

A Case Study in Fundraising, Logistics, and Collective Action for a Neglected Disease: Global Scaleup of Insecticide- Treated Nets in the 2000s

Cordelia S. Kenney
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Abbreviations

ACT	Artemisinin-based combination therapy
ALMA	African Leaders Malaria Alliance
ART	Antiretroviral treatment
CDC	Centers for Disease Control and Prevention
CIDA	Canadian International Development Agency
DAH	Development assistance for health
DFID	UK Department for International Development
HWG	Roll Back Malaria Harmonization Working Group
IFRC	International Federation of Red Cross and Red Crescent Societies
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LLIN	Long-lasting insecticide-treated net
MDG	Millennium Development Goal
MEP	Malaria Eradication Programme
MIM	Multilateral Initiative on Malaria
PEPFAR	US President’s Emergency Plan for AIDS Relief
PMI	President’s Malaria Initiative
PSI	Population Services International
RBM	Roll Back Malaria
RCT	Randomized controlled trial
TDR	Special Programme for Research and Training in Tropical Diseases
UHC	Universal health coverage
USAID	United States Agency for International Development
USG	US government
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

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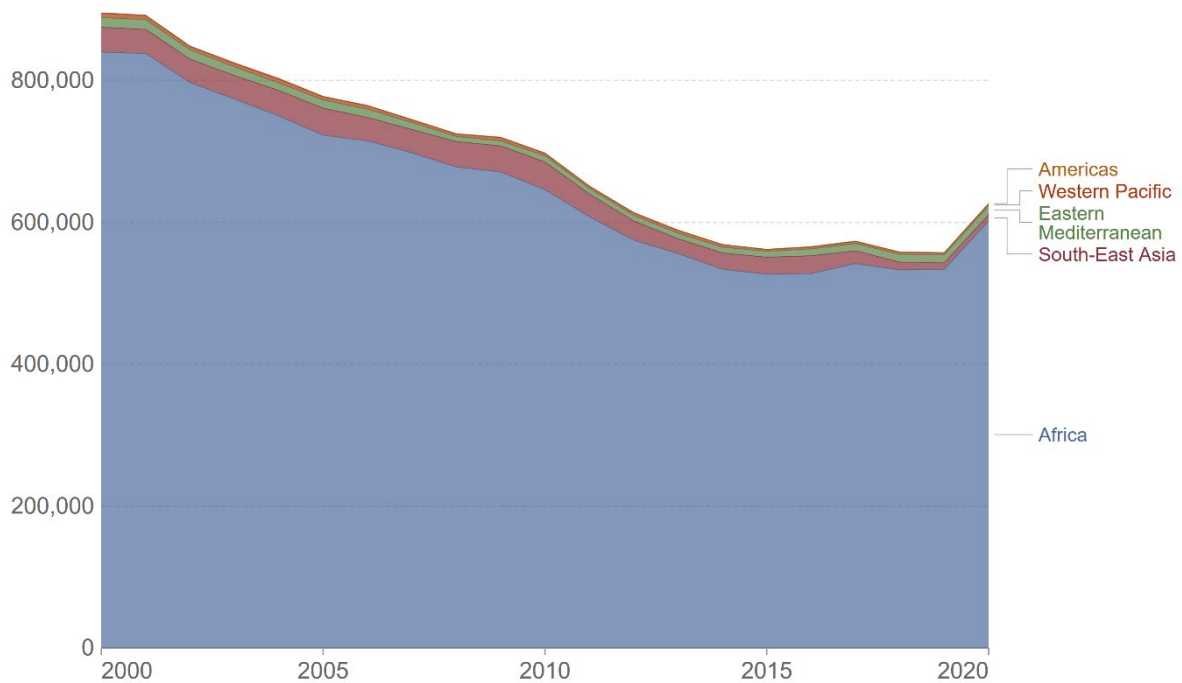
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Overview

Malaria, a potentially fatal febrile illness caused by *Plasmodium* parasites transmitted by *Anopheles* mosquitoes, contributes significantly to global mortality and morbidity: nearly 250 million cases occur annually worldwide, and it remains a leading cause of death in children under 5.¹ Malaria has proven difficult to eliminate in many regions or eradicate globally,² in part because of a relatively complex disease ecology and ongoing challenges with waning effectiveness of existing tools, such as insecticides and antimalarial drugs.

Yet the global scaleup of insecticide-treated nets (ITNs) in the 2000s marked a turning point in malaria-control efforts. First used in the 1950s and field-tested throughout the 1980s and 1990s, ITNs are now a cornerstone of most malaria-control programs. Together with new diagnostics, drugs (including chemoprevention), and other vector-control tools (e.g., indoor residual spraying, or IRS), ITNs have helped reverse trends in global malaria mortality rates: the World Health Organization (WHO) estimates that global malaria deaths decreased by 40 percent between 2000 and 2015, from about 896,000 to 562,000 (figure 1).³ According to one study, ITNs alone prevented an estimated 450 million malaria cases during that period (Bertozzi-Villa et al. 2021).

FIGURE 1
Malaria Deaths by World Region, 2000 through 2020
Annual deaths from malaria across all ages and sexes

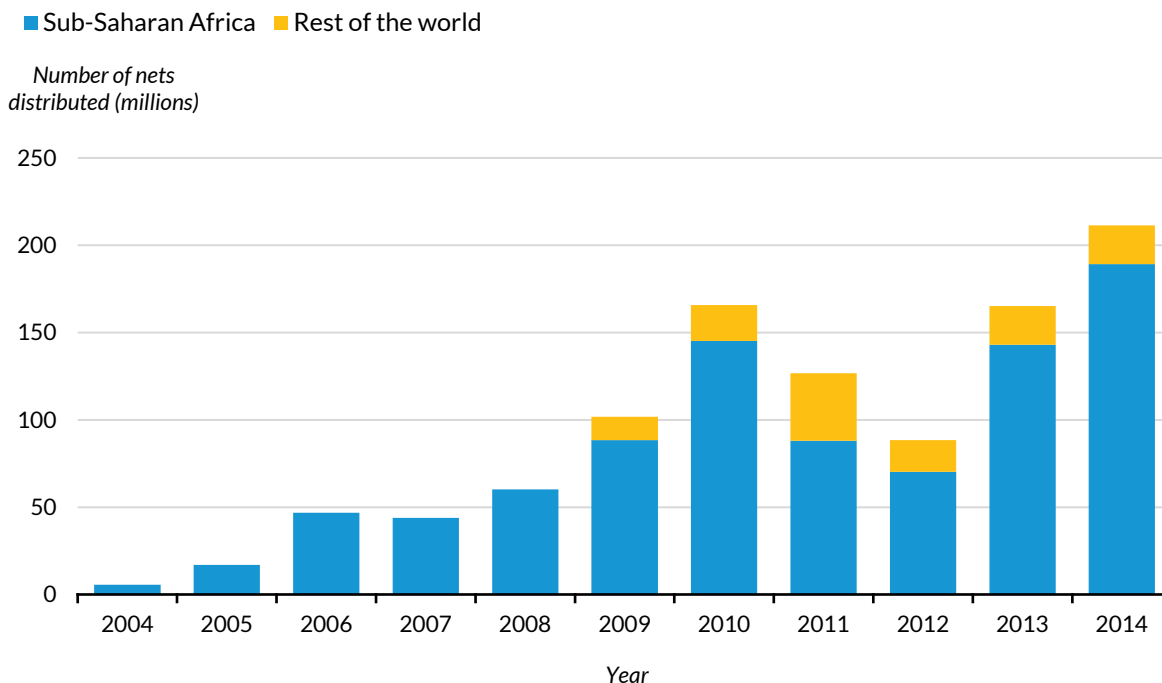


Source: Max Roser and Hannah Ritchie, “Malaria,” Our World in Data, last revised February 2022, <https://ourworldindata.org/malaria>.

Between 2004 and 2009, global ITN distribution increased nearly twentyfold, from 5.6 to 101.7 million nets (figure 2).⁴ By 2010, this figure reached 165.7 million, and in 2014 rose to 200 million. This global scaleup of ITNs, which contributed to the significant reductions in malaria cases and deaths worldwide, is often celebrated as one of the greatest achievements in global health in recent memory. In 2020, in honor of the world reaching the milestone of a cumulative total of 2 billion nets distributed, United to Beat Malaria called ITNs “one of the most effective investments the world has made over the past two decades to improve maternal and child health.”⁵ As another testament to this success, one expert consulted for this case study recalled having “been in many meetings where policy advocates asked, ‘What’s our bednet [equivalent]?’”⁶

FIGURE 2

Global Shipments of Insecticide-Treated Nets by Region and Year



URBAN INSTITUTE

Source: Alliance for Malaria Prevention’s Net Mapping Project (Q4 2021).

