

Global Malaria Commodities Procurement Forecast

December 2021



Overview

- This deck provides an overview of short-term forecast outputs from year one of the Global Malaria Commodities Forecasting Project
- Projections of procurement volumes from 2021 to 2024, key assumptions and key takeaways are summarized
- The forecast methodology can be found [here](#).

Overview of the Global Malaria Commodities Forecasting Project

- In order to develop a more organized approach to navigating an increasingly complex malaria commodities market, Clinton Health Access Initiative (CHAI) assembled a consortium of partners to produce global forecasts for malaria commodities. The forecasting consortium includes Malaria Atlas Project (MAP), RBM Partnership to End Malaria (RBM), Innovative Vector Control Consortium (IVCC) and Medicines for Malaria Venture (MMV)
- The short-term (three-year) procurement forecast is one of three annual outputs, alongside long-term (ten year) projections of both commodity demand and need and “Deep Dive” analyses around the market for specific commodities
- The project has a five-year timeline, running from 2021 to the end of 2025
- Review and support has been provided by the project Steering Committee, including representatives from GFATM, PMI, WHO PQ, RBM, PAHO, APLMA, BMGF, Unitaid, MMV, IVCC, AMP, FIND, and the FCDO.
- The project is funded by the Bill & Melinda Gates Foundation.

List of figures: Case Management

- Treatments:
 - Forecast donor-funded ACT treatment procurement volumes, by type
 - Forecast donor-funded Injectable and Rectal Artesunate procurement volumes
 - Forecast estimations of SP-AQ procurements
 - Forecast donor-funded SP procurement volumes
 - Forecast API/KSM volumes
 - Weighted average prices for treatments from 2018-2021
- Diagnostics:
 - Forecast donor-funded RDT procurement volumes, by type
 - Weighted average prices for RDTs from 2018-2021

List of figures: Vector Control

- Insecticide Treated Nets:
 - Forecast ITN volumes, by type
 - Weighted average price projections, 2018 - 2024
 - ITN scenario - budget adjustments in 2024
 - ITN scenario - price increases and freight cost increases from 2022 - 2024
- Insecticides for IRS :
 - Forecast insecticide volumes, by class
 - Weighted average prices for insecticides, by class, from 2018 - 2024

Events that may influence short-term commodity procurements (1/2)

Freight-related cost increases due to container shortages and shipping disruptions:

- Freight costs have increased dramatically since 2020, with signals that higher costs will be maintained through to the end of 2022.¹ Changes in freight costs may substantially influence total commodity costs to procurers, with estimates that costs may at least double. Freight constitutes a substantial proportion of costs for goods, with pre-increase GF PPM median costs for 2021 ocean freight ranging from 7% of the product value for antimalarials to 20% of the product value for mRDTs and 13% of the product value for LLINs.²

Changes in available funding and the implications for budgets:

- International funding has been impacted by COVID-19, with major changes in government allocations toward international aid observed in 2021³ that could affect the Global Fund's seventh replenishment for 2023-2025. While this could have implications for commodities procured in 2024, national malaria programs typically prioritize case management commodities (followed by ITN commodities), so we expect that there will be some resilience in commodity volumes despite potential changes to budget allocations.⁴

Increased costs of raw materials:

- Oil and plastic prices have increased, with costs of high-density polyethylene at their highest since 2008.⁵ Manufacturers across a range of malaria commodities have indicated that they may revise pricing in advance of upcoming procurement rounds to adjust for the increased cost of raw materials.
- Shifts in costs of production and/or active pharmaceutical ingredient/key starting material availability have also been reported, which may translate to increased costs for treatments in the short term.

How cost, budgets and commodity pricing changes are being considered for the short-term forecast:

Case management commodities are normally prioritized in country decisions on budgets, followed by ITN commodities. As such, we expect volumes for case management and ITN procurements to have some resilience in the face of changing budgets and price increases. However, insecticides for IRS may be less resilient to changes, and budget/pricing changes are expected to have some influence on country choices around net splits. Therefore, we have included scenarios for ITNs and IRS to examine how potential changes in the above factors may influence procurements.

Key events that may influence short-term commodity procurements (2/2)

RTS,S Vaccine:

- In 2021, the Mosquirix/RTS,S vaccine was approved for P.falciparum malaria.⁶ In the short-term, this may represent an additional strain on the total funding envelope for malaria, but this potential is not being included in the current forecasts due to high levels of uncertainty around where funding will come from and how scale up will transpire.
- Vaccine supply constraints are expected to moderate RTS,S' impact on global commodity supplies in the short term. GSK, the current manufacturer of the RTS,S vaccine, has committed to production of 15 million doses per year whilst their technology transfer, due to be completed by 2028, is underway.⁷ Given the 4-dose regimen, this production volume would cover <4 million children, globally, per year.

New products entering the market:

- New products and/or new formulations of current products are expected to enter the market over the next one to three years.
- Specific commodities that may be entering the market and that have not been included in the forecast due to the continued high levels of uncertainty around market uptake in the short term are outlined within the relevant sections of this report.

How the RTS,S vaccine and emerging products are being considered for the short-term forecast:

Given the high levels of uncertainty surrounding product entry, emerging products have been excluded from our short-term forecast due to limited ability to reasonably estimate impact.

References (events influencing short-term procurement pages 1 and 2) :

1. [The rise and rise of global shipping costs \(ING, 2021\)](#).
2. [GF PPM: Freight, Insurance and QA/QC Indicative Reference Costs \(2021\)](#)
3. [UK parliament briefing document \(2021\)](#)
4. African Leaders Malaria Alliance (2016). How countries prioritized malaria control interventions: A review of recipients' decisions under the Global Fund's New Funding Model, 2014—2017.
5. [Bloomberg, Plastic prices hit record high \(2021\)](#)
6. [WHO news release \(2021\)](#)
7. [PATH: FAQs - Product Transfer for the RTS,S/AS01 Malaria Vaccine \(2020\)](#)

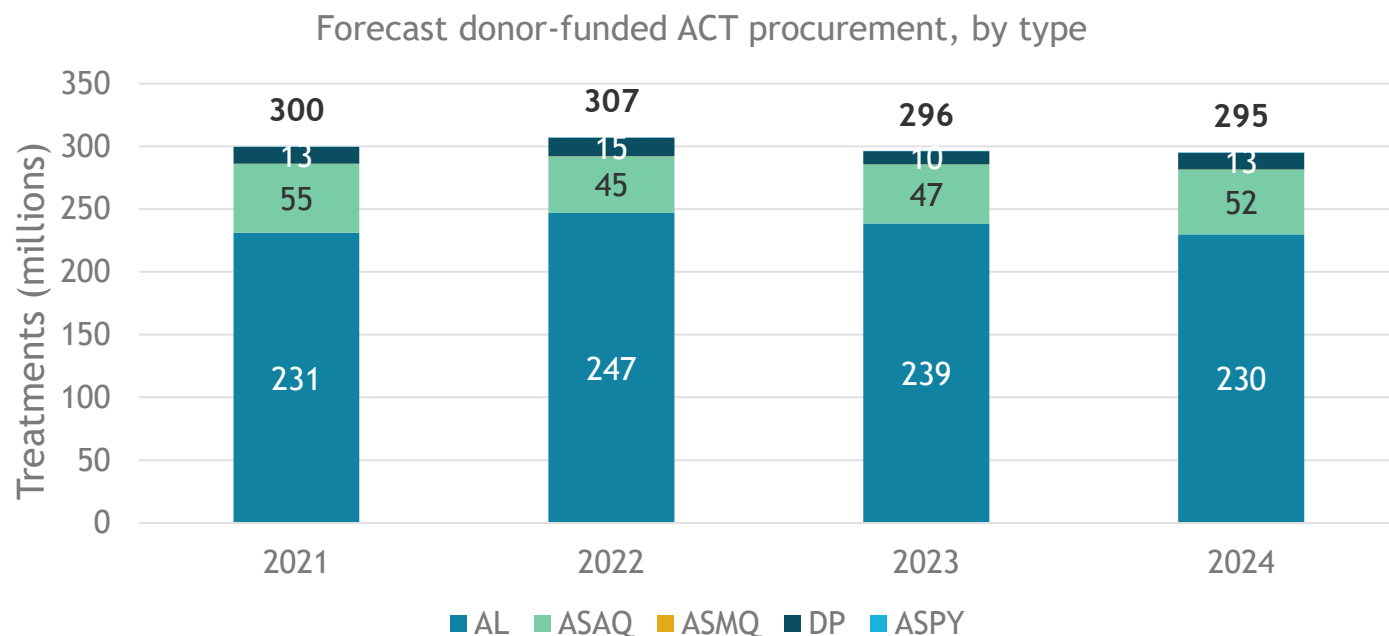
Sources of Uncertainty

Calculations for the short-term forecast are based on historical and planned procurements as specified in country and donor plans and adjusted where possible using country/partner insights to increase the accuracy of estimations. Although this does not give us a range by which to base uncertainty estimates, imprecision in the forecasts is driven by the following factors:

