TROPICAL HEALTH

ITN durability: Implications for ITN access

Durability and retention

Recent analysis on net retention times from Bertozzi-Villa et al

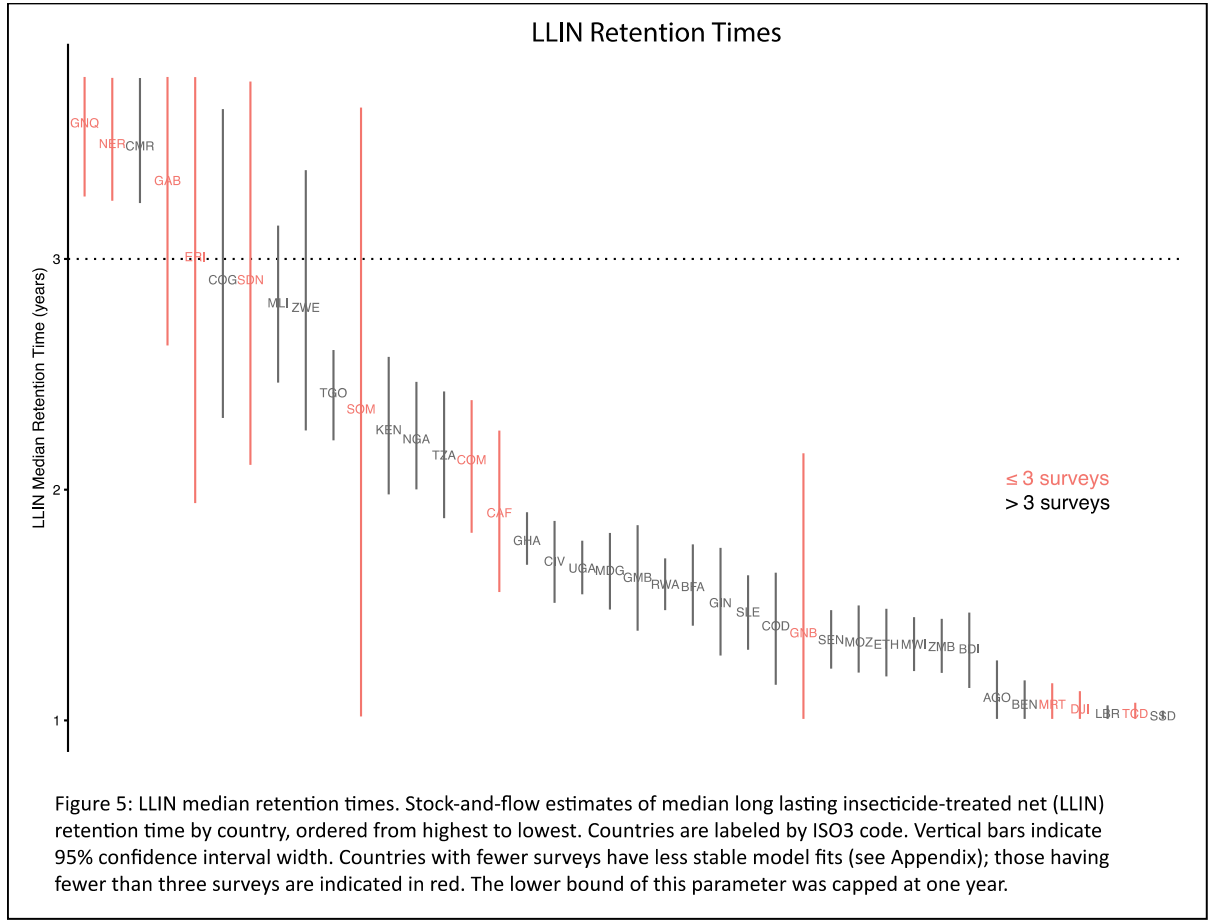


Figure 5: LLIN median retention times. Stock-and-flow estimates of median long lasting insecticide-treated net (LLIN) retention time by country, ordered from highest to lowest. Countries are labeled by ISO3 code. Vertical bars indicate 95% confidence interval width. Countries with fewer surveys have less stable model fits (see Appendix); those having fewer than three surveys are indicated in red. The lower bound of this parameter was capped at one year.

