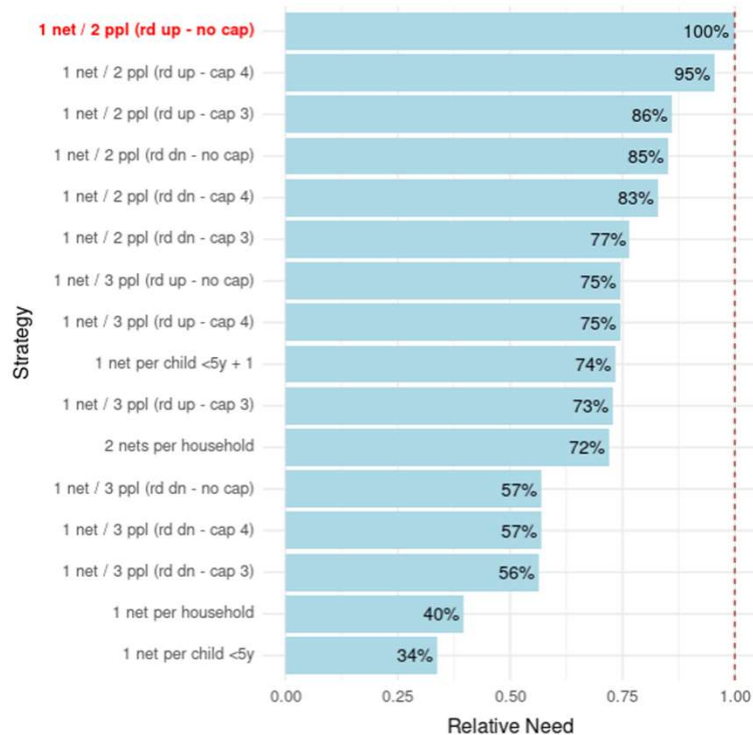
Select Region:

South

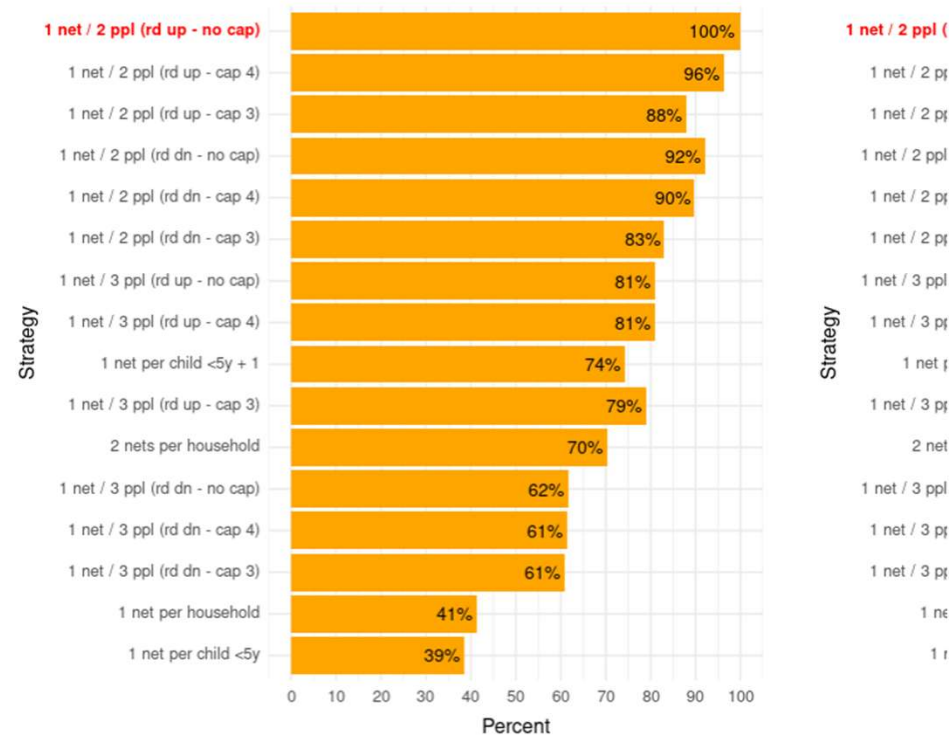
Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

Relative ITN need



Population ITN access



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Sud (South)