1. Incomplete reporting in donor and country procurement plans, including Global Fund's Price Quality Reference Database
2. Adjustments between budgets outlined in funding requests and actual procurement budgets
3. Out of date information on procurement planning, with undocumented/unavailable updates on changes to plans
4. Changes in global malaria budgets, including to US government funding for USAID and funding commitments for Global Fund replenishments
5. Changes in donor and/or domestic funding or programmatic priorities
6. Incomplete data on donor-funding for malaria commodities, and unpredictable ad-hoc donations for commodity procurements

Antimalarial treatments

ACT Treatments



Key takeaways:

- AL is expected to maintain 77-81% of the market share for donor-funded ACT procurement through to 2024
- ASAQ volumes are expected to remain the second highest for ACTs, representing 18% market share in 2021 and 17% in 2024.
- Total volumes of ACTs procured from 2021 to 2024 are expected to remain relatively stable due to countries' continued prioritization of case management commodities with available funding
- ASMQ and ASPY volumes are projected to be marginal as a proportion of overall ACT procurements in the short term

Key assumptions:

- The percentage spend on specific treatments in NFM4 (2023-2025) will mirror the percentage spend in NFM3 (2020-2022), and/or any changes in the next GF replenishment will not impact volumes of treatments procured due to the prioritization by countries in their applications.
- The forecast is focused on donor-funded procurement, with the largest donors for treatments being PMI and GF, which capture >75% of the procurement market for treatments (source: GF market shaping report 2020).
- Average prices in the Global Fund PQR data are representative of historical pricing for treatments at Global Fund. PMI price estimates are based on cost assumptions and MOPs.
- Prices for ACTs and other antimalarials will remain stable in next one to three years or will not shift to the extent that we expect price changes to impact procurement volumes given available budget in the short term.
- ACT treatment splits are based on current country splits, where information is available through the PQR or internal country knowledge.
- Volumes are according to year of purchase order

ACT Treatments

Unmodeled events that could influence ACT procurement volumes:

Product split:

- i. Artemether-Lumefantrine: there is the potential of emerging resistance to AL in Africa, but the extent of this is currently unclear. If stronger data supporting resistance does emerge, we may expect a stronger shift by countries to other ACT types.¹
- ii. Artesunate Amodiaquine: volumes may shift with stronger implementation of WHO recommendation that ASAQ should not be used in areas where seasonal malaria chemoprevention using SPAQ is taking place.¹
- iii. Dihydroartemisinin Piperaquine: is being considered as an alternative drug regimen for SMC in areas outside of the Sahel region. This may substantially increase the uptake of DHA-PPQ, depending on the extent of pilot scale up plans.

Raw material price increases, related to reduced supply and increased costs of production driven by oil and container price increases as well as shifts in active pharmaceutical ingredient/key starting material availability, production or cost, may translate to increased costs for treatments in the short term. These additional costs are not considered in projections of treatment volumes, as countries are expected to prioritize maintaining required volumes.

Artesunate-Pyronaridine (ASPY):

- Pyramax (ASPY) is the most recent ACT to be approved by a Stringent Regulatory Authority (SRA) and is recommended by the WHO for treatment of acute uncomplicated *P. falciparum* and *P. vivax* malaria in adults and children²
- An interactive map of countries in which Pyramax is currently registered can be found on MMV's website [here](#)
- Currently, Pyramax has only been implemented in the public sector by countries in South-East Asia, with constraints including registration restrictions in the Americas and relatively higher cost compared to AL and ASAQ. In 2021, the GF reference price per treatment for ASPY ranged from \$0.68 to \$2.73 according to weight band, compared to a range of \$0.27-\$0.60 for AL.³
- ASPY market share may increase over the short term if procurers accommodate higher prices for treatment of ASPY in order to promote diversity in the ACT market.

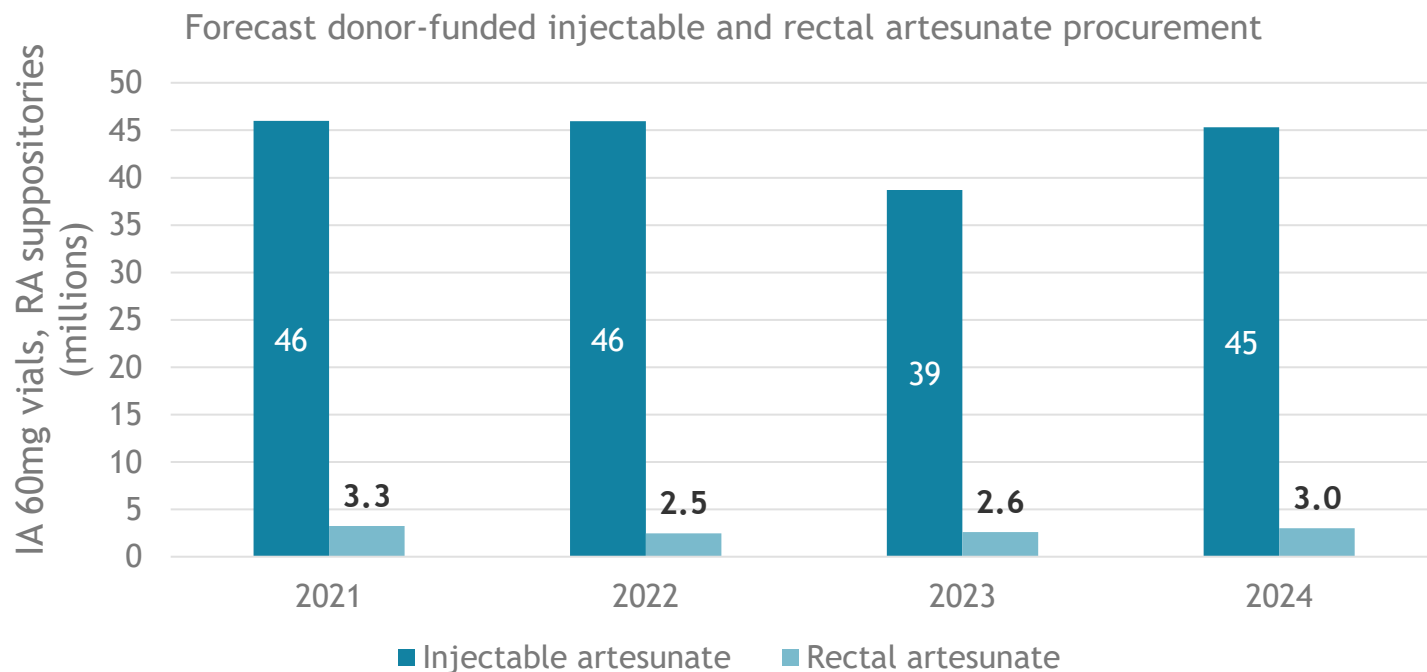
Weighted average price (US\$) for ACTs, ex works

Type	2018	2019	2020	2021
AL	0.60	0.52	0.54	0.53
ASAQ	0.41	0.46	0.40	0.43
DHA-PPQ	1.47	1.55	1.89	1.80
ASMQ	2.97	-	2.95	3.15

*Prices based on GF PQR data and PMI costing assumptions from 2021

1. [WHO MPAC October 2021 Day 2](#)
2. [MMV product summary](#)
3. [Global Fund PPM price reference list 2021](#)

Severe Malaria Treatments



Key takeaways:

- Injectable artesunate volumes are expected to stay relatively consistent in the short term, due to stable need across years and prioritized funding by countries. Volumes may be expected to reduce in 2023 as countries approach the end of their current Global Fund funding cycle.
- Rectal artesunate suppository numbers are expected to remain relatively stable in the short term, although it should be noted that substantial uncertainty exists around how uptake will progress from 2024. A drop in donor procurement volumes is expected between 2021 and 2022 based on disbursement patterns for countries procuring substantial proportions of RA.