In early 2022, the Urban Institute, with support from Open Philanthropy, initiated this case study analyzing the causal factors contributing to the global scaleup of ITNs, particularly from 2000 through 2010, with an emphasis on the roles research and philanthropic funding played in the scaleup. The aim of this case study is to identify what specific causal mechanisms or factors enabled the global scaleup of ITN distribution and of funding for (and political mobilization around) global malaria more broadly, attending to the strength of the evidentiary basis for such claims (and to particularly significant gaps in that evidence). In doing so, the case study also addresses the question of why global ITN scaleup did not happen sooner, given the scope of research that existed by 2000 demonstrating the effectiveness and cost-effectiveness of ITNs in preventing child mortality. The findings presented in this case study are based on an extensive literature and document review and qualitative interviews with 25 experts spanning the public sector, private sector, research and academia, and health program implementation.⁷

The path to global ITN scaleup was not straightforward, nor was it guaranteed. Briefly, the seven key constraining causal factors for faster scaleup identified in the literature and through expert interviews include: severely insufficient global malaria funding before 2005; lack of political will at international institutions to control malaria in Africa before the early aughts; insufficient manufacturing capacity to meet global demand for ITNs; lack of consensus around the optimal ITN delivery model, shaped in part by ideological and theoretical opposition to free health products; additional operational and logistical challenges (e.g., Global Fund to Fight AIDS, Tuberculosis and Malaria procurement delays);

lack of coordination across implementing organizations; and lack of clear policy and technical guidance for implementation (e.g., WHO policy delay).

The 10 key enabling causal factors for scaleup identified in the literature and through expert interviews include: purchasing power created primarily by the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) and secondarily by the President's Malaria Initiative (PMI); robust evidence of ITN effectiveness, cost-effectiveness, and implementation feasibility generated through randomized controlled trials (RCTs), effectiveness trials, and large-scale integrated child survival campaigns; multisectoral partnerships and collective action (e.g., Roll Back Malaria's [RBM's] working groups); political will from multilateral agency heads and heads of state championing malaria control; political will from the broader public (e.g., the impact of HIV/AIDS activism on global health financing and public scrutiny of US government [USG] aid spending); consensus around mass free distribution as the optimal delivery model (dependent in part upon all five preceding factors); attributes of ITNs (e.g., marketability) and technological innovation (e.g., long-lasting insecticide-treated nets, or LLINs[†]); increased global ITN production capacity; technical guidance and support; and clear policy guidance.

Taken together, these causal factors can be grouped into three overarching, interlinked categories:

- ▣ **Mechanistic factors.** These are the tangible, concrete factors without which ITN scaleup could not proceed. They include inhibiting factors that had to be removed or remedied for scaleup to occur.
 - » Examples include funding for malaria control, purchasing power, and LLIN manufacturing capacity.
- ▣ **Enabling-environment factors.** These are the necessary broader contextual factors and conceptual shifts in the aughts without which ITN scaleup likely would not have proceeded at the pace it did. Absent other causal factors and by themselves, these enabling-environment factors may have been insufficient for scaleup to occur, but the presence of these factors *together with* other causal factors created favorable conditions for rapid scaleup. (At times, this case study mentions enabling-policy-environment factors in discussions of the policy environment specifically). These factors include inhibiting factors that had to be removed or remedied for scaleup to occur.
 - » Examples include health commodities and grants as a conceptual shift in how aid donors thought about health aid and the enabling policy environment created by the rise of the movement for universal health coverage.

[†] At times, LLIN and ITN are used interchangeably in this case study, but they are not synonymous. LLINs have an insecticide woven directly into the net fiber, whereas ITN is the umbrella term for a mosquito net treated with an insecticide (which includes, for example, untreated nets sold with insecticide sachets that require re-treatment). In the 1990s through the mid-2000s, most ITNs in circulation were not LLINs.

- ▣ **Accelerating factors.** Overlapping with the preceding two categories, these factors by themselves may not have been necessary for scaleup to occur but seem to have accelerated its pace.
 - » Examples include evidence generated by development economists Pascaline Dupas and Jessica Cohen on cost as a barrier to net access and use.

This case study focuses narrowly on documenting and understanding the reasons net scaleup happened at the particular historical moment it did. It does not consider the relative merits of different strategies to prevent and control malaria beyond their relevance to this causal question (though, of course, these strategies are important to consider for malaria control).⁸ This case study similarly does not consider the humanistic or health impacts of ITNs beyond their relevance to the causal arguments made around scaleup; extensive research has documented these impacts elsewhere.⁹ Moreover, though “scaleup” has multiple possible definitions, this case study defines ITN scaleup primarily in terms of global net distribution and secondarily in terms of global malaria funding. Other potential definitions of ITN coverage not considered in this case study include net ownership (i.e., how many people own a net) and net use (i.e., how many people consistently sleep under a net each night). These definitions are more useful for understanding the actual health impacts of ITNs on malaria; again, however, this strand of analysis is beyond the scope of this particular inquiry.

Furthermore, this case study is not intended to and does not provide a comprehensive account of global efforts to prevent and control malaria. Rather, it focuses narrowly on the pertinent political, financial, social, operational, and other contextual factors that contributed to the global scaleup of ITNs during the aughts. Though the author has endeavored to base all conclusions and inferences on available evidence, this case study is not intended to be an exhaustive account of malaria-prevention efforts and is necessarily limited in scope. It is possible that other important elements of this scaleup story have been missed, and additional perspectives would likely shed further light on how scaleup happened. Further case studies and other investigative projects exploring the context and history around global malaria-prevention and malaria-control efforts, such as innovations in rapid diagnostics, novel therapeutics, and vaccines, would likely yield additional valuable insights. In this case study, some of these possible directions for further research are flagged.

A Chronology of Major Milestones in the ITN Scaleup Story: Setting the Stage for Analysis

This case study homes in on the decade spanning 2000 to 2010 as the key period of ITN scaleup for three main reasons.¹⁰ First, global annual ITN distribution increased nearly twentyfold during this period and annual distribution remained consistently above 100 million nets after 2010. Second, funding for malaria similarly grew near-exponentially. Third, by the end of the decade, debates around optimal delivery models for bednets² were settled and the production capacity necessary to deliver nets

[‡] In the literature, “bednet” and “bed net” are both used at relatively similar rates. In this case study, the spelling “bednet” was chosen as the default spelling. This case study otherwise uses the same spelling used in quoted materials (e.g., reports and articles) and publication titles. This choice results in an inconsistent spelling overall in the case study.

at that scale was well on the way to being established. In addition, by the end of 2010, global targets and associated indicators for ITN distribution reflected the ambition for universal ITN coverage. Geographically, this case study focuses primarily on efforts to scale ITN use on the African continent, as in the 2000s most ITNs were distributed in African countries.

The preceding two decades, particularly the 1990s, were also an active period of research and evidence generation and of political mobilization around malaria, which occurred alongside a worsening malaria pandemic. As will be discussed further, these activities provided an important foundation on which subsequent advocacy, policy guidelines and decisions, and resource mobilization were built. Table 1 highlights some of the key milestones that fueled the broader mobilization around malaria control that, in turn, contributed to the conditions necessary for global scaleup of ITNs.

TABLE 1

Timeline of the Scaleup of Insecticide-Treated Nets: Key Milestones

Year	Milestone
1991	First ITN efficacy trial conducted with outcome measures for child mortality in The Gambia; findings indicate 63 percent reduction in child mortality
1992	Ministerial Conference on Malaria convened in Amsterdam; attendees endorse a Global Malaria Control Strategy ^a
1997 (June)	Harare Declaration on Malaria Prevention and Control in the Context of African Economic Recovery and Development, made at 33rd Assembly of Heads of State and Government of the Organisation of African Unity
1997	First International Conference on Malaria in Africa convened in Dakar, Senegal (January); Multilateral Initiative on Malaria subsequently formalized (July and November)
1997 (October)	International Conference on Bed Nets and Other Insecticide Treated Materials convened in Washington, DC (led by USAID)
1998 (May)	First Cochrane systematic review of ITNs published; reviews evidence from 18 trials, concluding that “ITNs have been shown in trials to reduce overall mortality by about a fifth in Africa”; highlights some “financial, technical and operational problems” ^b
1998	Roll Back Malaria launched by the UN Development Programme, UNICEF, the WHO, and the World Bank
2000 (April)	African Summit on Roll Back Malaria; Abuja Declaration signed by African heads of state; target of 60 percent coverage by 2005 set for all “at-risk” populations (e.g., pregnant women and children under 5) with preventive and curative tools, including ITNs
2000	ITNs included in United Nations Millennium Declaration (Millennium Development Goal 6C, indicator 6.7)
2001	Togo, via the Organisation of African Unity, requests 55th UN General Assembly agenda item to make 2000–2010 the “Decade to Roll Back Malaria in Africa” ^c
2001	The WHO approves first LLIN, Sumitomo Chemical’s Olyset
2001	Kofi Annan proposes the idea for the Global Fund to African leaders at the African Summit on HIV, Tuberculosis, and Other Infectious Diseases
2002	The Global Fund to Fight AIDS, Tuberculosis and Malaria established

Year	Milestone
2002 (December)	UN General Assembly formally adopts resolution to make 2000–2010 the “Decade to Roll Back Malaria in Africa”; includes 60 percent ITN coverage target for most at-risk populations ^d
2003	The US President’s Emergency Plan for AIDS Relief established
2004	Updated Cochrane systematic review of ITNs published; reviews evidence from 22 randomized controlled trials, concluding that ITNs are “highly effective in reducing childhood mortality and morbidity from malaria” ^e
2004	Second LLIN, Vestergaard’s PermaNet 2.0, approved by the WHO
2005	The WHO 58th World Health Assembly: target of 80 percent coverage by 2010 set across four key interventions, including ITNs; ITN-specific coverage target remains set to 60 percent among most vulnerable populations (WHA58.2)
2005	US President’s Malaria Initiative launched; three focus countries initially included
2006 (December)	White House Summit on Malaria; Malaria No More launched and eight more countries announced as focus countries for President’s Malaria Initiative
2007	Third LLIN, BASF’s Interceptor, approved by the WHO
2007 (August)	The WHO issues new global guidance, recommending universal, free coverage of LLINs ^f
2008	UN Millennium Development Goals Malaria Summit hosted; world leaders endorse Global Malaria Action Plan and associated goal “to reduce malaria deaths in Africa to near zero by 2015”
2009	African Leaders Malaria Alliance launched
2009	Total annual global ITN distribution surpasses 100 million nets for the first time
2014	Cumulative global ITN distribution surpasses 2 billion nets