492,077

576,075

83,998

85.4%

Strategy: 1 ITN for every 2 people, rounding down

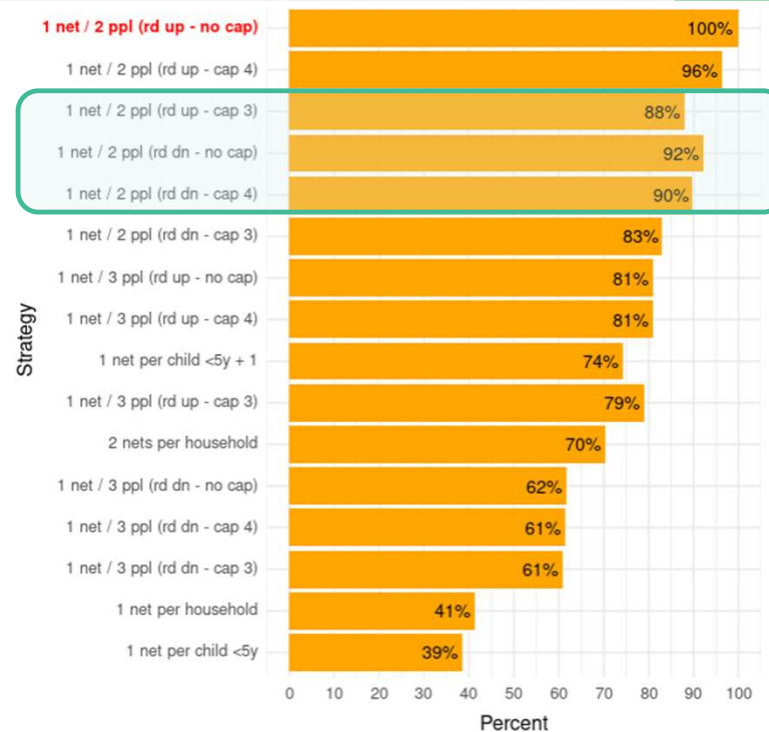
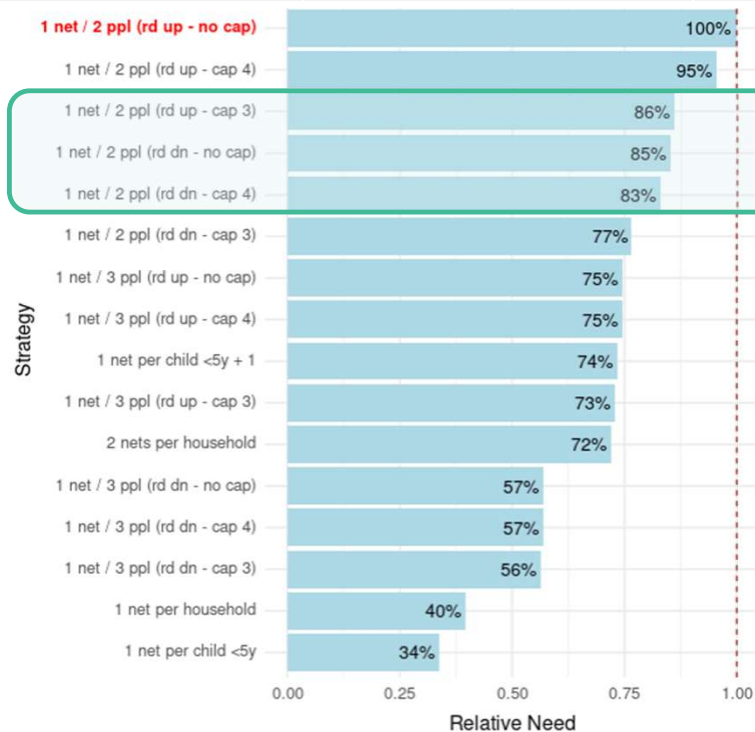
Sud (South)

492,077

489,664

-2,413

0.5% surplus



1 net / 2 ppl (rd up - no cap)

1 net / 2 ppl (rd up - cap 4)

1 net / 2 ppl (rd up - cap 3)

1 net / 2 ppl (rd dn - no cap)

1 net / 2 ppl (rd dn - cap 4)

1 net / 2 ppl (rd dn - cap 3)

1 net / 3 ppl (rd up - no cap)

1 net / 3 ppl (rd up - cap 4)

1 net per child <5y + 1

1 net / 3 ppl (rd up - cap 3)

2 nets per household

1 net / 3 ppl (rd dn - no cap)

1 net / 3 ppl (rd dn - cap 4)

1 net / 3 ppl (rd dn - cap 3)

1 net per household

1 net per child <5y

Est (East)