Key assumptions:

- The percentage spend on specific treatments in NFM4 (2023-2025) will mirror the percentage spend in NFM3 (2020-2022), and/or any changes in the next GF replenishment will not impact volumes of treatments procured due to the prioritization by countries in their applications.
- The forecast is focused on donor-funded procurement, with the largest donors for treatments being PMI and GF, which captures >75% of the procurement market for treatments (GF market shaping report 2020).
- Average prices in the Global Fund PQR data are representative of historical pricing for treatments at Global Fund. PMI price estimates are based on cost assumptions and MOPs.
- Injectable artesunate amounts have been normalized to 60mg vials and rectal artesunate suppositories to individual suppositories.
- Rectal artesunate volumes are expected to remain stable in the next one to three years, with the impact of ongoing discussions around recommendations for use most likely to influence shifts in the mid-term (4 years +).
- Rectal artesunate supply will be sufficient to cover demand in the short term.

Severe Malaria Treatments

Unmodeled events that could influence procurement volumes for severe malaria treatments:

Trials of artesunate use as a potential treatment for COVID-19:

- i. Artesunate is one of three new candidate drugs included in the ongoing Solidarity Plus trial of treatments for patients hospitalized with COVID-19.¹ Favorable results for artesunate are likely to substantially increase supply demands for this product which could result in supply constraints and associated price increases in the short term.

Dual vials for Injectable Artesunate:

- i. Market introduction of dual vials for WHO PQ injectable artesunate is expected in 2022. How the introduction of dual vials will influence the market for injectable artesunate in the short term is unknown, including what uptake will be within specific countries, and market share impact on current 60 mg vial products. Dual vial InjAS will likely have some influence on pricing estimates and product split in the short term and as such will be monitored closely for future forecast updates.

Updates to guidelines on rectal artesunate use based on recent study results

- i. Results of the Unitaaid-funded Community Access to Rectal Artesunate for Malaria study did not find an association between scale up of RAS and decreased case fatality rates. In addition, the risk was highlighted that “the use of monotherapy may contribute to accelerate the selection of artemisinin partial resistant strains”.²
- ii. In the short term, ongoing discussions around the appropriate use of RAS are not expected to impact procurements due to the lack of consensus around scale up and use.

1. [WHO News Release \(2021\)](#)

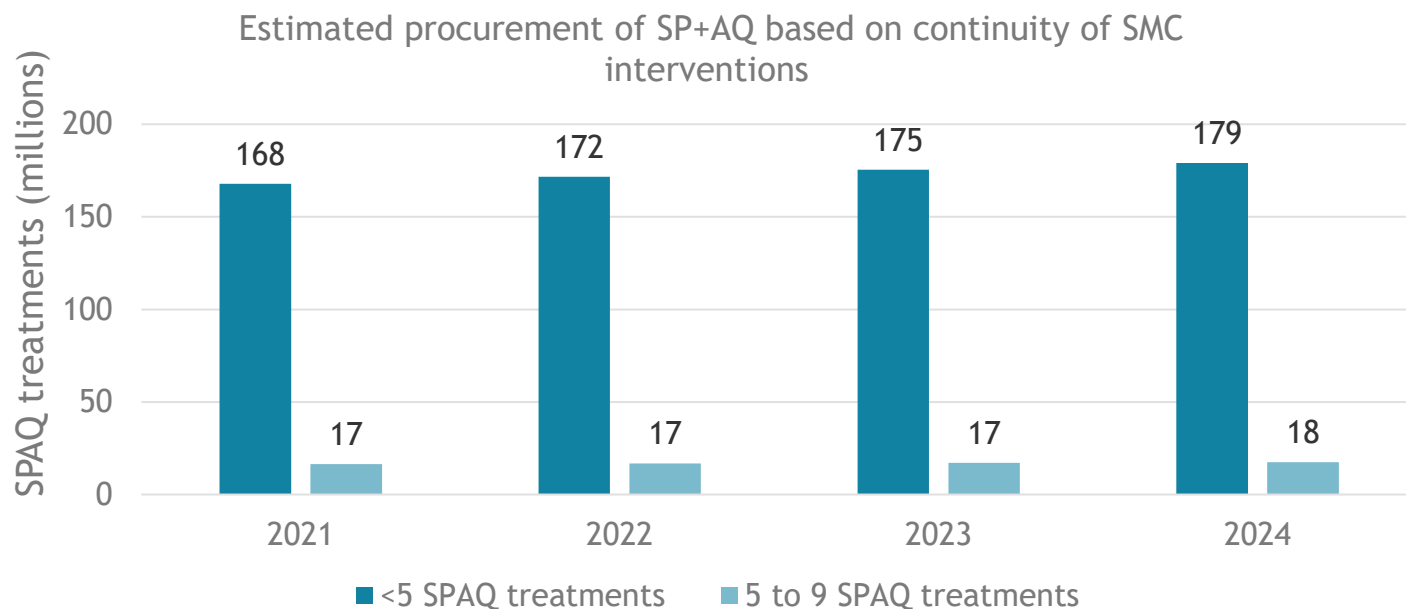
2. [WHO MPAG \(2021\)](#)

Weighted average price (US\$) for Injectable Artesunate and Rectal Artesunate, ex works:

Type	2018	2019	2020	2021
Injectable artesunate	1.73	1.88	1.86	1.84
Rectal artesunate	0.49	0.44	0.39	0.40

*Prices based on GF PQR data and PMI costing assumptions from 2021

Seasonal Malaria Chemoprevention - SPAQ



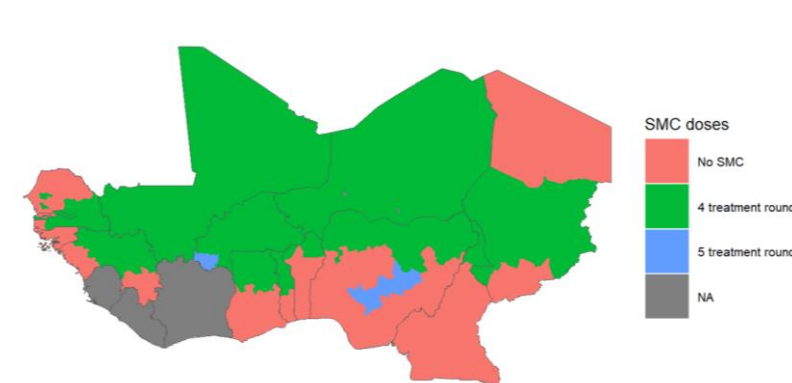
Key assumptions:

- In 2020 SMC alliance data, the targeted population was largely equivalent to population for children under 5 in SMC eligible regions and treated population was on average equivalent to the targeted population. Therefore, treatment estimates are based on under 5 population.
- Currently assuming funding will continue for SMC to meet targeted need for districts.
- In regions in Burkina Faso where Malaria Consortium piloted five rounds of SMC, we are assuming 5 rounds will continue to be funded.
- Malaria Consortium's pilot of five rounds in three additional states (Plateau, Nasarawa & Kogi states) in Nigeria will continue to be funded.
- 5- to 9-year-old SMC deployment is only in Mali and Senegal in SMC eligible regions
- We have not included scale up of SMC being piloted outside of the Sahel, due to uncertainties around the level of scale up and treatment regimens used in the short term