ISO3	Median Retention Time (Years)	Survey Count
AGO	1.10 (1.01, 1.26)	3
BDI	1.31 (1.14, 1.47)	4
BEN	1.07 (1.01, 1.17)	4
BFA	1.58 (1.41, 1.76)	5
CAF	1.90 (1.56, 2.26)	2
CIV	1.69 (1.51, 1.86)	4
CMR	3.49 (3.24, 3.78)	4
COD	1.41 (1.15, 1.64)	3
COG	2.91 (2.31, 3.65)	3
COM	2.13 (1.81, 2.39)	1
DJI	1.05 (1.01, 1.13)	2
ERI	3.01 (1.94, 3.79)	1
ETH	1.33 (1.19, 1.48)	4
GAB	3.34 (2.63, 3.79)	1
GHA	1.78 (1.67, 1.90)	7
GIN	1.51 (1.28, 1.75)	4
GMB	1.62 (1.39, 1.85)	4
GNB	1.38 (1.01, 2.16)	2
GNQ	3.59 (3.27, 3.79)	1
KEN	2.26 (1.98, 2.58)	5
LBR	1.03 (1.01, 1.07)	4
MDG	1.65 (1.48, 1.81)	4
MLI	2.81 (2.46, 3.14)	6
MOZ	1.34 (1.21, 1.50)	3
MRT	1.07 (1.01, 1.16)	2
MWI	1.33 (1.21, 1.45)	9
NER	3.50 (3.25, 3.78)	2
NGA	2.22 (2.00, 2.47)	9
RWA	1.59 (1.48, 1.70)	6
SDN	2.91 (2.11, 3.77)	2
SEN	1.35 (1.22, 1.48)	10
SLE	1.47 (1.31, 1.63)	5
SOM	2.35 (1.02, 3.66)	1
SSD	1.02 (1.01, 1.04)	3
TCD	1.03 (1.01, 1.08)	1
TGO	2.42 (2.21, 2.61)	4
TZA	2.15 (1.88, 2.43)	6
UGA	1.66 (1.55, 1.78)	6
ZMB	1.32 (1.21, 1.44)	9
ZWE	2.79 (2.26**3**.38)	5

Table A.5: Median retention times and 95% CI's for LLINs from the stock and flow model. Number of surveys used to fit each country model also listed.

What are the implications of these estimated retention times for ITN access?

- How quickly will ITN access decline in different countries under current mass campaign strategies?
- How many ITNs are needed as a result of these declines?
- What target level of ITN access are we aiming for, anyway?
  - And is it achievable?
    - And if not – what next?

How many nets are needed for universal coverage?

- Countries have quantified their mass campaigns using population / 1.8 for over a decade
- Given what we know now about retention and durability, is this quantifier still appropriate in all settings?

How many nets are needed to achieve universal coverage in a continuous distribution strategy?

- Continuous distribution at scale through school or community channels has been challenging to quantify
- Do these new findings enable us to develop a population-times-X% quantifier that will achieve targeted levels of ITN access in a continuous strategy?
- Goal – simple population-based percentage to determine quantities of nets to procure – tailored for specific settings.

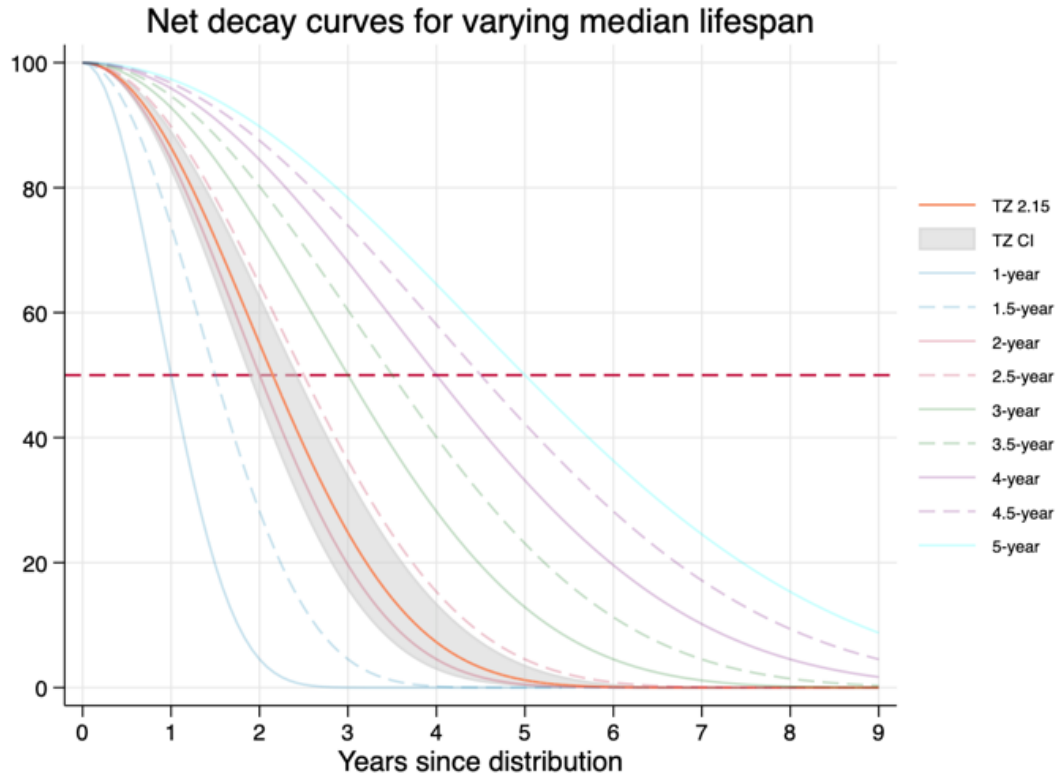
Using a stock and flow model to simulate ITN distributions over 15 years under five typical distribution scenarios