665,026

937,617

272,591

70.9%

Select Country:

Cameroon

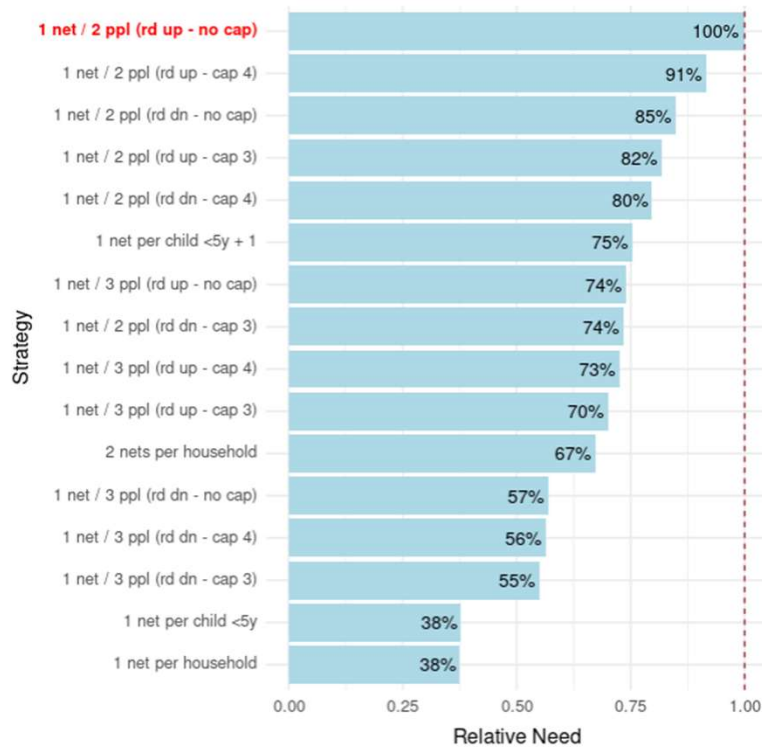
Select Region:

East

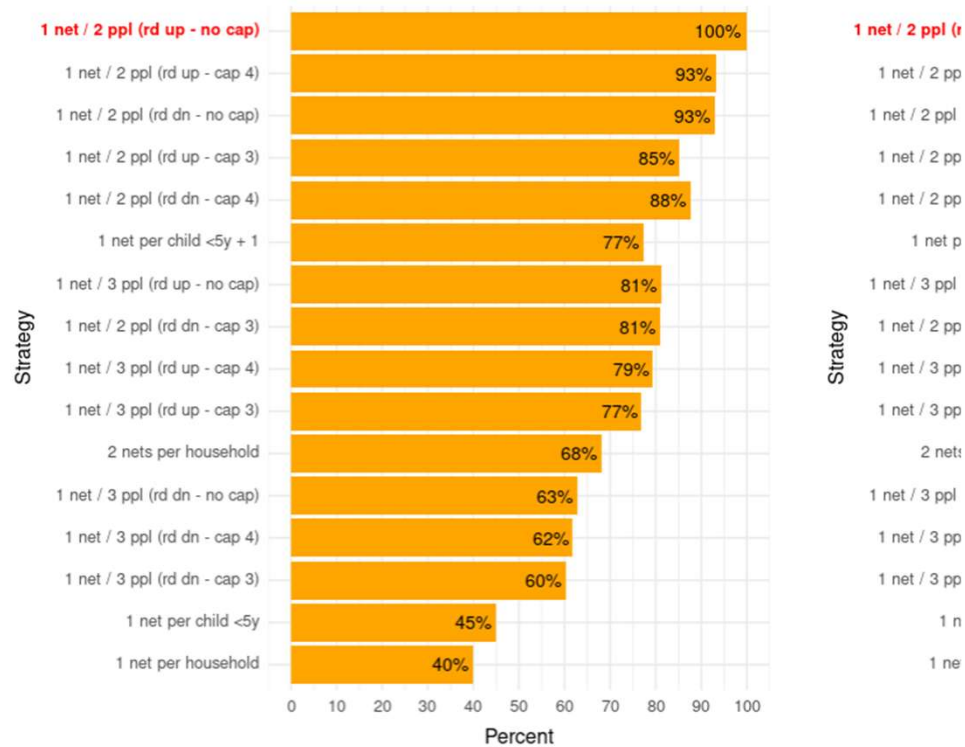
Select Default Strategy:

1 net / 2 ppl (rd up - no cap)

Relative ITN need



Population ITN access



Est (East)

665,026

937,617

272,591

70.9%

Strategy: 1 ITN for every 2 people, rounding up (cap at 3 ITNs)

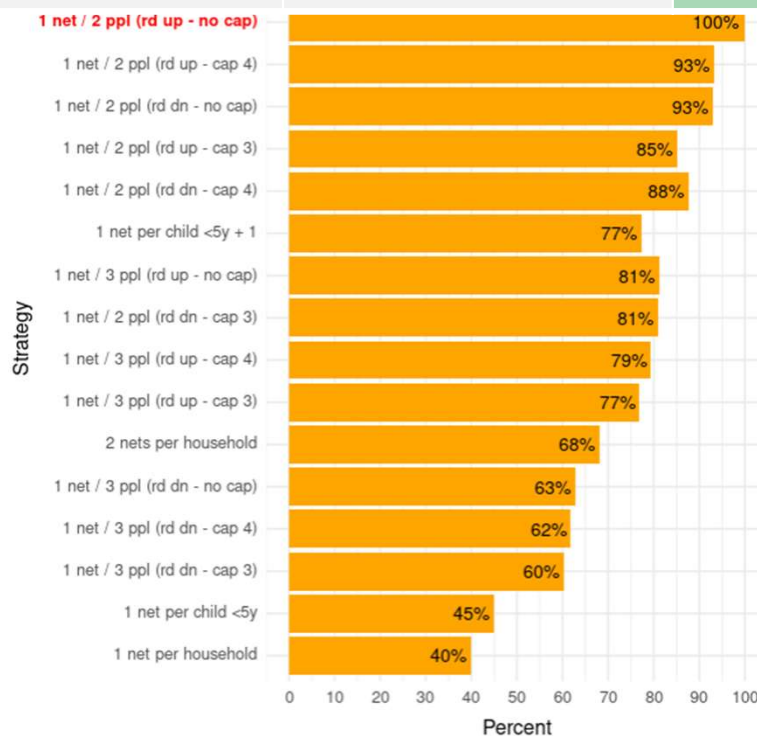
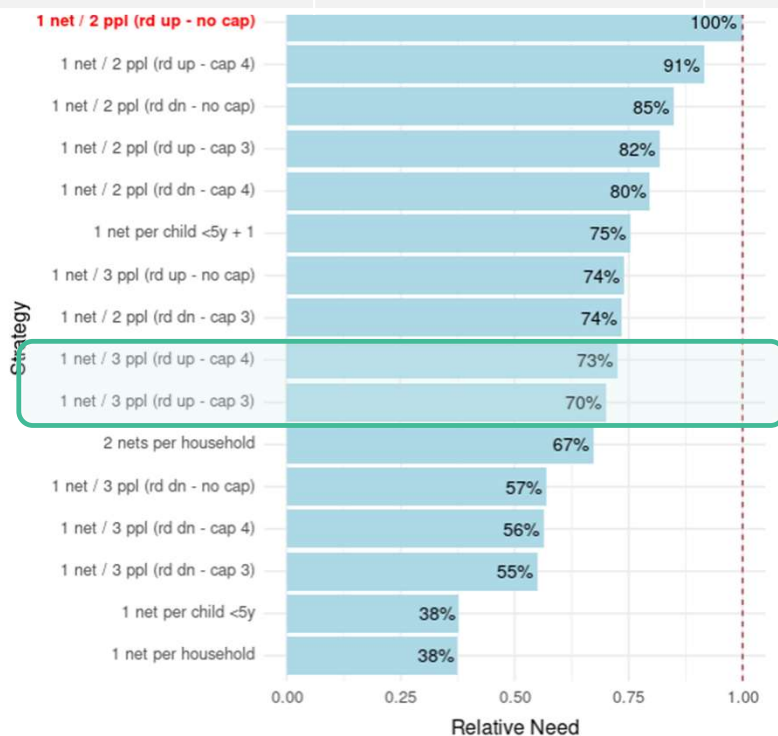
Est (East)

665,026

656,332

-8,694

1% surplus



Strategy

1 net / 2 ppl (r

1 net / 2 pp

1 net / 2 ppl

1 net / 2 pp

1 net / 2 pp

1 net p

1 net / 3 ppl

1 net / 2 pp

1 net / 3 pp

1 net / 3 pp

2 nets

1 net / 3 ppl

1 net / 3 pp

1 net / 3 pp

1 n

1 ne



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Expanding the ownership and use of mosquito nets