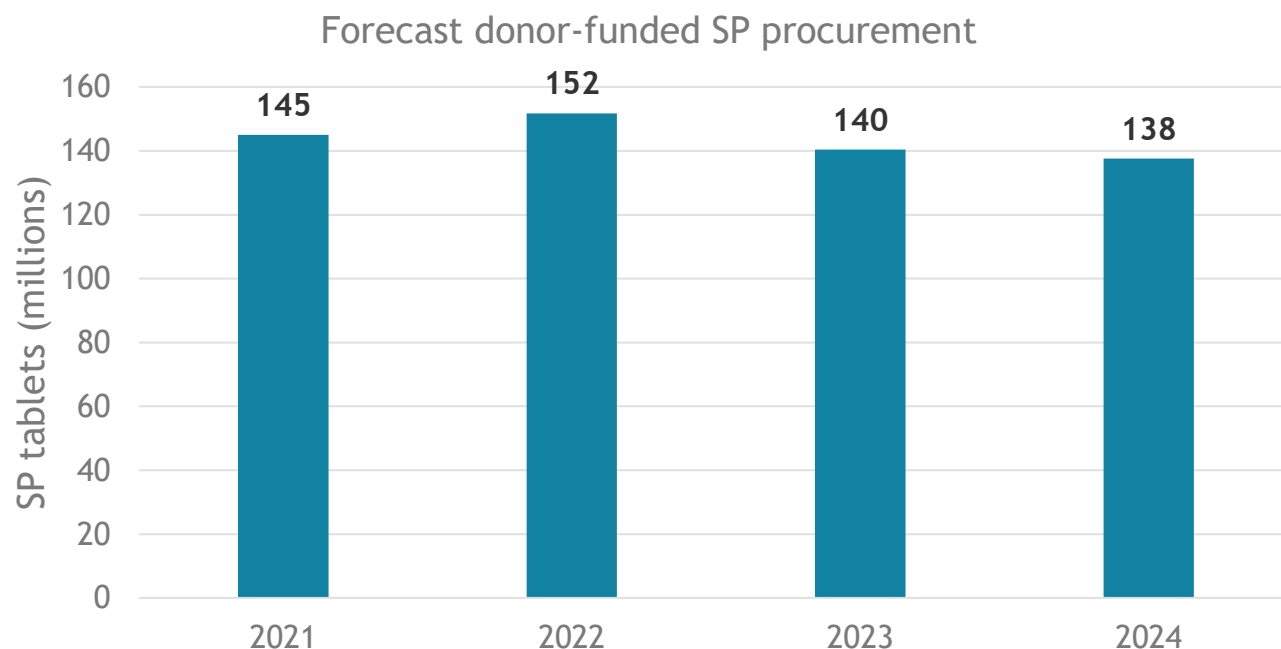
Key takeaways:

- In areas currently supported by SMC, procurement of SP+AQ is expected to increase in line with population growth
- Continued funding is assumed for areas currently piloting SMC deployments
- In the short-term for the Sahel region, SPAQ is expected to remain the primary regimen used for SMC. However, longer term we expect to see some shift to alternative drugs based on growing resistance.

Areas by treatment round in select countries of West and Central Africa



Intermittent preventive treatment of malaria in pregnancy using Sulfadoxine-Pyrimethamine



Key takeaways:

- Total treatments volumes of SP, as funded through key donors, are expected to remain relatively stable in the next one to three years, with no expected changes to treatment regimens or recommendations for use

Weighted average price (US\$) for SP, ex works:

Type	2018	2019	2020	2021
SP 500mg + 25mg	0.11	0.10	0.09	0.09

*Prices based on GF PQR data and PMI costing assumptions from 2021

Key assumptions:

- The percentage spend on specific treatments in NFM4 (2023-2025) will mirror the percentage spend in NFM3 (2020-2022), and/or any changes in the next GF replenishment will not impact volumes of treatments procured due to the prioritization by countries in their applications.
- The forecast is focused on donor-funded procurement, with the largest donors for treatments being PMI and GF, which captures >75% of the procurement market for treatments (GF market shaping report 2020).
- Average prices in the Global Fund PQR data are representative of historical pricing for treatments at Global Fund. PMI price estimates are based on cost assumptions and MOPs.
- Prices for SP will remain stable in next one to three years or will not shift to the extent that we expect price changes to impact procurement volumes given available budget in the short term.
- Volumes are according to year of purchase order.

Aggregated volumes of API for finished products required for donor-funded antimalarial procurement volumes projected as part of this project

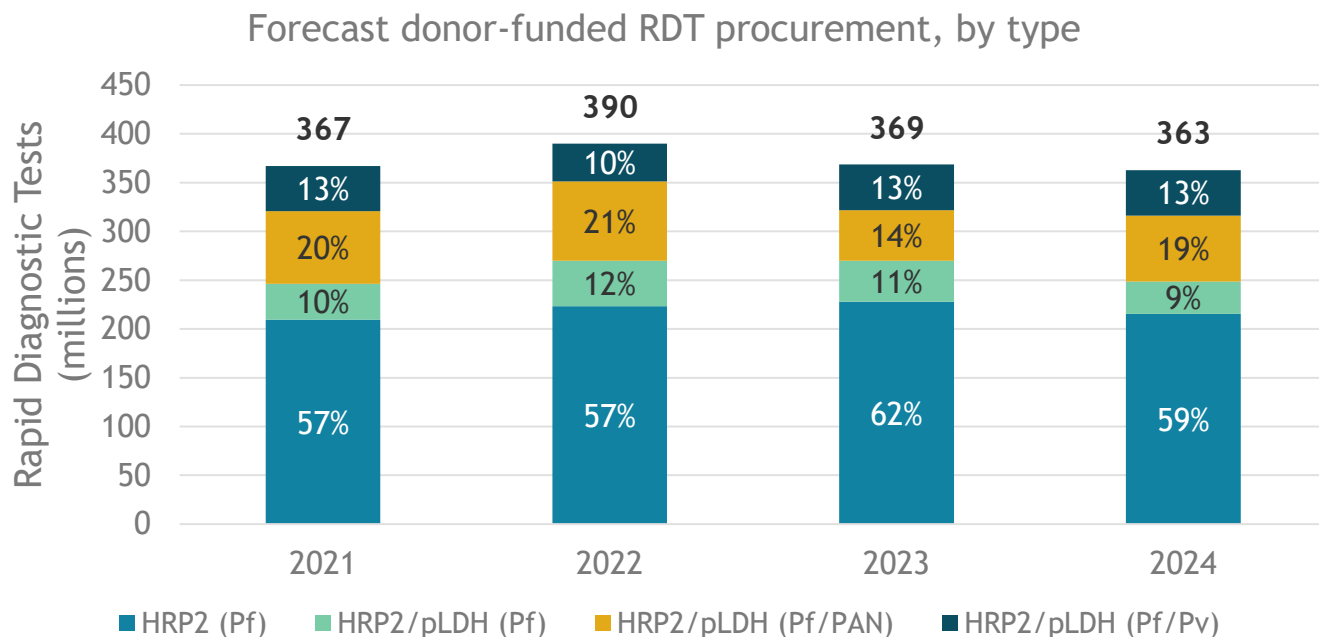
Total MT API of KSM	2021	2022	2023	2024
<i>API for finished products</i>				
Amodiaquine	140	130	134	141
Artemether	77	82	79	76
Artesunate	24	19	20	22
Dihydroartemisinin	3	3	2	3
Lumefantrine	460	492	476	455
Mefloquine	0.1	0.1	0.1	0.1
Piperaquine phosphate	22	25	17	22
Pyrimethamine	8	8	8	8
Pyronaridine	0.1	0.1	0.1	0.1
Sufadoxine	165	170	166	167

Aggregated volumes of API or KSM required for donor-funded antimalarial procurement volumes projected as part of this project