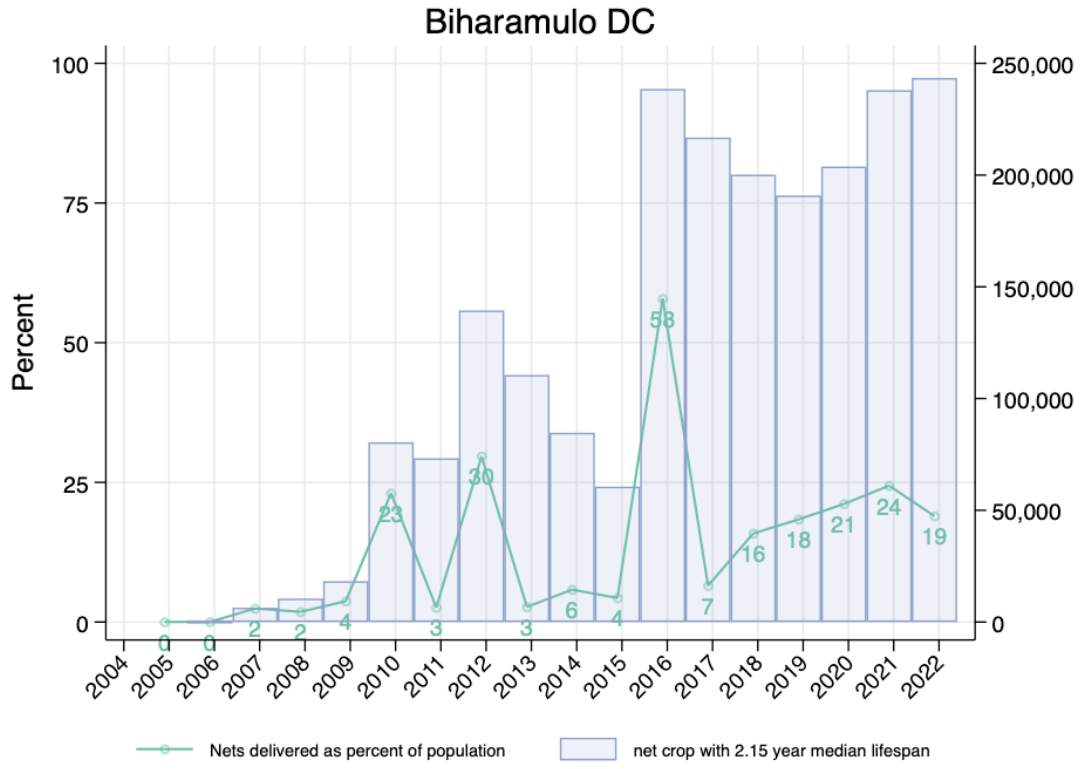
Scenario	Mass Campaign	ANC/EPI (routine)	Annual school/ community
1. "Status Quo"	In 2022, 2025, 2028, 2031, 2034 at population / 1.8	2020-2035, **varying** from pop x 5-7%	none
2. "Full-scale continuous"	In 2020, to establish high coverage at population / 1.8	2021-2035 at pop x 6%	2022-2035 **varying** from pop x 1% to pop x 20%
3. "Mass plus continuous"	In 2022, 2025, 2028, 2031, 2034 at population / 1.8	2020-2035 at pop x 6%	Only in years between campaigns, **varying** from pop x 1% to pop x 20%
4. "Varying 3-year mass"	In 2022, 2025, 2028, 2031, 2034, **varying** from population / 1.0-2.0	2020-2035 at pop x 6%	none
5. "Varying 2-year mass"	In 2022, 2024, 2026, 2028, 2030, 2032, 2034 **varying** from population / 1.0-2.0	2020-2035 at pop x 6%	none

How the model works

How the model works – net distribution and decay

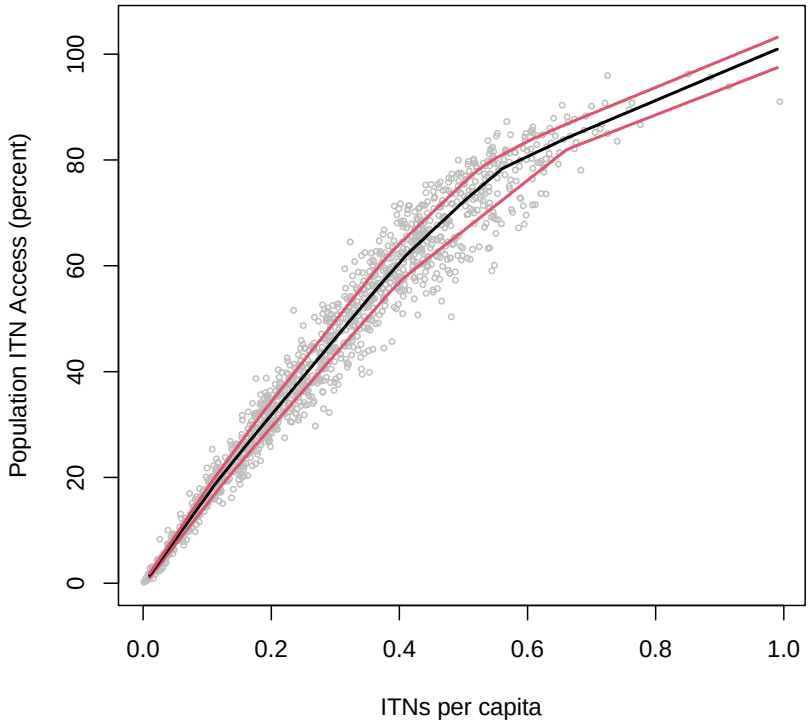
- Nets distributed according to the scenario into a population of 10,000,000 people
- Each yearly ‘crop’ of nets is then decayed according to S-shaped curves, following the estimated retention times from Bertozzi-Villa et al