Sources: ^a *Ministerial Conference on Malaria* (Amsterdam: World Health Organization Division of Control of Tropical Diseases, November 25, 1992). ^b Christian Lengeler, “Insecticide treated bednets and curtains for malaria control,” *Cochrane Database of Systematic Reviews*, 1998, Issue 2, Art. No. CD000363. ^c “Request for the inclusion of an additional item in the agenda of the 55th session: Decade to Roll Back Malaria in Africa,” *United Nations*, 2001, <https://digitallibrary.un.org/record/436185?ln=en>. ^d United Nations General Assembly, “57/294. 2001–2010: Decade to Roll Back Malaria in Developing Countries, Particularly in Africa,” December 2002, <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N02/560/93/PDF/N0256093.pdf?OpenElement>. ^e Christian Lengeler, “Insecticide-treated bed nets and curtains for preventing malaria,” *Cochrane Database of Systematic Reviews*, 2004, Issue 2, Art. No. CD000363. ^f “WHO releases new guidance on insecticide-treated mosquito nets,” World Health Organization, August 15, 2007, <https://www.who.int/news/item/15-08-2007-who-releases-new-guidance-on-insecticide-treated-mosquito-nets>.

Notes: ITN = insecticide-treated net. LLIN = long-lasting insecticide-treated net. USAID = US Agency for International Development. WHO = World Health Organization.

In the 1990s and through the early 2000s, malaria incidence and malaria mortality rates rose to their highest recorded levels, experienced most acutely in Africa. Yet during this period, global malaria funding and global public health spending more generally were at historically low levels. The inertia following several decades of inaction on malaria carried well into the aughts, which created a set of entrenched hurdles policymakers had to address before ITN scaleup could proceed. The global scaleup of ITNs during the 2000s was the product of multiple intersecting causal factors, any of which, if absent, might have prevented further progress. As will be elaborated on in this case study, each step on the path to scaling ITNs globally was contingent upon each preceding step. The growth in global ITN distribution

in the 2000s required sustained collective action and coordination at the global, national, and local levels from all involved: researchers, implementers, net manufacturers, policymakers, donors, and net users.

Insufficient domestic health financing combined with insufficient development assistance for malaria made rapid ITN scaleup practically impossible before 2005. Politics and ideological entrenchment contributed to this lack of resource mobilization for malaria. In many heavily indebted African countries (many of which overlapped with malaria-endemic countries), constrained domestic health budgets and World Bank loan requirements meant governments adopted health user fees, which displaced some of the costs of health care onto citizens. Before the mid-aughts, most malaria programs were domestically funded, yet amid numerous other competing health-financing demands and high poverty rates, domestic resourcing was insufficient for national ITN distribution campaigns. External financing funded significant portions of many malaria-control programs' budgets after the mid-aughts. Two of the largest aid donors at the time, the US and UK governments, promoted health user fees and commercialization and social marketing of health products, including mosquito nets.¹¹

This norm of charging people for health products impeded ITN scaleup. Disagreements over net prices (i.e., whether to fully or partially subsidize them, sell them commercially, or pursue some mix of these options) resulted in a lack of consensus around the optimal ITN scaleup strategy, which in turn delayed formal policy and technical guidance. Because of the role of external financing in ITN scaleup, moreover, this protracted debate also seems to have discouraged donors from funding mass free distribution campaigns before 2005. Untested economic theories, such as the idea that people would value mosquito nets more if they paid for them, and a lack of malaria data also contributed to this disagreement. At the same time, these debates occurred within the context of constrained financing for malaria. Although the Global Fund was formed in 2002, the magnitude of financing available in early funding rounds—combined with operational challenges—was not sufficient to meet countries' demand for nets, let alone the full suite of malaria-control tools countries needed. The President's Malaria Initiative, meanwhile, was not formed until 2005 and similarly took time to scale.

Manufacturing, operational, and logistical challenges all impeded scaleup efforts throughout the 2000s, most acutely before 2007. Only two quality-assured manufacturers, Sumitomo Chemical (Japanese) and Vestergaard (Danish),¹² produced LLINs by mid-decade, resulting in insufficient production capacity to meet global LLIN demand. Additional manufacturers slowly entered the market, though regulatory processes and approvals took time. Production capacity, however, also depended on assurance of a market; until the assurance of purchasing power from the Global Fund and PMI (and from the International Federation of Red Cross and Red Crescent Societies, or IFRC, earlier), ITN scaleup could not proceed. Hurdles created by certain aspects of the Global Fund's early operations—problems with its procurement function and application process—also had to be overcome to enable scaleup. Other operational challenges included a lack of coordination around evidence generation and implementation efforts. Early on in ITN scaleup efforts, moreover, malaria researchers had to understand people's preferences around nets and then convince policymakers, donors, and users of the public health and vector-control value of nets, which took time.

Without the robust body of evidence demonstrating the effectiveness and cost-effectiveness of ITNs in killing mosquitos and saving lives—and ongoing research generation around ITN uptake in the 2000s—ITN scaleup would almost certainly not have happened. Randomized controlled trials and other studies demonstrated efficacy, effectiveness, and cost-effectiveness; donors such as PMI cited this evidence base as an impetus to fund ITNs (among other malaria interventions).¹³ Furthermore, not everywhere had preexisting cultures of net use. Identifying and responding to local preferences and needs around net use was necessary to ensure ITN uptake. Monitoring and evaluation in the early 2000s that documented poverty and net costs as key barriers to net use, along with evidence of net uptake across different delivery models, facilitated ITN scaleup by resolving arguments against free nets. The WHO cited evidence from several distribution campaigns in Kenya from 2004 to 2006 in its 2007 decision to formally recommend universal free coverage of LLINs, which accelerated scaleup.

Arguably the most critical factor for ITN scaleup, though, was the creation of new financing mechanisms for HIV/AIDS in the early 2000s, which also opened new funding pathways for malaria thanks to the efforts of malaria advocates. Spurred in large part by AIDS activists, the creation of the Global Fund in 2002 and other large health aid agencies ushered in a new era of global cooperation for global health, from which ITN scaleup efforts benefited greatly (not least because the Global Fund is a health commodities fund and ITNs are a health commodity). The pot of money made available by the Global Fund and PMI also removed a main impediment to faster scaleup: the question of whether nets should (or could) be free. As the Global Fund and PMI scaled funding, moreover, volume assurances generated by the volumes these two entities procured signaled to manufacturers the existence of a market for LLINs, which helped bring more manufacturers into the market. More competition contributed to greater LLIN production capacity and lower unit costs, which contributed to the ability to scale. The technological innovation of weaving an insecticide directly into the net fabric, moreover, alongside other contemporaneous innovations in the malaria toolkit, also likely accelerated scaleup.

Political will and advocacy from senior-level policymakers, malaria advocates, and the broader public was another necessary factor for ITN scaleup. Malaria's inclusion in the Global Fund happened in part because of advocacy from African policymakers and other constituents. Other policymakers in national governments such as Tedros Adhanom Ghebreyesus and Charity Ngilu, along with multilateral policy leaders such as Kofi Annan, Gro Harlem Brundtland, Arata Kochi, and Jeffrey Sachs, leveraged their positions of power to champion efforts to combat malaria and scale up ITNs, especially within the UN system. Before about 2005, malaria had a relatively low global policy profile (and it remains neglected relative to the disease burden); that sustained effort and advocacy was needed to raise the prominence of that profile and enforce accountability to act. ITNs, in turn, were “an advocate's dream,” in the view of John McArthur, who managed the UN Millennium Project from 2002 to 2006. The “vivid” visual of a bednet as “a physical shield protecting children from killer mosquitos,” he added, made it a “compelling” point of advocacy toward donors.

Multisectoral partnerships such as Roll Back Malaria, moreover, contributed to ITN scaleup by coalescing advocacy efforts, creating coordinating platforms, and bringing together disparate actors: multilateral and bilateral agencies, funders, researchers, net manufacturers, implementers,

policymakers, and net users. Although specific agencies and individuals are discussed at length in this case study, no one agency or individual can credibly claim the lion's share of the credit. Global ITN scaleup was incontrovertibly a collective effort involving many groups, and what made the difference was arguably the *coming together* of those groups. On the role of this coordinated action, Mariatou Tala Jallow, The Gambia's chief pharmacist from 1993 to 2007 and Global Fund manager and senior manager from 2007 through 2019, stated:

The most important part of this story is partnership, the spirit of partnership—it was all hands on deck. It was not just the Global Fund or PMI saying, “we have the money,” but [rather] we have those who were advocating for the money, those who were supporting the countries to make sure that they can get their proposals right, they can get the campaigns to be done on time. You had the manufacturers where it's also that kind of conversation with them to know what is going to happen to make them be part of the big picture because they have a contributing role to play. And then you have all the others who are pushing to make sure that they have enough nets and to monitor the situation.¹⁴

Several other factors further contributed to ITN scaleup in the aughts. Technical guidance and support, enabled in part by this kind of partnership, contributed to scaleup by more than doubling the approval rate of Global Fund grants for malaria in that decade. Public scrutiny on, and negative media coverage of, certain aspects of various donor programs and policies seemed to accelerate enabling-policy-environment factors. Broader sectoral shifts throughout the 2000s, such as the abolition of health user fees and the embrace of universal health coverage, were also enabling-environment causal factors in ITN scaleup.