Total MT API of KSM	2021	2022	2023	2024
<i>API or KSM</i>				
2-aminobenzotrifluoride	0.15	0.17	0.21	0.14
2-pyridylacetonitrile	0.03	0.04	0.05	0.03
ethyl trifluoroacetoacetate	0.17	0.19	0.24	0.16
2,8-bis(trifluoromethyl)quinolin-4-yl-pyridine-2-yl-methanone (QU020)	0.07	0.08	0.10	0.07
3-chloroaniline	76	70	72	76
4,7-dichloroquinoline	82	78	78	83
Artemisinin	112	115	112	110
DBA	391	418	405	387
DCMP	135	139	136	137
EMME	127	118	122	128
guanidine hydrochloride	7	7	7	7
isopropyl propionate	5	5	5	5
p-chlorophenylacetonitrile	6	6	6	6
potassium borohydride	18	19	18	17
propane-1,2-diol	5	4	5	5
SMC (4-sulfanilamide-5-methoxy-6-chloropyrimidine)	168	173	170	170
sodium borohydride	6	5	5	6
succinic anhydride	8	6	6	7

Rapid Diagnostic Tests

Rapid Diagnostic Tests



Key takeaways:

- **Historical increase in volumes:** Total volumes of RDT sales increased from 2019 to 2020 (source: World Malaria Report 2021). This increase is likely a reflection of countries increasing buffer stock and front-loading GF orders due to anticipated COVID-19 supply chain disruptions (source: partner correspondence). We do not expect frontloading to negatively impact volumes in later years, given the substantial differences noted in 2020 between allocations and actual GF orders (i.e., actual orders were much higher) and the continuation of high procurement volumes into 2021.
- **RDT type:** Approximately 10% of mRDT market share is taken up by HRP2/pLDH (Pf) RDTs. This increase from historical market share of HRP2/pLDH RDTs may be driven by continued advocacy by a major manufacturer to lock in market share (i.e., prices do not seem to be higher than HRP2 Pf RDTs), rather than a response to evidence of HRP2 deletion.

Key assumptions:

- The percentage of overall budget spend on rapid diagnostic tests (mRDTs) in NFM4 (2023-2025) will mirror the percentage spend in NFM3 (2020-2022), and/or any changes in the next GF replenishment will not impact volumes of diagnostics procured due to the prioritization of tests by countries in their applications.
- The forecast is focused on donor-funded procurement, with the largest donors for tests being PMI and GF, who funded 87% of mRDT procurements in 2020 (source: GF market shaping report 2020).
- Average prices in the Global Fund PQR data are representative of historical pricing for mRDTs at Global Fund. PMI price estimates are based on cost assumptions and MOPs.
- Prices for mRDTs are expected to remain stable in the next one to three years and/or will not shift to the extent that we expect price changes to impact procurement volumes given available budget in the short term.
- Volumes are according to year of purchase order

Rapid Diagnostic Tests

Unmodeled events that could influence procurement volumes for RDTs:

Product split:

- i. Advocacy by ultra-sensitive RDT manufacturers in high burden countries may alter costs and types of RDTs being procured
- ii. Increasing prevalence of HRP2 deletions resulting in a move to non HRP2 type Pf RDTs; entrance to the market of non-HRP2 combo RDTs able to detect *P. falciparum* and *P.vivax*
- iii. Supply related constraints for specific types of RDTs, as a result of manufacturers switching to production of COVID-19 tests

COVID related changes in procurements of malaria rapid diagnostic tests:

- According to Global Fund’s end of year Strategic Performance report for 2020, RDT volumes increased 55% compared to forecast procurement allocations. However, DHIS2 analysis of 2020 did not find a major increase in global testing rates (source: p.46, [Global Fund Results Report, 2021](#)), suggesting that these increased volumes were driven by front-loading of orders and increased buffer stock, rather than substantial changes to country need for tests.
- Coordinated partner procurements have since resulted in an expansion of the supplier base for mRDTs, mitigating the cost increase from mRDT procurements due to re-prioritization by COVID-19 manufacturers in 2020.

Weighted average price (US\$) for RDTs, ex works

Type	2018	2019	2020	2021
RDTs (all types)	0.26	0.31	0.28	0.29

*Prices based on GF PQR data and PMI costing assumptions from 2021

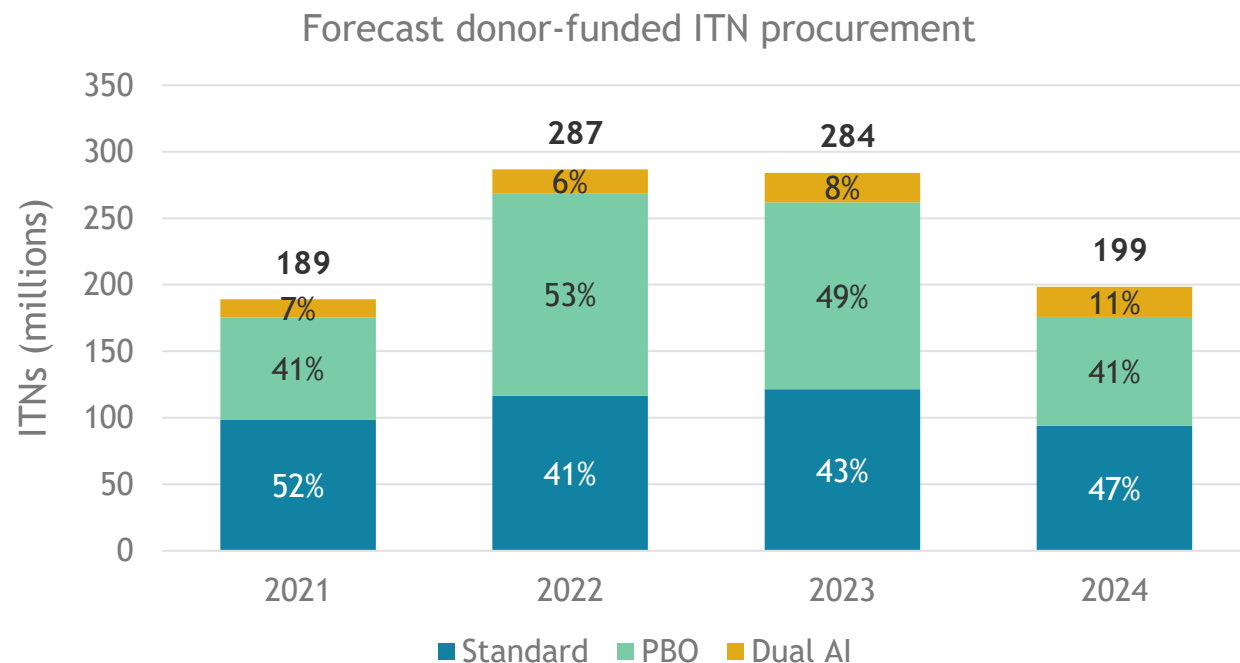
Average price for RDTs (US\$), ex works and by type, from 2021 PQR data analysis

Type	2018	2019	2020	2021
HRP2 (Pf)	0.18	0.21	0.23	0.23
HRP2/PLDH (Pf/Pan)	0.28	0.21	0.29	0.30
HRP2/pLDH (Pf/Pv)	0.33	0.24	0.26	0.28

*HRP2 Pf/pLDH (Pf) prices not currently included due to high fluctuation between reported prices in the PQR database

Insecticide Treated Nets

Insecticide Treated Nets - estimation based on current procurement trends



Key takeaways - status quo scenario:

- Market share of PBO nets is expected to increase in 2022, with a slight decrease for 2023 and 2024 as countries already implementing PBO nets start switching to Dual AI nets, reflecting relaxed supply constraints for Dual AI nets.
- Countries with a mass campaign coming up in 2024 are expected to procure proportionally fewer standard nets in comparison to their 2021 campaign choices, assisted by reductions in PBO net prices and budget increases in line with population growth.
- Absolute number of standard nets procured is expected to decline from 2023 to 2024, however the proportion of standard nets is expected to increase slightly due to the differing priorities of countries conducting mass campaigns in 2024.
- The absolute number of Dual AI nets procured is expected to increase from 2021 to 2022, but market share may decrease slightly whilst countries wait on further guidance around the implementation of Dual AI nets and supply options for Dual AI nets are limited.