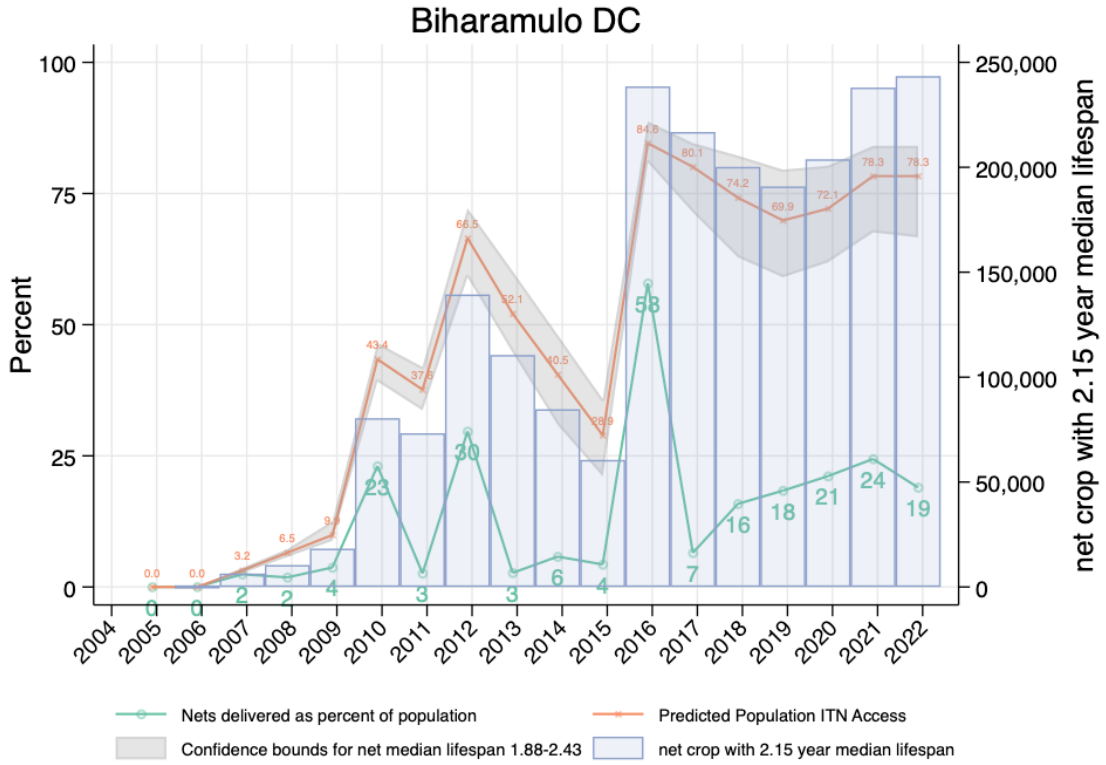




How the model works – ITN access

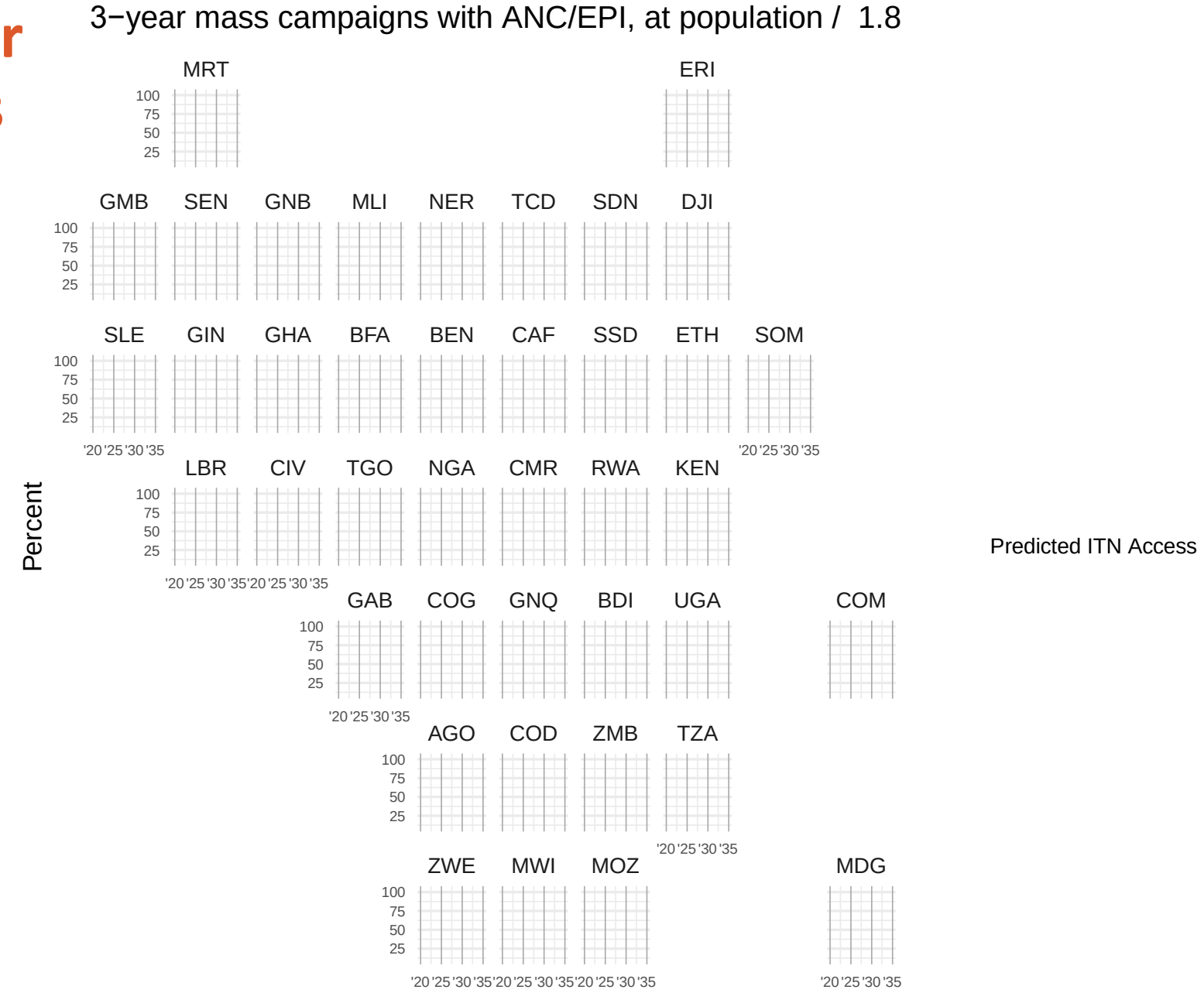
- The net crop in each year is divided by the population projected for that year, giving nets-per-capita.
- There is a strong relationship between nets-per-capita and ITN access, so we predict ITN access for each year from nets-per-capita