More generally, though, each piece of this puzzle seems to be deeply intertwined with and contingent upon each other piece. In McArthur's framing, “What led to each thing ratcheting up has its own story—each expansion of the effort stood on the shoulders of the piece that came before, even when people were not aware of that previous piece's existence.”

Background and Brief Historical Context

Malaria has been a global health challenge for centuries; it remains a leading cause of death in young children and is a significant driver of economic, educational, and health disruptions in endemic countries. Currently, almost half of all people live in malaria transmission zones; *Plasmodium falciparum* is the main malaria parasite in African countries while *Plasmodium vivax* is the main malaria parasite on other continents.¹⁵ Malaria has historically flourished across the globe and is a global disease; however, Africa currently bears the brunt of the disease burden: in 2021, 95 percent of malaria cases and 96 percent of malaria deaths occurred in the WHO African Region.¹⁶ Improved public health measures, along with socioeconomic development, have enabled previously malaria-endemic countries and regions, such as Europe, the US, and most of the Caribbean, to eliminate malaria (though, of course, malaria reintroduction remains a risk, particularly in the context of climate change).¹⁷

Controlling, eliminating, and eradicating malaria, however, has proved challenging.¹⁸ The complexity of the life cycle of malaria-causing *Plasmodium* parasites and the ecology of malaria makes

effective malaria control highly context-dependent. For malaria-control efforts to succeed, therefore, programs must attend to the specific epidemiological, ecological, and socioeconomic contexts in which they are implemented. Nevertheless, elimination has been achieved in dozens of countries, and the rest of the world has made significant progress in controlling malaria. Before the mid-20th century, advancements in sanitation and public health measures, along with economic growth and investments in social welfare, supported vector control, which is any activity that prevents diseases “whose transmission cycle relies on vectors or intermediate hosts” such as mammals and insects.¹⁹ Because malaria is transmitted by mosquito bites, vector control represents a critical component of preventing malaria transmission.

Throughout the 20th century, moreover, major innovations in therapeutics—including the development of chloroquine²⁰ and later of artemisinin-based²¹ combination therapies, the current first-line antimalarial—and other vector-control tools such as IRS and ITNs were all important contributions to malaria-control efforts. Though examining each innovation’s development and implementation would likely yield fruitful insights on the research-to-policy-to-practice pipeline, this case study focuses solely on the trajectory of ITNs.

The Legacy of the Malaria Eradication Programme

The development of the insecticide DDT kickstarted malaria-eradication ambitions in the mid-20th century. Launched in 1955 and officially ending in 1969, the WHO led the global Malaria Eradication Programme (MEP), which, despite the promise of DDT and the scale of investments made in the MEP, has been considered broadly unsuccessful. Over 14 years, \$1.4 billion was spent on the campaign; although more than half of the 46 countries in which the MEP was launched achieved elimination by 1970, “these declines proved in many cases to be unsustainable” as some countries experienced a rebound effect in malaria incidence in the decades after eradication programs, and associated funding, wound down (Packard 2007, 159).²² Few African countries, moreover, were included in the campaign, despite the significant malaria burden on the continent.

The tepid results of the WHO’s MEP in the 1950s and 1960s had a dampening effect on malaria research and malaria-control efforts, according to multiple experts interviewed for this case study.²³ Wendy Prudhomme O’Meara, a malaria and implementation science researcher affiliated with Duke University and Moi University, put it this way:

Not to say that [the MEP] wasn’t successful; there are places where malaria was eradicated during that global malaria eradication program. But the success that they were expecting certainly didn’t materialize. But then you have this moment in the history of malaria control where you have a dearth of scientists who have been trained in public health measures for vector control. There’s just this gap where there’s no entomologists [or] malariologists in the scientific training pipeline, which I think really set back the field quite a bit. Because there was so much overconfidence that we were going to eradicate malaria, we weren’t investing in training people to study malaria. So when the campaign ended, we had this gap in the pipeline. And then we were slow to refocus resources on that problem because we were so burned by our hubris.²⁴

This overconfidence, and the cost of the MEP and its failure to realize global eradication, created a “sense of pessimism around investing in malaria control” in the 1970s and 1980s, according to medical historian Kirsten Moore-Sheeley.²⁵ Another source who worked on malaria in the 2000s echoed this sentiment, stating that the magnitude of the MEP’s failure pushed malaria into “almost the dark ages.”²⁶

The Global Economic Situation in the 1970s and 1980s

The diminishing scale of investments that followed the MEP reflected this retraction of global attention on and resources for malaria: total development assistance for health (DAH) spent on malaria before 2000 has been estimated to have been as low as \$40 million (compared with \$724 million in 2007; precise estimates for DAH spent on malaria from 1970 through 1990 are lacking in the literature) (Flaxman et al. 2010). The disappointing results of the MEP were not the only contributing factor, however: the 1980s also saw a global debt crisis and subsequent global recession. Combined with other effects of this recession, a “period of resource scarcity” emerged, with dwindling financial support for the WHO, retreating ambitions for mass campaigns to eliminate or eradicate malaria (among other global public health problems), and a growing emphasis on cost-effectiveness and demonstrable results (or on maximizing the health benefits of reduced health budgets) (Moore-Sheeley 2017).²⁷

This constrained economic context contributed to relatively low levels of DAH spending by bilateral and multilateral agencies broadly,²⁸ while heavily indebted and low- and middle-income countries were left in a particularly precarious economic position.²⁹ Or as Moore-Sheeley put it, “Not only were poorer countries dealing with malaria, but it’s not like there was a lot of help and support and funding coming from the international community.” At the same time, the World Bank and International Monetary Fund enacted a series of structural adjustment programs in low- and middle-income countries that constrained domestic health budgets. These programs tended to undermine health system capacity, which predictably resulted in worse health outcomes. Evidence suggests a negative relationship between these programs and maternal and child health outcomes, for a variety of reasons (Thomson, Kentikelenis, and Stubbs 2017).

Against this economic backdrop, many heavily indebted countries—which overlapped significantly with malaria-endemic countries—increasingly privatized health care, while donor agencies promoted “market-based” approaches. Those approaches included commercialization of health products, use of user fees (i.e., displacing some health care costs onto citizens), and prioritization of health commodities over structural drivers of illness. This context is important for understanding why health commodities became a central focus of global health institutions in the early 2000s and why ITNs were seen as an attractive investment and an attractive apparent solution to a complex health problem.

Establishing the Evidence Base for ITNs

The State of Research in the 1980s and 1990s

Bednets have been used as a vector-control tool for centuries in many places. The addition of insecticides began around the 1950s in China, where nets were treated with emerging innovations in insecticides such as DDT (Moore-Sheeley 2017). Although DDT was initially a quite effective vector-

control tool, growing resistance, or waning effectiveness, made it less useful throughout the 1970s and 1980s. Taken together with growing resistance to chloroquine (the standard of care for malaria treatment in the latter half of the 20th century) and dwindling public resources for investing in malaria control, the malaria prevention and treatment toolkit was limited. And with malaria also rebounding in some countries where malaria-eradication programs had ceased, more effective tools to prevent and control malaria were needed.

Another global health crisis, moreover, was brewing. The first AIDS cases were documented in 1981 in the US, and by the start of the 1990s, more than half a million people were dying worldwide from AIDS a year (this figure increased until 2004, when it peaked at nearly two million AIDS-related deaths a year).³⁰ HIV/AIDS compromises a person's immune system, making them more vulnerable to opportunistic and other infections, including tuberculosis and malaria. With the rise in HIV/AIDS globally, more people were then also dying of tuberculosis and, most likely, of malaria (data are lacking from the 1990s, so estimates are imprecise). Other factors, of course, influence malaria mortality rates, but the combined effects of these overlapping pandemics compounded the crisis.

With the rising challenge of HIV/AIDS, a substandard malaria-control toolkit, and limited public resources for combating malaria (including research and development for new interventions), ITNs looked like a "promising new tool in a landscape devoid of hope," according to Moore-Sheeley. More specifically,

ITNs seemed to be an economically suitable or viable intervention, but also they seemed very simple-to-use tools, something you didn't need technical experts to use, so something rural villagers could implement. And so at a time when there wasn't a lot of international funding and support for malaria activities, that technical simplicity was also...very critical to scientists and then later on policymakers and health officials for mobilizing around as a potential solution.

Although bednets were already common in some contexts, it was not until the 1980s that researchers began studying their effects on mosquito vector control and malaria transmission. In 1983, entomologists conducted the first trials of nets in Burkina Faso and Tanzania; in 1985, scientists conducted the first clinical trial for nets in The Gambia (Port and Boreham 1982).³¹ Over the following decade, researchers undertook multiple trials across the continent. These earliest trials focused on measuring reduction in malaria exposure.³² In the 1990s, trials were focused on measuring the efficacy of ITNs in reducing morbidity and mortality, particularly among children, who accounted for most malaria deaths. This shift in what studies measured was important: one person interviewed for this study cited malaria researcher Pedro Alonso's dictum "mortality data drives policy."³³ The first study to measure the efficacy of nets in preventing mortality occurred in The Gambia in 1991 and was led by Alonso; the study showed a 63 percent reduction in mortality among children under 5, which led The Gambia to decide to implement the National Impregnated Bednet Programme in 1992 (Alonso et al. 1991).³⁴ Though this was obviously a substantial reduction in mortality, the question of generalizability still loomed. According to Moore-Sheeley,

At the time, people weren't sure whether these results [from The Gambia] could be applied to other parts of Africa. Especially with malaria, it's dependent on so many local factors. And malaria

experts knew that, knew that malaria could be a very local disease, or manifests differently based on very local factors. And so it was very exciting to see that these [ITNs] could save children's lives, but also it was unclear how widely these results were applicable.