Key assumptions for all scenarios:

1. Per WHO guidelines, net replacement cycle is usually 3 years and adherence to this guidance will continue through to the end of 2024. As such, market share trends for 2024 are most comparable to 2021 procurements
2. Assume that products are shipped in the same year as needed in country. **Procurement years specified are based on the date at which products are shipped, rather than PO placed, due to variation in lead times across different net types.**
3. Resistance is expected to continue at current trends/impact of resistance on volumes is already accounted for by country in funding requests
4. In the short term, vaccines will not impact budgets allocated to vector control
5. Current procurer perceptions of product performance does not change for each net type
6. The impact of PBO and Dual AI recommendations in 2022 will depend on pricing and budget availability. Both recommendations are assumed to be moderate (strong enough to avoid a downwards effect but not so strong to influence a big shift in product type preferences).

Insecticide Treated Nets - ITN BUDGET SCENARIO - budget adjustments in 2024

	Assumption	Description	Net Type	2021		2022		2023		2024	
Status Quo	Current funding levels maintained in next Global Fund round starting in 2024, with increase to account for population growth	Countries implementing mass campaigns in 2024 will adjust 2021 net split to match 2023 routine distribution split (as outlined in country funding requests) and/or country distribution plans where available. In countries not doing routine distribution, 2024 split is expected to be the same as previous campaign splits unless additional information for adjustment is available. For routine distributions, countries will increase total volumes in line with population growth.	Standard	98,390,100	52%	116,668,000	41%	121,386,300	43%	93,936,100	47%
			PBO	76,986,500	41%	151,698,600	53%	140,462,400	49%	81,852,100	41%
			Dual AI	13,563,900	7%	18,403,400	6%	22,251,500	8%	22,764,000	11%
			Total	188,940,500		286,770,000		284,100,200		198,552,200	
High	ITN budgets increase by 5% in 2024, as per 105% allocation seen during NFM3 (2020-2022)	Countries use additional budget to increase proportion of nets that are PBO and/or Dual AI compared to standard nets, with preference for Dual AI. Countries not procuring standard nets will use additional budget to increase proportion of Dual AI nets being procured (assumes sufficient supply of Dual AIs).	Standard	98,390,100	52%	116,668,000	41%	121,386,300	43%	65,414,800	31%
			PBO	76,986,500	41%	151,698,600	53%	140,462,400	49%	97,797,500	47%
			Dual AI	13,563,900	7%	18,403,400	6%	22,251,500	8%	44,630,700	21%
			Total	188,940,500		286,770,000		284,100,200		207,843,000	

Pricing assumptions:

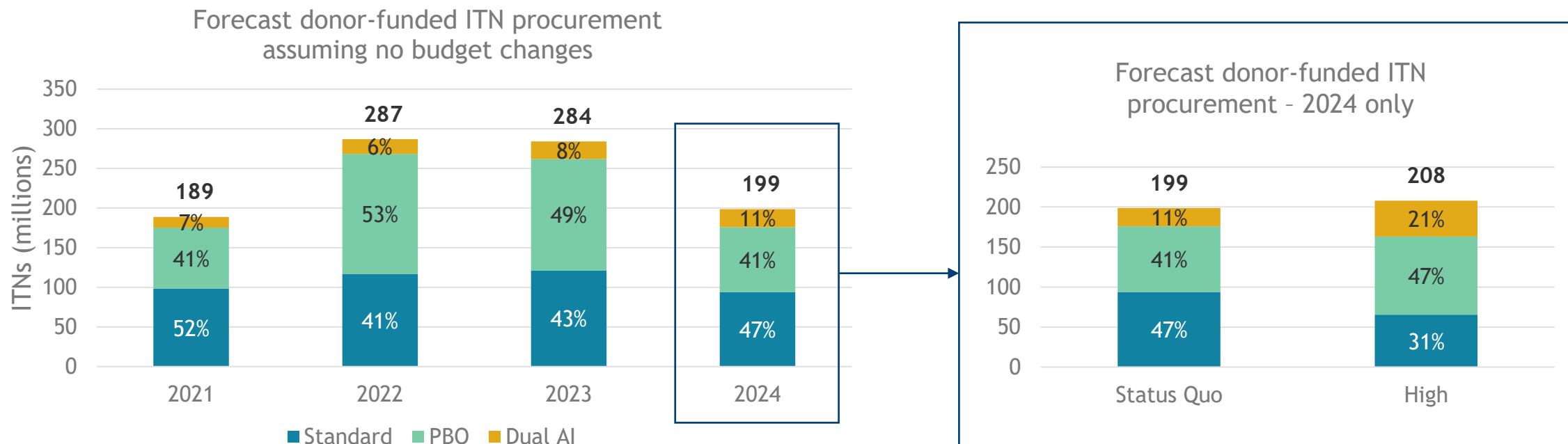
- Historical prices based on GF PQR and PMI costing assumptions retrieved in 2021
- For projected prices, standard nets are assumed to have hit floor, PBO prices rate of decline due to competition is expected to continue.
- The New Nets Project exit price for Dual AI nets in 2024 is expected to be in line with PBO net prices, with estimated difference based on IVCC analysis of parameters for adjustments specified in the NNP volume agreement. In 2024, procurements assumed to have reached sufficient volumes for manufacturers to achieve required economies of scale, so price for Dual AIs is based purely on supplier pricing without further market co-payment support.¹

Weighted average price (US\$) for ITNs, ex works (budgets)

Type	2019	2020	2021	2022	2023	2024
Standard	1.99	1.97	1.93	1.93	1.93	1.93
PBO	2.71	2.65	2.58	2.46	2.37	2.28
Dual AI	2.46	2.5	2.18*	2.18	2.18	2.38

*Based on continued co-payment support through NTI for GF countries. NTI procurement support to end in 2024. In 2022, countries covered by PMI still benefiting from NNP, with most of these countries moving to NTI by 2023.

Insecticide Treated Nets - budget replenishment scenarios for 2024



Key takeaways - 2024 budget scenarios:

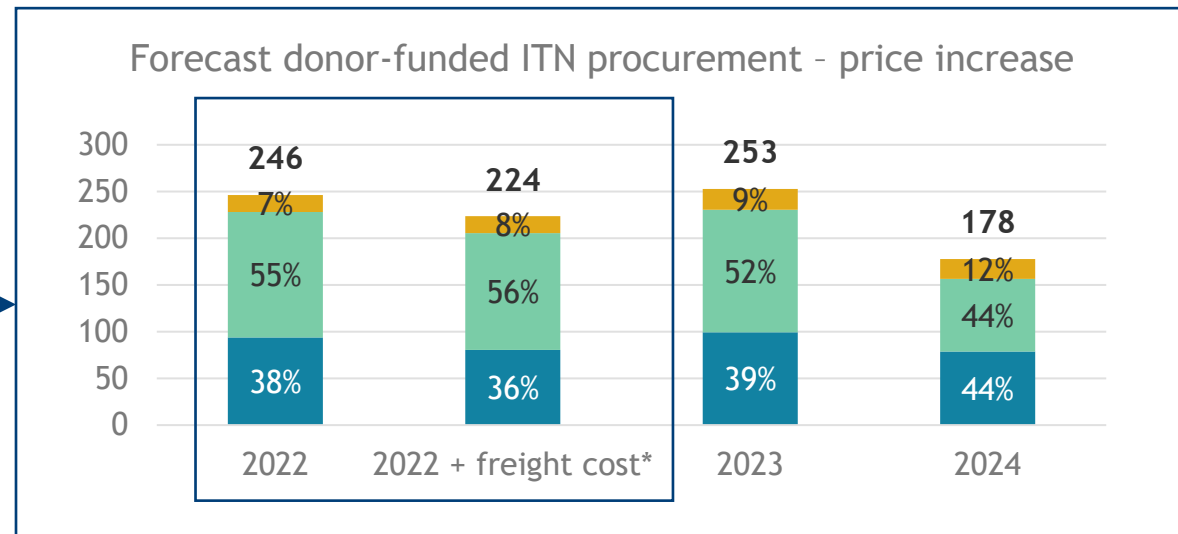
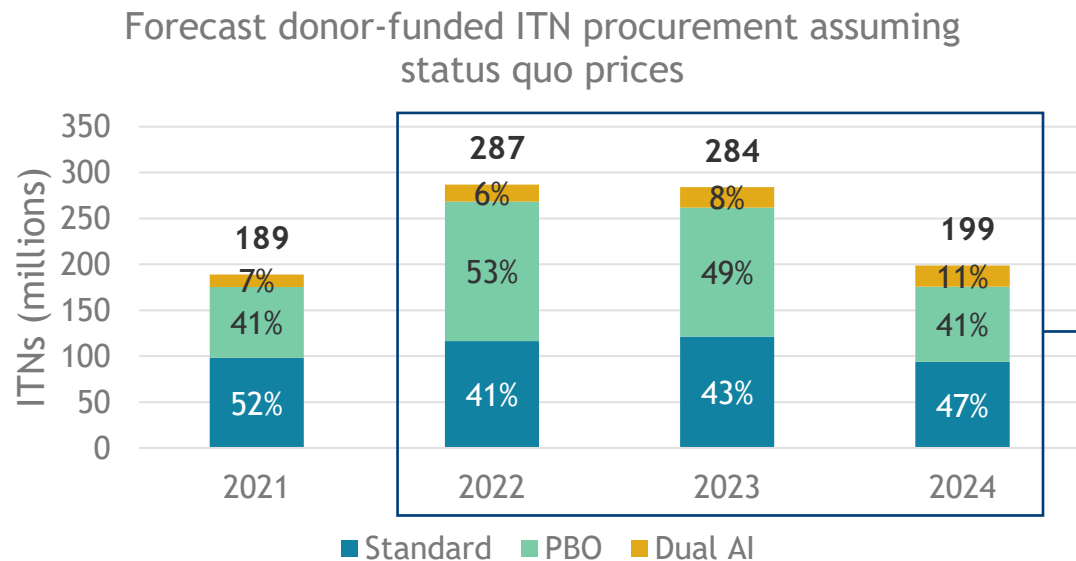
- An increase in available funding will allow countries to accelerate switching to PBO and Dual AI nets in the next funding cycle.
- The rate of switching is expected to be highest for Dual AI nets, as countries implementing PBO only or PBO and Dual AI nets use additional funds to accelerate the switch towards Dual AI. By 2024, supply constraints for Dual AI are no longer expected to be a limiting factor and demand is expected to increase in line with increasing resistance pressures.
- Projected market share of PBO nets in 2024 is expected to increase substantially in the case of increased budgets becoming available, with PBOs shifting more strongly towards the “standard of care” net in 2024.

Insecticide Treated Nets - ITN PRICING SCENARIOS - price changes in 2022-2024

	Assumption	Description	Type	2021		2022		2023		2024	
Status Quo	Standard nets remain at 2021 prices having hit floor. PBO net prices continue to decline due to increased competition. Exit price for Dual AI nets is close to that of PBO, based on supplier pricing without market interventions (no remaining subsidies/co-payment/volume guarantee) and informed by IVCC analysis on possible parameters for adjustment.	Countries implementing mass campaigns in 2024 will adjust 2021 net split to match 2023 routine distribution split (as outlined in country funding requests) and/or country distribution plans where available. In countries not doing routine distribution, 2024 split is expected to be the same as previous campaign splits unless additional information for adjustment is available. For routine distributions, countries will increase total volumes in line with population growth.	Standard	98,390,100	52%	116,668,000	41%	121,386,300	43%	93,936,100	47%
			PBO	76,986,500	41%	151,698,600	53%	140,462,400	49%	81,852,100	41%
			Dual AI	13,563,900	7%	18,403,400	6%	22,251,500	8%	22,764,000	11%
			Total	188,940,500		286,770,000		284,100,200		198,552,200	
Low	Price of standard nets increases 15% (\$0.30) in 2022 driven by rising cost of raw materials. Absolute increase of \$0.30 added to PBO nets (11% increase) and to Dual AI price, including for subsidized countries through the NNP (14% increase). In 2023 and 2024, prices shift according to trends described in status quo scenario. In 2024, Dual AI Net pricing matches PBO as price adjustments for plastic already made.	Countries already implementing a mix of PBO and Dual AI nets will maintain volumes despite increased prices and reduced budgets. For 2022 and 2023, countries implementing PBO and Dual AI nets will prioritize Dual AI given the cheaper cost associated with the NTI	Standard	98,390,100	52%	93,701,300	38%	99,247,900	39%	78,762,200	44%
			PBO	76,986,500	41%	134,231,800	55%	131,307,700	52%	77,506,200	44%
			Dual AI	13,563,900	7%	18,201,500	7%	22,251,500	9%	21,392,200	12%
			Total	188,940,500		246,134,600		252,807,100		177,660,600	
Low + costs (2022 only)	In addition to the low scenario assumptions outlined above, COVID-19 related increase in freight and container costs of 13% of the standard LLIN price in 2020 (a \$0.25 increase on the total cost of freight) must be absorbed by ITN commodity budgets in 2022 only.	As per above (low volumes description)	Standard	98,390,100	52%	80,582,300	36%	99,247,900	39%	78,762,200	44%
			PBO	76,986,500	41%	124,947,300	56%	131,307,700	52%	77,506,200	44%
			Dual AI	13,563,900	7%	18,068,500	8%	22,251,500	9%	21,392,200	12%
			Total	188,940,500		223,598,100		252,807,100		177,660,600	

Insecticide Treated Nets - price increases from 2022-2024

Note: Budgets are expected to shift to accommodate price/cost increases in 2022 and 2023. These theoretical scenarios aim to highlight what we may expect to see happen if that is not possible



Key takeaways - 2022-24 price scenarios:

- If additional budgets cannot be leveraged to support a \$0.30 increase across all types of nets, total volumes of nets would be expected to decrease from 2022 to 2024
- Increased raw material costs are expected to maintain from 2022-2024, but pricing for PBO nets is expected to decrease again after 2022 in response to other market pressures.
- In order to maintain net types needed to manage resistance, countries will prioritize maintaining Dual AI nets, then PBO volumes, leading to a reduction in the total volume of nets
- In this scenario, Dual AI and PBO net prices are assumed to be equivalent in 2024, as NNP parameters for price difference have already been reached

*Freight costs from 2020 to 2021 are expected to more than double¹ with new pressures likely to reduce in 2023. Median freight costs for GF are 13% of LLINs product value.²

Weighted average price for ITN (US\$), ex works (price increase)