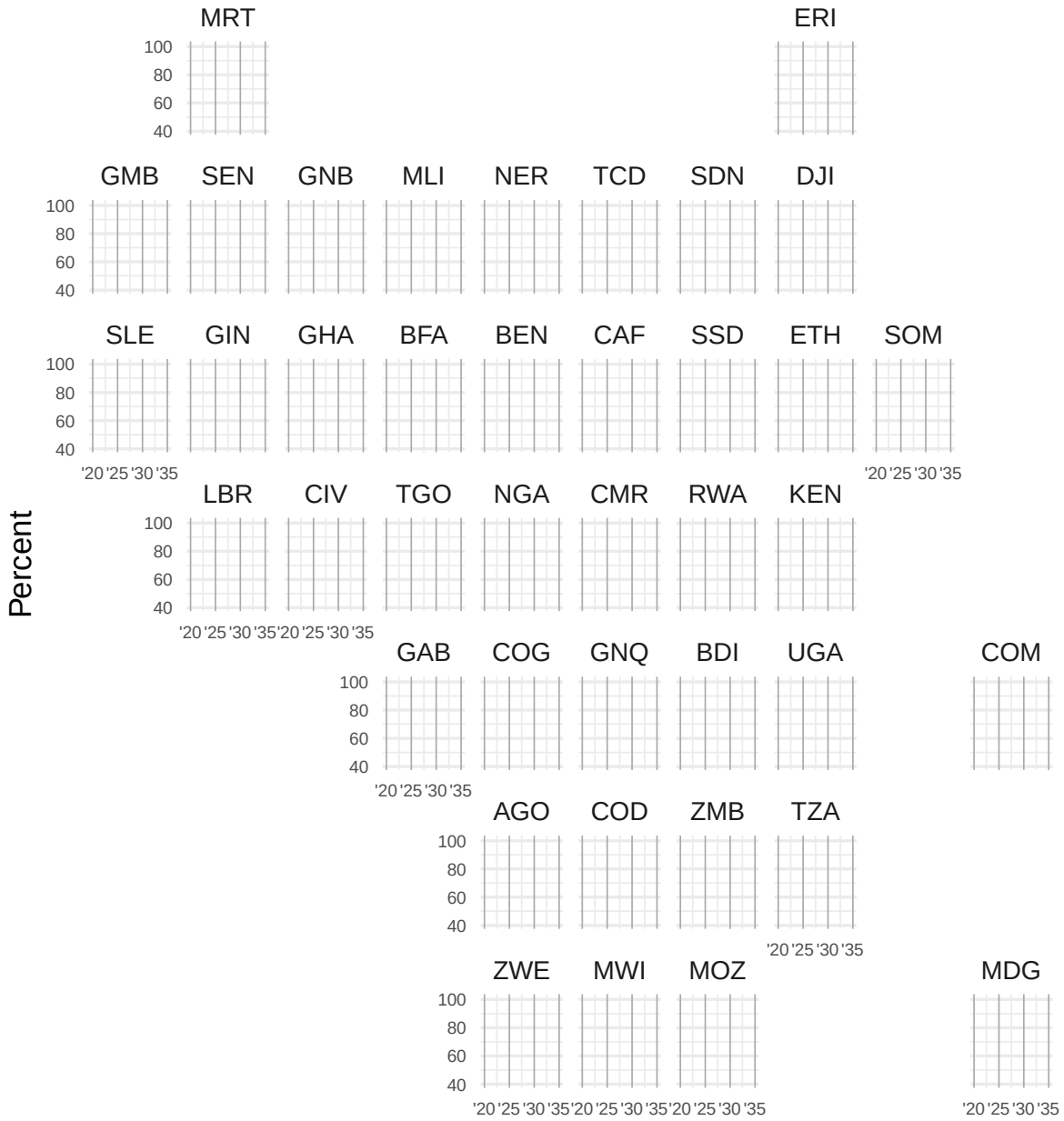
Findings

Predicted ITN access for 3-year mass campaigns at population / 1.8



Predicted ITN access for annual continuous distribution at population x 17%

ANC/EPI at 6% and annual school/community distribution at 17 % of the populat



What's the right quantifier for your country and ITN strategy?