To find out how applicable to other contexts these results were, the Special Programme for Research and Training in Tropical Diseases (TDR)³⁵ supported four large-scale RCTs between 1992 and 1995 that measured mortality outcomes in four sites in The Gambia, Ghana, Kenya, and Burkina Faso. The four trials were designed with policy design and implementation in mind and also included cost-effectiveness measures (Moore-Sheeley 2017). By 1996, researchers had shown that nets reduced child mortality by one-fifth;³⁶ findings from the Ghana and Kenya trials suggested ITNs had the potential to save half a million children's lives annually.³⁷

These were “mind-blowing results,” as “nothing else was reducing childhood mortality as well, save for childhood immunizations,” according to Des Chavasse, former senior vice president and chief evidence officer for Population Services International (PSI).³⁸ Mind-blowing as they were, these results did not receive unanimous enthusiasm at the time of publication because of concerns about the generalizability and sustainability of the results. Indeed, several researchers who led some of these studies who were interviewed for this case study expressed frustration and disappointment that the results were not acted upon faster.

These four RCTs, though, together with other efficacy studies conducted during the 1990s, generated clear evidence that ITNs significantly reduced malaria mortality among children: a Cochrane systematic review, considered the gold standard for assessing evidence in the health sector, published in 1998 confirmed that ITNs reduced “overall mortality by about a fifth in Africa” (Lengeler 1998). The trials also demonstrated cost-effectiveness. Yet although looking at the evidence base retrospectively may make it appear there would have been consensus on how to interpret these findings, this was not the case. Instead, active debates within the scientific research community about what some framed as “unresolved scientific questions” undermined consensus. According to Moore-Sheeley, “it took many years to build up a scientific consensus around the effectiveness of” ITNs.

There were several focal points of this scientific disagreement at the end of the 1990s. Christian Lengeler, one of the main researchers leading bednet studies during this period, stated there was a “very substantial fraction of malaria researchers that made the claim that although there were short-term gains from mosquito nets,” nets just delayed death; or, put differently, there was “a real concern that nets didn't lead to long-term gains.”³⁹ According to another leading malaria researcher, Fred Binka, this concern was primarily in the context of high-transmission areas, where some people thought that “nets posed a danger to children in high-transmission areas because they thought children wouldn't develop immunity to protect them from malaria, so it would just postpone deaths.”⁴⁰

Subsequent research disproved this concern. Findings from follow-up studies in western Kenya, along with research generated by Binka and Bob Snow in northern Ghana, “settled the dispute,” according to Binka, about whether nets worked in high-transmission areas (Lindblade et al. 2004). Although these and other follow-up studies demonstrated nets' sustained impact on child mortality,⁴¹ the perceived risk of delaying but not preventing child mortality seems to have tempered enthusiasm

around the immediate adoption of ITNs among international organizations that were supporting malaria control in endemic countries. According to Binka, “Big NGOs were saying ‘we’re trying to protect children, but don’t want to get in the position where we’re starting epidemics.’ Even though there was no evidence” for that concern, the risk was perceived as too significant. Lengeler similarly stated that the question of sustained benefits “was disputed enough that many organizations such as UNICEF hesitated to invest in mosquito nets because they didn’t want to waste their money.” By the end of the decade, however, sufficient additional evidence had been generated to definitively counter these doubts.

As researchers such as Binka and Lengeler led studies that proved instrumental in demonstrating the causal health gains of using nets, small-scale implementation efforts across the African continent were also under way. According to Moore-Sheeley, “RCTs really mobilized funders in some of the wealthy countries, but other NGOs and African countries themselves were already thinking about ways to implement this” intervention at scale. In other words, funders had to be convinced to invest in nets through larger trials first, whereas researchers and implementers saw the potential after the 1991 Gambian study and did not need convincing in the same way. Some “early adopters” implemented net campaigns in the 1990s, such as The Gambia (which implemented a national net program in 1992). Other small-scale ITN distribution models emerged across Africa, including in Kenya, Tanzania (Zanzibar), and Zambia; Tanzania, for example, used local production (A to Z Textile Mills) and social-marketing and voucher schemes (Schellenberg et al. 2001).⁴²

Alongside these ongoing research trials and implementation projects, efforts to synthesize lessons learned also abounded in the 1990s. Between 1995 and 1998, the WHO/TDR ITNs Task Force for Operational Research supported more than 20 implementation research projects.⁴³ In 1996, the WHO/TDR’s Applied Field Research in Malaria Steering Committee, with Canada’s International Development Research Centre, published *Net Gain: A New Method for Preventing Malaria Deaths*, which attempted to collate findings and lessons learned across research and implementation efforts. The book highlighted the need for more evidence documenting the “cost, effectiveness, long-term sustainability, and practical feasibility of routine (‘nonresearch’) ITN-implementation programs” (Lengeler, Cattani, and de Savigny 1996, xi). And in 1999, in a study funded by the UK Department for International Development (DFID) of nearly 30 implementation projects across 15 countries, Chavasse coauthored a manual for ITN delivery (Reed, Chavasse, and Attawell 2000). The extent to which policymakers and donors, along with others in the malaria research and implementation space, read and were influenced by these works, however, is unclear.

Despite these efforts at synthesis and although the WHO African Region encouraged countries to undertake implementation research, many African countries did not have the resources to do so without external support, according to Moore-Sheeley. Consequently, “a lot of knowledge about how best to implement ITNs was coming from whichever program happened to be studying their outcomes,” which in turn was a function of who had the funding to do so. WHO/TDR, for its part, had a budget of only about \$1.5 million for malaria research (Miller 2010). With the creation of Roll Back Malaria in 1998,⁴⁴ WHO/TDR scaled back its malaria research efforts, creating a “disconnect,” according to

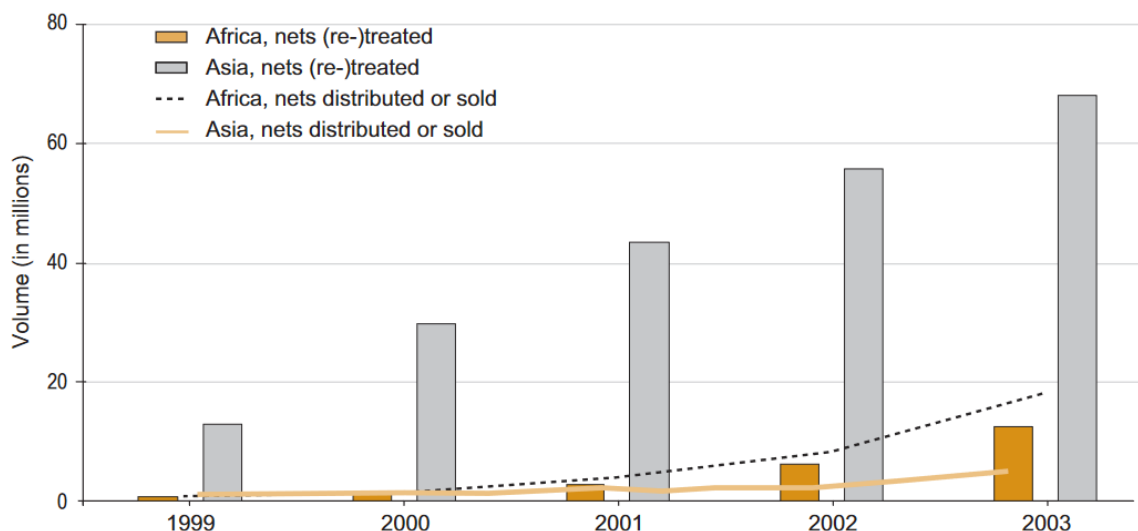
Moore-Sheeley. This disconnect led to “not a very well-coordinated effort to pool knowledge” in which it “seemed like people were learning the same lessons in different parts of the continent over and over.”

In October 1997, the first international conference centered specifically on ITNs, the International Conference on Bed Nets and Other Insecticide Treated Materials, was hosted in Washington, DC. It featured plenary presentations on bednet trials, the “bednet experience in Africa,” demand creation, accessibility, affordability, and appropriate use, as well as remarks from then-USAID administrator Brian Atwood.⁴⁵ According to Lengeler, “all the major players” such as UNICEF, the WHO, and representatives of national governments attended. “Quite frankly,” Lengeler noted, “there wasn’t much of a discussion, because the results were so incredibly powerful that everyone was pretty excited.” Yet at that point, there was virtually no funding to realize a global ITN scaleup campaign.

Understanding User Demand for ITNs: Net Acceptance and Adoption

Indeed, the 1998 Cochrane review pointed to “financial, technical and operational problems” that needed to be addressed before scaleup could happen, foreshadowing what would become some of the key constraints to scaleup in the 2000s (Lengeler 1998). Halima Mwenesi, an expert on malaria program implementation who has provided technical support to the Global Fund, the US government, and the WHO, noted that during the last four years of the 1990s when effectiveness and operational studies were starting to occur, many new questions began to emerge around bednet delivery, treatment, and use.⁴⁶ Notably, many countries in Asia already had cultures of net use; up through 2003, most ITNs in use were in Asia (figure 3).