Use case 2: Addressing ITN gaps after microplanning

Region	ITNs available	ITNs required based on microplan	Gap	Percentage of ITN need met
Ouest (West) 1 net / 2 ppl ↑ cap 4	1,240,500	1,243,626	3,126	99.7%
Sud (South) 1 net / 2 ppl ↓	492,077	489,664	-2,413	0.5% surplus
Est (East) 1 net / 3 ppl ↑ cap 3	665,026	656,332	-8,694	1% surplus
Est (East) 1 net / 3 ppl ↑ cap 4	665,026	684,461	19,435	97.2%

ITN allocation analysis and considerations

Analysis and data sources

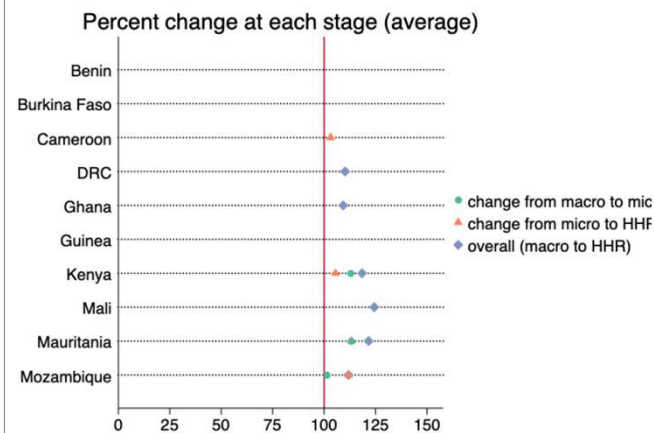
Country	Year	Type
Angola	2015-16	DHS
Burkina Faso	2021	DHS
Benin	2017-18	DHS
Burundi	2016-17	DHS
DRC	2023-24	DHS
Chad	2014-15	DHS
Congo	2011-12	DHS
Cote d'Ivoire	2021	DHS
Cameroon	2022	MIS
Ethiopia	2016	DHS
Gabon	2019-21	DHS
Ghana	2022	DHS
Gambia	2019-20	DHS
Guinea	2021	MIS
Kenya	2022	DHS
Liberia	2022	MIS
Lesotho	2023-24	DHS
Madagascar	2021	DHS
Mali	2023-24	DHS
Mauritania	2019-21	DHS
Malawi	2017	MIS
Mozambique	2022-23	DHS
Nigeria	2021	MIS
Niger	2021	MIS
Rwanda	2019-20	DHS
Sierra Leone	2019	DHS
Senegal	2023	DHS
Togo	2017	MIS
Tanzania	2022	DHS
Uganda	2018-19	MIS
Zambia	2018	DHS
Zimbabwe	2015	DHS

- Analyses are based on the latest available national data from [The DHS Program](#).
- DHS and MIS are designed to be representative at the admin-1 and national levels (and often urban/rural within admin-1 levels).
- Important to consider regions individually as household size/composition can vary substantially within a country.
- Simulate perfectly executed ITN campaign to survey households under different allocation strategies (assume all households receive all ITNs allocated).
- Estimate:
 - Relative difference in ITN needs by allocation strategy
 - Population-level ITN access
 - Household-level ITN access
 - Quantification factor for each strategy

Analysis considerations for users

$$\text{ITN need} = \frac{\text{Population}}{\text{Quantification factor}}$$

Source: 2020 presentation on ITN need by Hannah Koenker



Average increase of 13% from macro-quantification to household registration

Accurate quantification relies on accurate population estimates

Website considerations and possible future edits

ITN allocation strategies and results

- Strategies don't include allocation by sleeping space due to paucity of data in DHS and MIS.
 - This choice could be included if a reliable data source with sufficient coverage exists.
- Results are not available for rural and urban areas separately.
 - Admin-1 and national results are representative of the rural/urban residential mix in each geography.
- Analysis does not consider equity of access / equity of the access gap.
 - A strategy of 2 ITNs *per household* often results in moderate levels of population access, but this strategy leaves larger households uncovered (relative to smaller households).
- Analysis assumes all households receive all the ITNs allocated to them.
 - This is not true in practice; unclear whether acceptance/uptake is linked to allocation strategy.

ITN quantifications

- Users are responsible for the quality of the population data entered in the site
 - No buffer is added during the calculations of ITN need.

Q & A

Feedback and suggestions

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