- What is the target level of ITN access that you want to maintain?
- If doing mass campaigns, what is the minimum level of ITN access that you want to allow between campaigns?
- Type your answer in the chat box!

Recommended continuous distribution quantifiers for a few countries

What this means:
To maintain ITN access at a minimum of 80%, using a full-scale continuous strategy (no mass campaigns), Nigeria would need to quantify annual school/community distribution using population x 18%.

To maintain ITN access at a minimum of 80% with a combination of mass campaigns and continuous, Nigeria would need to quantify the nets for the between-campaign years using population x 7%, in addition to ANC/EPI.

Minimum annual quantifier for continuous distribution channels to sustain ITN access at targets of 70, 80, and 90%

	Scenario 2 (full continuous strategy)			Scenario 3 (continuous between mass campaigns)		
Country	70%	80%	90%	70%	80%	90%
Burkina Faso	19	25		11	17	28
Benin	26			23	30	
DRC	22	28		15	21	28
Cameroon	7	10	17	7	7	7
Nigeria	12	18	27	7	7	15
Sierra Leone	21	27		14	20	30
Senegal	22	28		16	22	30
Tchad	26			25	22	
Togo	11	15	25	7	7	13
Tanzania	13	19	28	7	8	16
Uganda	20	24	30	10	15	26
Zambia	23	29		17	23	30

How low does ITN access get between 3-year campaigns?

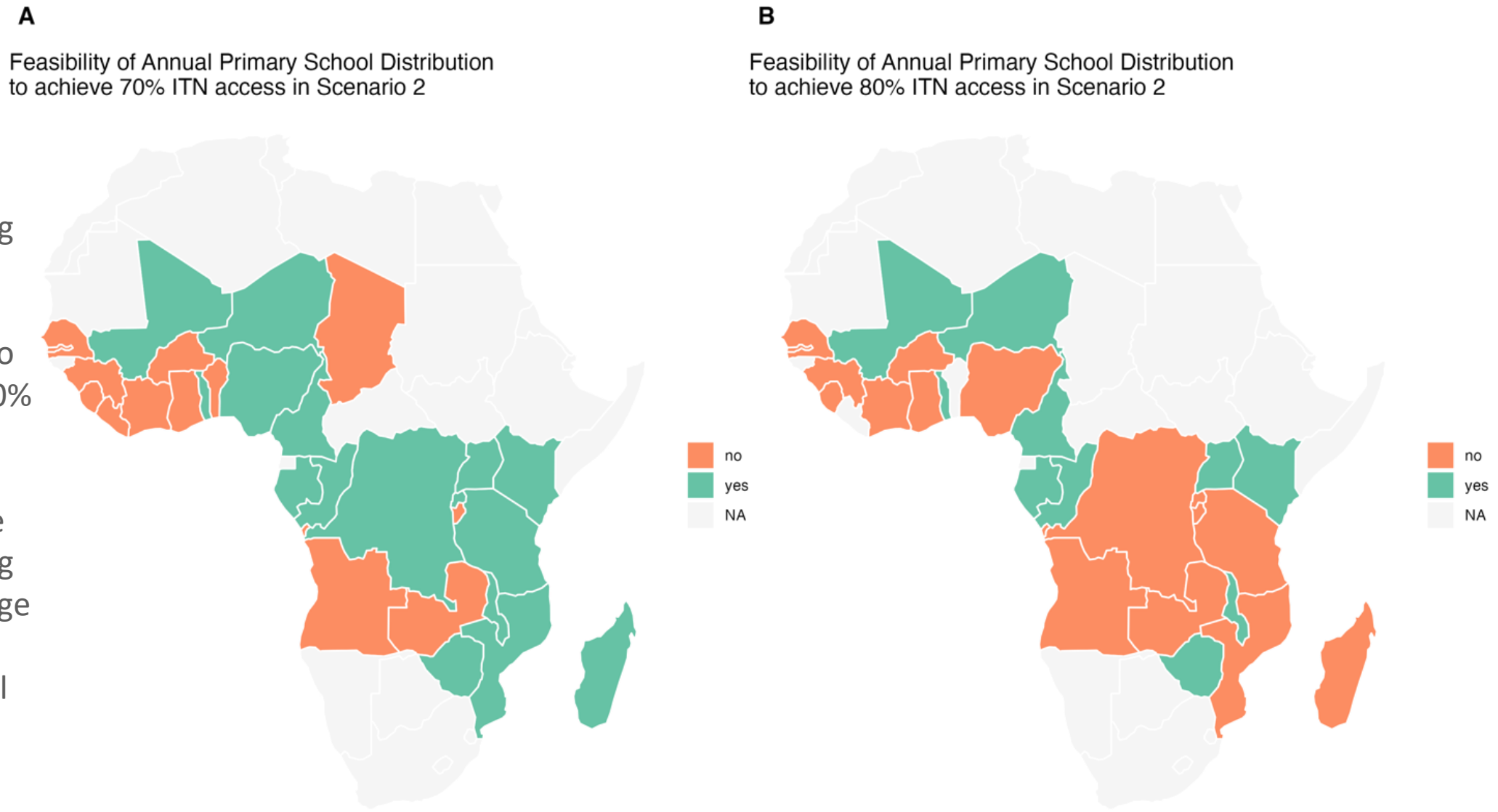
Lowest ITN access between 3-year campaigns for each quantifier