FIGURE 3
Cumulative Number of Mosquito Nets Distributed, Sold, or (Re-)treated by Region According to Country Reports, 1999–2003



Source: *World Malaria Report 2005* (Geneva: Roll Back Malaria and World Health Organization, and New York: UNICEF, 2005).

Leading up to the establishment of the Global Fund in 2002, there was an impetus to “look more at the Asian and Latin American experiences,” according to the fund’s founding executive director Richard Feachem.⁴⁷ Until the development of long-lasting insecticide-treated nets in the 1990s and their widespread availability in the late 2000s, ITNs had to be re-treated about every six months to remain effective. Various approaches to re-treating nets were used, such as periodic communal dipping of the nets in large vats of the insecticide. For multiple reasons, regular re-treatment created barriers for some net users. Yet even with this technology, “well-managed programs” outside of Africa showed what was achievable in malaria control, according to Feachem. “Malaria control and prevention depends more on good management than on science,” he added.

In Africa, some communities had preexisting cultures of net use, though many did not; this varied within and across countries and meant cultures of net use had to be built in some communities before scaleup could occur. Broadly speaking, some parts of East and West African countries tended to have such cultures by the late 1990s, though many rural areas in these regions did not. In addition, Moore-Sheeley and others noted that “not everyone linked malaria and mosquitos,” so ITNs were not necessarily “intuitive as a malaria control measure” for net users or donors, initially. For example, in urban areas of East Africa in particular with “high culicine biting rates,” residents used untreated nets “purely for protection against mosquito biting nuisance,” Abraham Mnzava, former coordinator of the WHO Global Malaria Programme’s Entomology and Vector Control Unit, explained.⁴⁸ Strategies that might have made malaria-control programs in Asia effective, then, would not necessarily translate; target populations for ITN use needed to be engaged to understand their needs and preferences around nets. “It was easy for communities already using nets to shift from nontreated to treated nets, but for those who never used bednets, it was really strong advocacy from the global level, from the national level,” according to Jallow. “Communities who were willing to use it had to adopt it, use it—that in itself was a journey.”

By the late 1990s and early 2000s, ITNs were understood within the malaria community as an effective malaria-prevention tool; researchers and program implementers had to address questions around net acceptance and adoption, however, before they could implement nets at scale. Leading questions at the time were whether people would use the nets, whether nets would be repurposed, and what people’s preferences were around net use. Because insecticides are generally harmful substances, implementers also needed “to make sure the insecticide was going to be used properly,” according to Mwenesi.⁴⁹ According to Moore-Sheeley, however, there was “insufficient engagement with intended users to figure out how best to meet them where they are—what they think about it, why they’re not using it [if they’re not using nets], how to make it work better.” Mnzava, currently a senior malaria adviser with the African Leaders Malaria Alliance, also reported this experience: “A lot of people thought—including decisionmakers—‘oh, this is a simple tool, you can just roll it out,’” but this was not the case. He further explained,

It was a vector control tool that had to be deployed not only with an understanding of entomology—in particular vector behavior—and vector control, but also by individuals who understood the communities very well, because its [effectiveness] also depends on the uptake of

this tool. This is not entomology; this is anthropology, [understanding how] communities that take up this tool for prevention [will use it].

Marcy Erskine, who worked on the IFRC's national distribution campaigns in the early aughts, shared that "this was actually why the Canadian Red Cross hired" her in 2004: to lead research that would assess whether people would "actually use the nets if we [got] them out" and to understand "barriers to use."⁵⁰ Erskine, who has a PhD in anthropology, said that the "Canadian Red Cross was putting in CAD 20 million [dollars] for nets [by early 2005], but wasn't convinced that the nets were going to get used" consistently following early coverage surveys. Through campaigns involving "wholesale coverage of entire districts with everyone sleeping under a net," the Canadian Red Cross, the IFRC, and other partners developed a better understanding of how people were living and sleeping and how nets might fit into that, according to Erskine. It seems likely that addressing these concerns was important for bolstering other donors' confidence in investing in nets alongside the Red Cross.

Around this time, media outlets such as the BBC started reporting anecdotes of net misuse; development economists, policymakers, and funders who favored cost-sharing and the commercialization of ITNs used ITN misuse in support of that argument. The most frequently cited example was the use of ITNs as fishing nets; as several experts interviewed for this case study pointed out, however, the magnitude of the problem seems to have been misrepresented, possibly in service of continuing to charge people for nets (then the dominant delivery model).⁵¹ Erskine, for example, acknowledged that net misuse was a "more visible problem in larger campaigns," but noted it is important to keep in mind that most ITN distribution schemes around this time were distributing nets on the scale of tens of thousands over several months, whereas national distribution campaigns distributed millions of nets over several days. On this larger scale, net misuse will necessarily occur in larger numbers in absolute terms. Pascaline Dupas, who coauthored a study that conclusively demonstrated distributing nets for free achieved greater access and use than subsidized nets (Cohen and Dupas 2007),⁵² said "if you do the math, most people at risk are not even close to a lake. Even if some number of people misuse the nets, they are still most likely very beneficial for all the other communities who would use them."⁵³

Although development economists such as Dupas showed that people use nets if they have access to them, it seems plausible that concerns around net mis- or nonuse initially tempered enthusiasm to finance large-scale ITN delivery early on. Dupas, for example, noted that to be able to implement nets at scale in the context of limited health financing, African national governments first needed to see "enough evidence that showed the products wouldn't be wasted." Especially in the context of having to regularly re-treat nets before the widespread accessibility of LLINs, donors may not have initially been confident in nets "as an effective public health tool," according to Moore-Sheeley. Over time, however, enough evidence was generated to show that people understood nets, wanted nets, and would use nets if they had access to them (Eisele, Thwing, and Keating 2011). This evidence generation was achieved primarily through large-scale distribution campaigns led by national malaria-control programs in partnership with Red Cross Red Crescent National Societies, the Canadian Red Cross, the IFRC, and others (such as UNICEF and the WHO), which Erskine supported through her role with the Canadian Red Cross.

Establishing that evidence base took time, though, and other evidence suggests that donors may have been skeptical about fully subsidizing nets without assurance that people would use them as intended. Erskine noted that “a lot of money went for communication and social mobilization at the start because of the worry that people wouldn’t use the nets, which would limit data showing nets worked.” There was an incentive, then, to social-market nets in communities to ensure net use, to in turn ensure nets’ health impacts could be shown, which was important for convincing donors to back free nets. In the context of limited global malaria funding, moreover, this extra spending on communications, marketing, and uptake took up precious budget lines that would later be used for direct commodity purchasing.

Proponents of social marketing approaches to ITN scaleup emphasized the need to attend to user preferences and net attributes (e.g., size, shape, color, additional features). Proponents of free mass delivery, however, countered that most malaria deaths occurred among poor, rural, and marginalized segments of the population, and therefore that rapid free scaleup should take precedence over net customization or commercialization. This difference of opinion shaped how people were thinking about approaches to ITN scaleup and arguments made against mass campaigns to deliver free nets (which would become the model for scaleup).

The State of Technical Guidance and the Evolving Evidence Base for ITNs by the Early 2000s

Amid all this ITN implementation and operational research activity, malaria cases and mortality climbed in the nineties through the early aughts: between 1980 and 2004, global malaria deaths nearly doubled, from an estimated 995,000 to 1,871,000 (Murray et al. 2012). Most of these deaths occurred in Africa among children younger than 5: malaria deaths in this cohort tripled between 1980 and 2004, from an estimated 377,000 to 1,047,000 (Murray et al. 2012).⁵⁴ With growing resistance to the main antimalarial on the market (chloroquine) and no rapid diagnostic test, the situation was becoming dire. Better tools to prevent, diagnose, and treat malaria were needed, along with much greater investments in malaria control. ITNs were looking increasingly promising, but challenges on the path to scaleup remained.

MAKING NETS “LEGIBLE” AS BOTH A LIFESAVING HEALTH COMMODITY AND MALARIA VECTOR-CONTROL TOOL

Among the necessary shifts that helped enable global ITN scaleup were (1) generating recognition among donors, policymakers, and the broader public that nets were a lifesaving health commodity, and (2) overcoming varied hesitations around, and resistance to, this idea. Researchers who led the ITN trials in the 1990s have noted that the influential medical journal *The Lancet* rejected their work and would not publish trial results (Moore-Sheeley 2017). According to Moore-Sheeley,

Even though there were these great results from the trials, people were just a bit slow to get on board. And scientists had to overcome some of the hurdles of convincing people that actually, this very simple net was something that could make a dent in malaria rates, was something that could save people’s lives. Major medicine and public health journals didn’t initially want to publish the results and I think because yeah, it’s a *net*; it’s not a drug, it’s not a vaccine, it’s not as legible as a public health intervention. It seems like that was really an obstacle that [researchers] faced in trying to get people excited about it.

For funding especially, it was therefore necessary to make nets legible to donors as a public health intervention, and more specifically as a relatively low-cost lifesaving health commodity. Preceding scientific and epidemiological debates, particularly in the context of low public spending on health aid, seemed to have amplified donors' cautiousness vis-à-vis nets. Robust evidence generated by trials and effective dissemination of that evidence were necessary to get donors on board: "It seemed from people I interviewed [for *Nothing But Nets*] that those scientific results were very critical to getting buy-in from donors. It did seem like those results were eventually exciting to people, but it took a lot of work to really publicize those results," according to Moore-Sheeley.