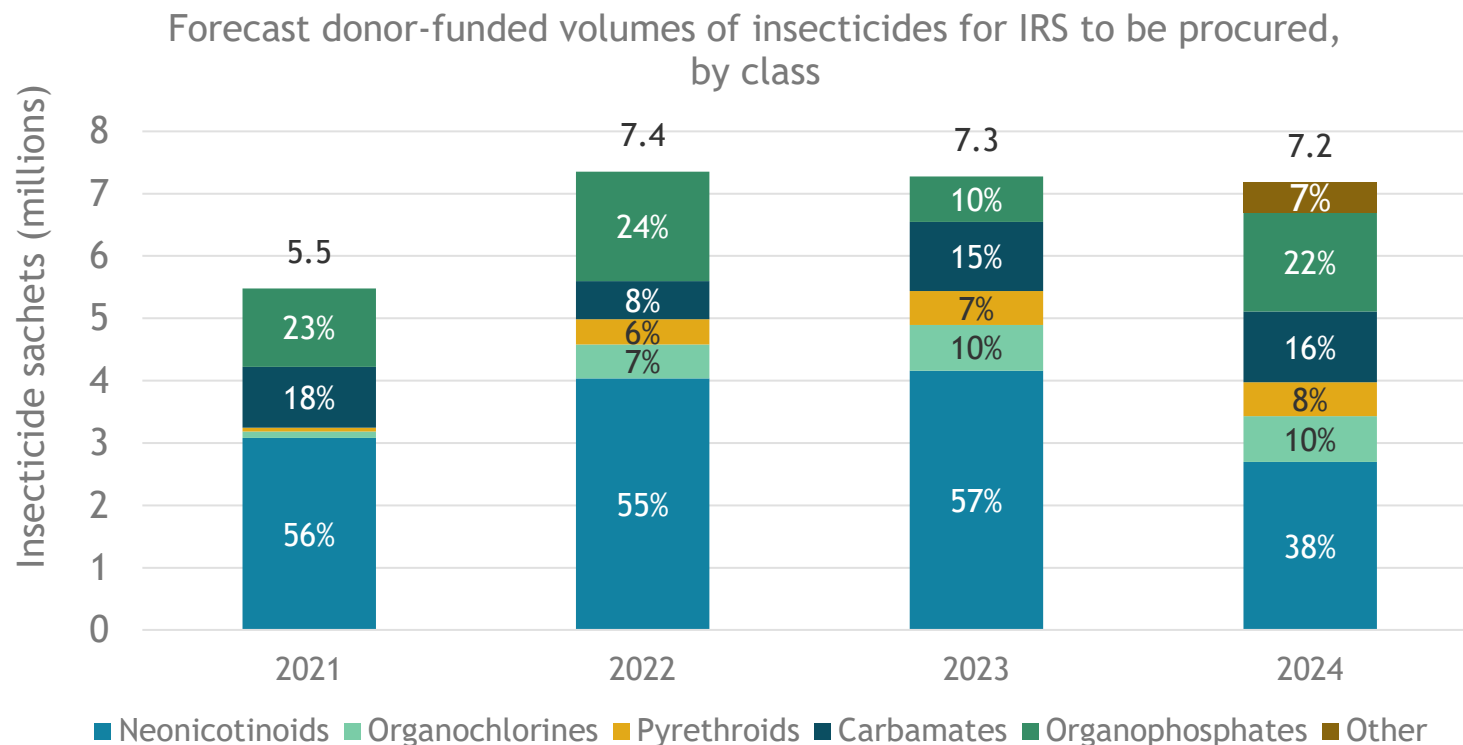
Type	2019	2020	2021	2022	2023	2024
Standard	1.99	1.97	1.93	2.22	2.22	2.22
PBO	2.71	2.65	2.58	2.87	2.59	2.50
Dual AI	2.46	2.49	2.18	2.48	2.48	2.50

*Cost increases due to increased cost of raw materials were estimated at 15% increase on the price of standard nets, translated to \$0.30 absolute increase for all net types in 2022.

1. [ING, The Rise and Rise of Global Shipping Costs \(2021\).](#)
 2. [Global Fund, Freight Insurance Quality Reference Costs \(Accessed October, 2021\)](#)

Indoor Residual Spraying

Insecticides for Indoor Residual Spraying



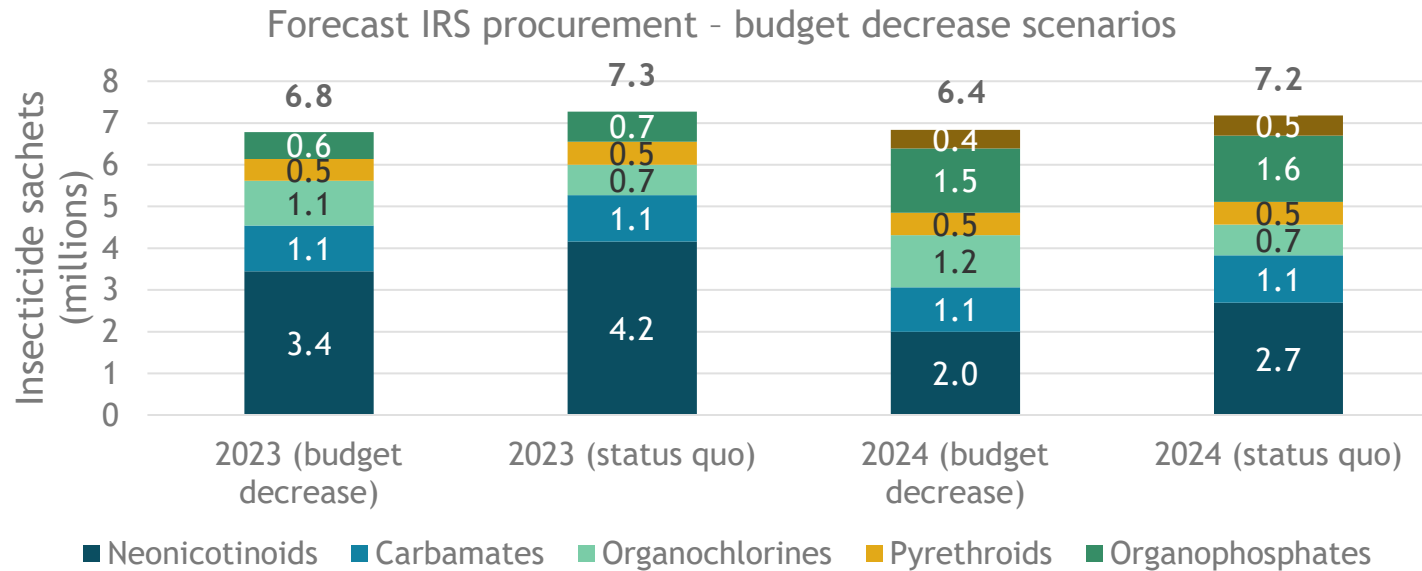
Key takeaways:

- Third generation insecticides (3GIRS) are expected to represent the majority of market share in the next 1-3 years
- Some fluctuation is expected between products year on year, due to rotation of insecticide classes across areas.
- 2021 showed a particularly low volume year for insecticide purchases, likely driven by COVID-19 disruptions and other funding priorities.
- In 2024, it is expected that some of the market for 3GIRS products will start to be taken up by new classes of insecticide currently in PQ.

Assumptions for IRS forecast:

- Estimates for 2021 and 2022 are based on actual procurements as reported through the Next Generation Indoor Residual Spray (NgenIRS) Project
- Countries that have not had campaigns from 2019 to 2022 and/or where partners have shared discontinuation of campaigns are assumed to have discontinued IRS from 2023
- For countries that have already introduced 3GIRS products (NN and/or OP), rotation is assumed to be between the two classes for each year, with accommodation made for known exceptions where countries continue to procure other insecticide classes.
- Countries that have not yet introduced 3GIRS products are expected to rotate based on current split.
- In 2024, new classes of insecticide currently in PQ (defined in the graph as “Other”) are expected to become available. These are expected to enter at a similar price point as 3GIRS insecticides and to be deployed in countries using 3GIRS with documented resistance to Organophosphates.

Insecticides for Indoor Residual Spraying - BUDGET DECREASE SCENARIOS - 2023 and 2024



Key takeaways:

- If increased costs related to net pricing are absorbed by budgets for IRS, a substantial drop in total volumes of insecticides purchased in 2023 and 2024 would be expected, which would have the most substantial impact on total volumes of organophosphates and neonicotinoids
- Total volumes would be expected to reduce by 7% in 2023 and 11% in 2024.

Budget decrease assumptions:

- For 2023 and 2024, we assumed countries would need to adjust their vector control budgets to accommodate the increased price of ITNs (as specified in ITN pricing scenarios slides) and that to do this, funds will be taken from the IRS budgets, with a proportion coming from IRS commodities.
- How much the budget decrease translates to in terms of insecticide volumes is estimated based on PMI costing assumptions per country (where available) or on average (if not available for a specific country) for the proportion of IRS budget taken up by insecticides versus implementation.
- Countries are usually expected to accommodate budget reductions by decreasing the total area to be sprayed, except for specific countries that have shown a history of switching to cheaper insecticides to maintain coverage.

Historical weighted average price (US\$) for classes of insecticides, ex works

Class	2018	2019	2020	2021-2024
Carbamates	8.33	7.65	7.68	8.45
Organochlorines	-	7.71	7.71	7.71
Pyrethroids	5.91	-	9.40	7.38
Neonicotinoids**	15.00	15.00	14.75	14.50
Organophosphates**	15.00	15.00	15.99	15.99

*Historical prices based on GF PQR and PMI costing assumptions retrieved in 2021, adjusted to quantity required for one tank of spraying

** Depicted 2018 and 2019 pricing for neonicotinoids and organophosphates is post-copayment pricing available to countries participating in the NgenIRS project.