	Population divided by										
Cty	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
AO	29	27	26	26	24	24	24	23	23	23	23
BF	64	61	58	55	52	51	49	46	45	45	43
BI	43	42	39	38	36	36	35	33	33	32	32
BJ	26	26	24	24	23	23	23	23	21	21	21
CD	52	49	46	45	42	41	41	39	38	36	36
CF	80	76	73	70	68	65	63	61	59	56	55
CG	95	92	89	87	85	84	82	81	79	77	76
CI	70	66	64	61	58	56	54	52	51	49	48
CM	100	96	93	91	89	87	86	84	82	81	80
DJ	24	24	23	23	23	21	21	21	21	21	20
ER	96	93	90	88	86	84	83	81	80	79	77

Feasibility of large-scale school distribution to achieve ITN access targets

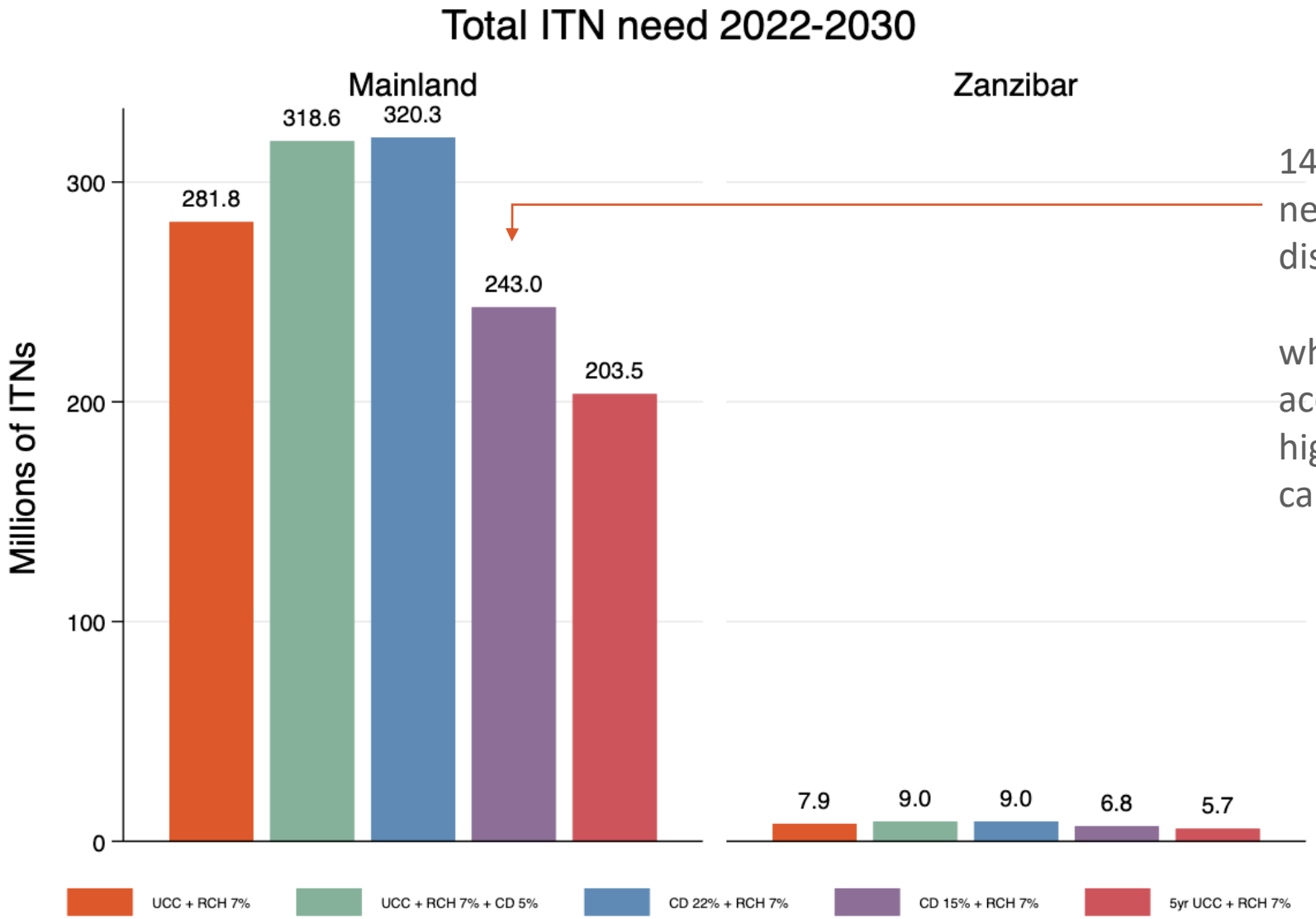
Green indicates countries where the primary-school-going population is large enough to allow school distribution to achieve targets of 70% or 80% ITN access

Orange indicates the primary-school-going population is not large enough, if only one net is given per pupil



But Hannah, isn't this orders of magnitude more ITNs than we are currently procuring?