The WHO, for its part, had been involved in much of the research around nets before 2000 and was "probably in the best position to publicize something like this for the international community and mobilize support," Moore-Sheeley explained. Yet by the nineties, it "was in a very weak position in terms of ability to raise money." In the decades before 2000, moreover, the WHO focused more on strengthening primary health care and health systems than on the more vertical, disease-focused programming that became more common in global health after 2000. This orientation may also have contributed to its reluctance to promote nets in the way "that I think a lot of the scientists would have liked," according to Moore-Sheeley.

At the same time, ITNs were, crucially, not *only* a health commodity. Mnzava emphasized that ITNs must also be understood as a malaria vector-control tool. In reflecting on what now looks like a delay in funding and policy recommendations for nets, Mnzava thought that "vector control was really, really sidelined. I think for me, that's the starting point."⁵⁵ Vector control is the cornerstone of malaria control. The potential public health benefit of an ITN extends beyond the person who sleeps under the net (the physical barrier from mosquitos) by also functioning as vector control. The insecticide kills mosquitos on contact; if more than about 60 percent of a community used ITNs, the cumulative mosquito kill and reduced transmission created a community-wide vector-control effect. Somewhat similarly to how high rates of immunization against measles within a community, for example, confer greater community-level protection against measles, the vector-control effect of high ITN coverage achieved community-level protection from malaria.⁵⁶

In Mnzava's opinion, funding "came gradually because a lot of people, notably the late Chris Curtis from the London School of Hygiene and Tropical Medicine, made a strong, strong case that this was a powerful tool for malaria vector control. I don't think anyone would be interested to provide the needed resources for the scaleup" without making that case.⁵⁷

WITH EPIDEMIOLOGICAL QUESTIONS (MOSTLY) RESOLVED, IMPLEMENTATION AND LOGISTICAL QUESTIONS REMAIN

By the early 2000s, ITNs were seen as a lifesaving health commodity, while the case for ITNs as a vector-control tool was being made; the remaining impediments to scaleup involved questions about implementation and logistics. Arguably by 2000, ITNs were recognized by policymakers as a critical tool for reducing malaria incidence and mortality.⁵⁸ Moreover, by 2004, an updated Cochrane review was published that reviewed evidence from 22 RCTs and concluded that ITNs are "highly effective in reducing childhood mortality and morbidity from malaria" (Lengeler 2004). This review solidified

evidence that ITNs are effective (in controlled research settings). In the view of John Simon, former senior director for relief, stabilization, and development on the National Security Council staff at the White House, the evidence for ITNs' health impact was incontrovertible by 2005: "It became less a question of, 'Will this work?' and more, 'Are we willing to spend the money?' It was more of a logistics question; there was no doubt that nets would save lives."⁵⁹

From the late 1990s through the early 2000s, as most endemic countries worked toward putting national malaria strategies and strategic plans in place, global technical guidance and available funding with which to implement strategies were lacking. "It's one thing to have the evidence base to show this is very important," according to Jallow, "but what translates it [that evidence] into action is where you have the big gap." Jallow, who was responsible for national health product procurement as The Gambia's chief pharmacist from 1993 to 2007, underscored the importance of this technical support component:

What kind of technical support is available to move it, to shift it from finding the evidence to now where people are looking at it in terms of how do we translate it into policy, translate it into guidelines, how do we make sure that the countries that need it actually adopt it? The WHO played a clear role. The WHO and others were taking the lead in terms of translating those findings into policy, which was important, because most countries need that kind of guidance and support to adopt [the evidence] within their treatment guidelines, their malaria programs, to be able to do it.

An important distinction in available evidence at this time was around evidence from "large-scale" implementation projects: many of the trials through the early aughts were community- or district-based projects, whereas national campaigns were relatively few and far between. "It's fair to say there wasn't evidence for large-scale campaigns, but that's because there just weren't that many large-scale campaigns at that time," according to Simon. "But that wasn't an epidemiological question, that was a question of, 'Can we solve the distribution problem?'" To that end, the first half of the aughts saw a growth in efforts to clarify and address some of these key operational, logistical, and implementation questions. In addition, Roll Back Malaria, a partnership discussed in greater depth in subsequent sections, formed numerous working groups to understand enablers and inhibitors of ITN scaleup.⁶⁰

The RBM Working Group for Scaling Up Insecticide-Treated Netting, for example, released a framework for scaleup in 2002 and a subsequent edition in 2005 titled *Scaling Up Insecticide-Treated Netting Programmes in Africa: A Strategic Framework for Coordinated National Action*. In the interim several years, a debate brewed about scaleup strategy that concerned whether to provide nets for free or charge people a nominal fee (i.e., subsidize or commercialize nets). RBM's 2002 pro-subsidy framework prompted pushback from malaria researchers Chris Curtis, Caroline Maxwell, and others, who argued against subsidies and for free distribution. In a May 2003 *Lancet Infectious Diseases* commentary, they wrote: "We consider that ITNs should be viewed as a public good, like vaccines, and should be provided via the public sector with generous assistance from donors" (Curtis et al. 2003, 304). Another 2003 *Lancet Infectious Diseases* commentary by malaria researchers Jo Lines, Christian Lengeler, and others challenged this view, arguing that "subsidies, and how to provide them, are a key element of debates over ITN implementation strategies." They further assert: "Curtis et al. make bold statements about

how the world 'should' be, but they do not address the question that confronts every programme manager: how best to use resources that are limited and that are not enough to do everything for everyone?" (Lines et al. 2003, 466).

Notably, the 2005 edition of the Working Group for Scaling Up Insecticide-Treated Netting framework emphasized the role of the private sector in scaleup: "Since the key to success in achieving rapid and sustained high coverage is complementarity between public and private sectors it also considers the best way to encourage the growth of a vigorous, competitive private sector" (RBM 2005). The strategic framework recommended targeted subsidy models via antenatal, maternal, and child health and Essential Programme on Immunization⁶¹ programs and clinics, along with "commercial market growth." The framework also notes that existing resources were not sufficient, so RBM recommended a "two-pronged approach" of using public subsidies to deliver nets to the most vulnerable people in the short term and using the commercial market in the longer term. The WHO, meanwhile, took a pro-free distribution stance at the 58th World Health Assembly in May 2005, highlighting a tension between the ITN scaleup approaches advocated for by the WHO and RBM. At the 2005 assembly, the WHO set an ITN coverage target of 80 percent by 2010 across four key interventions for malaria control, including ITNs:

To establish national policies and operational plans to ensure that at least 80% of those at risk of, or suffering from, malaria benefit from major preventive and curative interventions by 2010 in accordance with WHO technical recommendations, so as to ensure a reduction in the burden of malaria of at least 50% by 2010 and 75% by 2015...(5) *to pursue a rapid scale-up of prevention by applying expeditious and cost-effective approaches, including targeted free, or highly subsidized, distribution of materials and medicines to vulnerable groups, with the aim of assuring that at least 60% of pregnant women receive intermittent preventive treatment and at least 60% of those at risk use insecticide-treated nets, wherever that is the vector-control method of choice.* (WHO 2005a, 5; italics added)

Widening the aperture, we see that a broader debate around "aid effectiveness" in the development sector at the end of the 1990s and through the 2000s undergirded this tension between free net distribution and net commercialization/subsidization. Throughout the first half of the decade, prominent development economist Jeffrey Sachs argued for increasing official development assistance overall, making the point that "you can't do any of this without money," in the words of McArthur, who worked closely with Sachs on the UN Millennium Project. At the other end of the spectrum, development economists such as William Easterly argued that "the right response is to get tough on foreign aid," or to make existing aid flows more effective at poverty reduction rather than increasing overall aid spending.⁶² In fact, in Easterly's 2006 book on foreign aid, he criticizes a free ITN distribution program, using it as evidence against increasing official development assistance.⁶³

Easterly and others in this aid-critical camp also adopted the view that "the MDGs [Millennium Development Goals] exercise will fail in Africa,"⁶⁴ claiming that achieving the MDGs by 2015 was virtually impossible. "This so-called 'hardheaded' angle became an easy argument to latch onto for people who wanted to argue against foreign aid," in McArthur's view. The nuances of this broader debate and relative merits of either position are not considered at length in this case study; however,

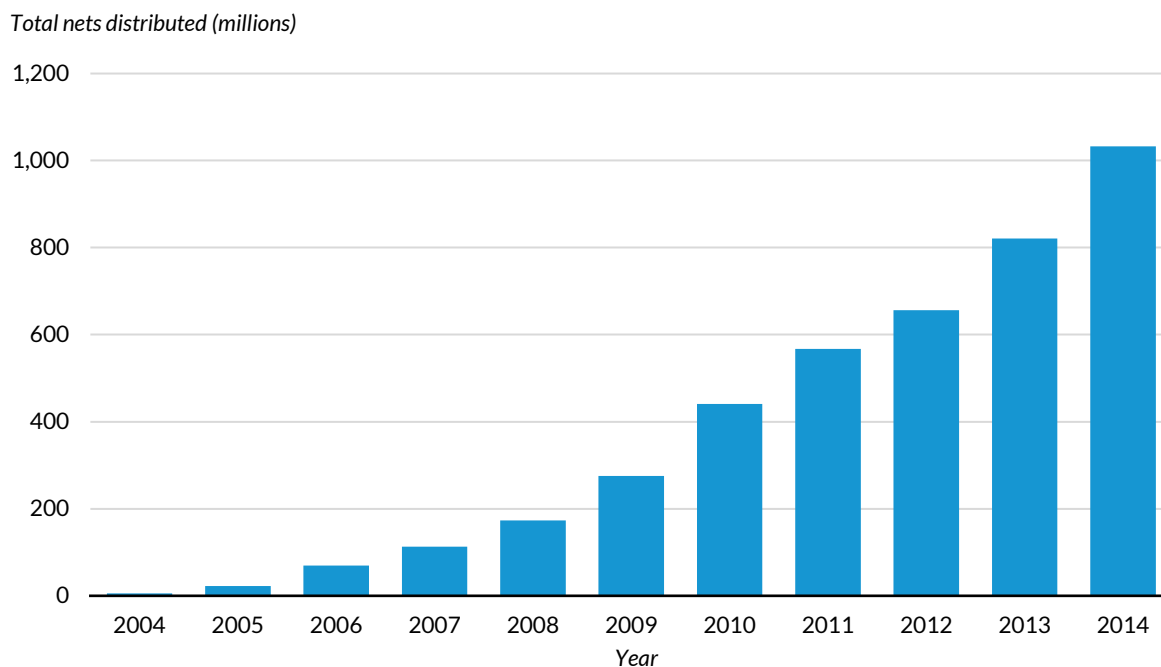
this tension shaped the flavor of debates around ITN scaleup strategies throughout the 2000s. Additionally, ITN scaleup occurred as a result of increased foreign aid spending; arguably, the argument against increasing official development assistance hindered scaleup.