How many nets are required in the different strategies?

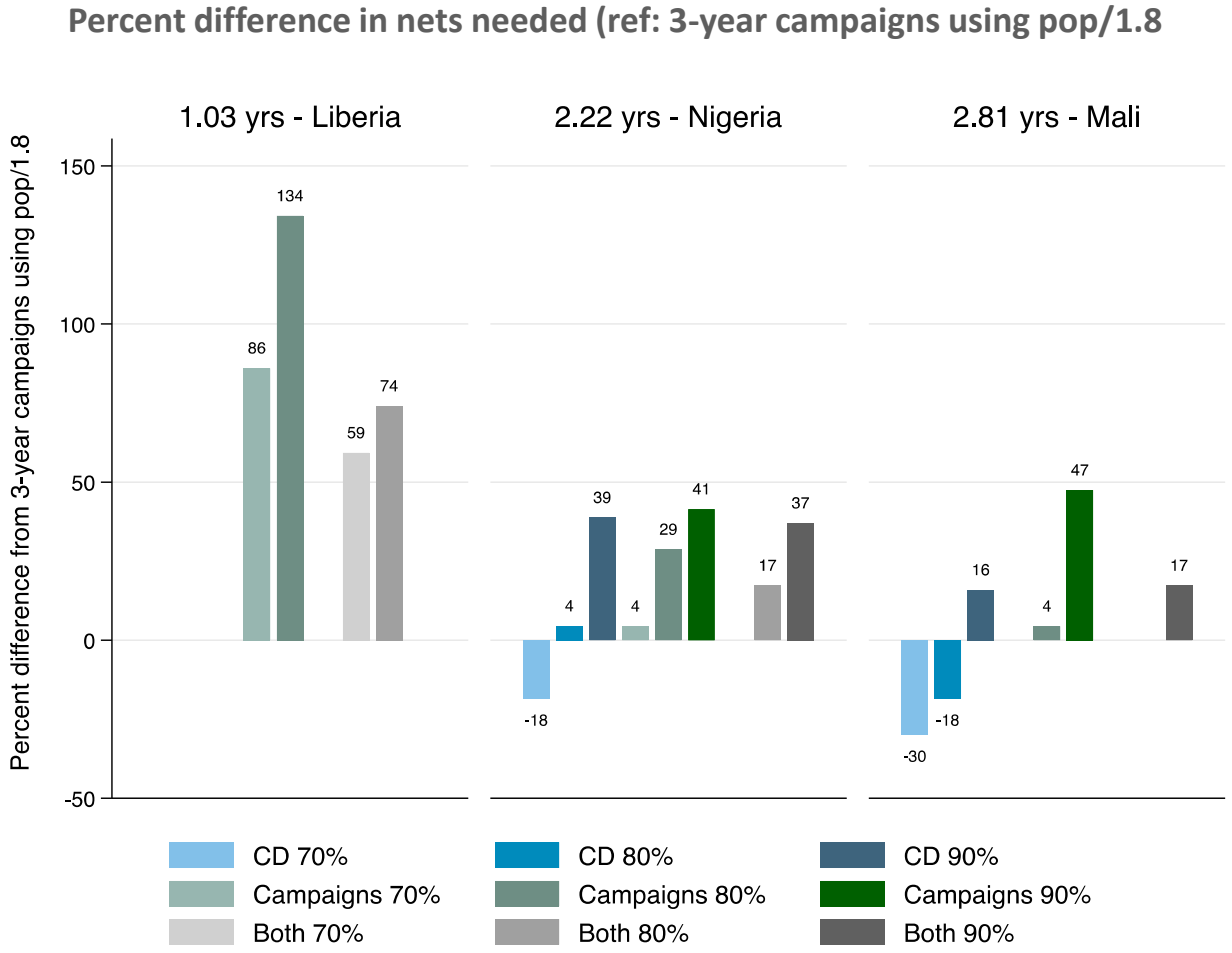


14% fewer ITNs needed under school distribution scenario

while maintaining ITN access consistently higher than mass campaign scenario

Nets needed for different target levels

- Calculated the number of nets needed over 15 years for 3-year mass campaigns using population / 1.8 as the reference.
- Compare the numbers of nets needed over the same period under CD to maintain 70, 80, or 90% ITN access
  - Same done for mass campaigns, and for campaigns+CD ("both")
- Higher targets = more nets needed
- With 1-year net lifespan, need campaigns every two years giving one net per person to maintain ITN access above 80%
- Maintaining ITN access at 80% with continuous distribution would provide better coverage with fewer nets than status quo
- Maintaining ITN access at 90% requires fewer nets under a continuous strategy than under a campaign-based strategy



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Thank you.

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