Enabling and Constraining Causal Factors of ITN Scaleup: 2000 to 2010 in Focus

By the early 2000s, a substantial body of evidence had demonstrated that ITNs significantly reduce morbidity and mortality from malaria among children while being cost-effective (Lengeler 2004). In addition, heads of state and other key decisionmakers had made significant political commitments related to reducing the malaria burden, as discussed further below. Yet ITN coverage remained low through the mid-2000s: in 1999, only an estimated 2.2 percent of children under 5 in 44 endemic countries had ITNs, and by 2003 this share had only increased to an estimated 5.1 percent (Flaxman et al. 2010).⁶⁵ By 2006, however, this figure had risen to 17.5 percent, and by 2008 to 32.8 percent (still low relative to the goal of universal coverage set in 2007) (Flaxman et al. 2010). Only 5.6 million nets were distributed globally in 2004, but distribution numbers steadily and then dramatically rose over the next several years: 16.9 million were distributed in 2005, 46.8 million in 2006, 60 million in 2008, 101.7 million in 2009, and 165.7 million in 2010 (see figure 1).⁶⁶

By 2014, global net distribution surpassed 200 million, and annual net distribution figures have remained in the 100–200 million range ever since.⁶⁷ In 2014, 200 million total nets were distributed for the first time, and cumulative net distribution surpassed 1 billion (figure 4). By 2015, 55 percent of the African population slept under an ITN, a direct result of increased access to ITNs. Combined with the rollout of other preventive, diagnostic, and therapeutic tools for malaria, ITNs nearly halved the number of global malaria deaths between 2000 and 2015. By 2015, the risk of contracting malaria had also dropped by 37 percent (WHO 2015). Because of the magnitude of these reductions, the role of ITNs in achieving them, and the pace of ITN scaleup after the mid-2000s, ITNs have become one of the most frequently cited examples of an evidence-backed global health success story. The path to scaleup over the 2000s, however, was not guaranteed, nor was it straightforward.

FIGURE 4
Cumulative Global Insecticide-Treated Net Distribution



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Source: Alliance for Malaria Prevention’s Net Mapping Project (Q4 2021).

Finding the Will: High-Level Commitments, Global Coordination, and Rising Ambition

GLOBAL ADVOCACY AND COMMITMENTS TO ACT ON MALARIA: 1997–2002

As researchers were generating more evidence of nets’ effectiveness in different epidemiological and ecological contexts (thereby resolving open scientific questions) and in turn trying to drum up support in the international community for nets as a public-health and vector-control tool, the global malaria situation was worsening. Global malaria cases and deaths climbed throughout the nineties into the aughts, peaking in 2004, when annual deaths approached 1 million by some estimates and annual cases exceeded 260 million (WHO 2015).⁶⁸ In response, policymakers, health practitioners, malaria researchers, and technical experts worked together and independently to reanimate global attention on malaria at the turn of the century.

Although some international conferences had been held and global commitments made on malaria control during the 1990s, inertia from the previous few decades still curtailed global coordination and resource mobilization for most of the decade. In 1992, for example, the WHO convened the Ministerial Conference on Malaria in Amsterdam, “in view of the general increasing gravity, complexity, and neglect of malaria” (WHO 1992). Participants signed the World Declaration on the Control of Malaria, which emphasized the need for international cooperation. In May 1998 at the Group of Eight (G8) Summit in Birmingham, UK, G8 leaders pledged support to malaria control; only the UK government made new

funding commitments, however, and no specific targets were agreed upon (Saldanha and O'Sullivan 1998).

African Heads of State

In Africa, however, momentum seemed faster to build. In June 1997, heads of state signed off on the Harare Declaration on Malaria Prevention and Control in the Context of African Economic Recovery and Development. In early 1997, the first International Conference on Malaria in Africa convened in Dakar, Senegal, which became known as the first Multilateral Initiative on Malaria (MIM) Pan-African Conference on Malaria (Rugemalila et al. 2007). The Multilateral Initiative on Malaria then formalized over the course of 1997 with an organizational aim to stimulate scientific collaboration across the Global South and North on malaria control.⁶⁹ These convenings and commitments occurred while research trials and small-scale implementation projects for ITNs were ongoing across the continent. The extent to which these ongoing trials and implementation efforts directly influenced policymakers' political commitments to malaria control and the emergence of Africa-based malaria research initiatives is unclear. Given the worsening malaria situation across the continent and the lack of any meaningful global response, however, it seems reasonable to infer that the growing malaria burden constituted a causal force for ITN scaleup in its own right.

In early 2000, African heads of state gathered for the African Summit on Roll Back Malaria, where they signed the Abuja Declaration, which committed to halving malaria mortality by 2010. To achieve this goal, African leaders set, among other targets, a target of 60 percent of vulnerable populations—defined primarily as children under 5 and pregnant women, the groups most likely to die from malaria—being able to “benefit from” preventive “protective measures,” including ITNs.⁷⁰ Similar access-related targets were set for treatment and chemoprophylaxis. These targets would become the yardsticks against which progress would be measured for the next five years. Then in 2001, Togo, via the Organisation of African Unity, requested as an agenda item for the 55th UN General Assembly to make 2000 to 2010 the “Decade to Roll Back Malaria in Africa.” In 2002, the assembly formally adopted the resolution and included a 60 percent ITN coverage target for the most at-risk populations.⁷¹

Despite commitments made by bilateral and multilateral agencies to mobilize funding to match the \$1 billion requested by African heads of state in the 2000 Abuja Declaration, available evidence suggests donors did not follow through on these commitments. Two health scholars evaluated progress on commitments based on donors' self-reported data in 2003 and concluded, “We note with alarm that nobody knows—or can know, if they want to—how much of the \$750 million that [Roll Back Malaria] counted as promises from various donors after the *Abuja Summit* has actually been delivered.” Notably, as of December 2002, \$490 million out of \$500 million of new funding committed by the World Bank to meet the Abuja targets remained “uncommitted and unspent” (Narasimhan and Attaran 2003).

The Creation of Roll Back Malaria and Its First Few Years of Operation

In 1998, the UN Development Programme, UNICEF, the WHO, and the World Bank established Roll Back Malaria, a global partnership tasked with strengthening coordination in the global malaria response. RBM's primary contribution to ITN scaleup consisted of amplifying advocacy efforts and harmonizing implementation of malaria-control programs. In multilateral policy advisor Mara Pillinger's

doctoral dissertation (2020, 325–26), she states that “at the request of African heads of state, ‘RBM was formed to do what WHO couldn’t’ in terms of advocacy and private sector engagement.” The WHO African Region, for its part, launched the African Initiative for Malaria Control in 1996, which formed the basis for RBM (Tambo et al. 2012). Gro Harlem Brundtland, WHO director-general from 1998 to 2003, led RBM’s creation from WHO headquarters;⁷² multiple sources interviewed for this case study cited her leadership in helping to revive global interest in addressing malaria more generally. Lengeler, for example, described Brundtland as a “very powerful, vocal advocate” for malaria. In addition to leading on RBM’s formation, she listed malaria as a top priority at the 51st World Health Assembly.⁷³

Most experts interviewed for this case study thought RBM played an important role in malaria advocacy and “building awareness” around the need to better coordinate global action on malaria, which was necessary for ITN scaleup to happen. Mwenesi described RBM as “very instrumental in getting countries that are part of the [WHO] to start rallying around malaria, and at that point, what was being promoted as the best way to deal with malaria was ITNs.” Indeed, Moore-Sheeley thought that RBM was made possible because donors had something “tangible” to support that also had robust evidence and seemed feasible to roll out, all of which “was very critical to mobilizing that support at that moment.” From the outset and based on evidence, ITNs were baked into RBM’s approach: RBM had an explicit ITN coverage goal of 60 percent, which was intended to help halve malaria deaths by 2010.⁷⁴ Because RBM intended to raise awareness and funding for malaria control, according to Moore-Sheeley, “there was a lot of pressure to do that quickly by showing some success in getting ITNs and antimalarial drugs out there.”

Funding for RBM and for malaria more broadly, however, remained a key constraint in the partnership’s ability to realize its goals in its earliest years. Although many experts consulted for this case study agreed RBM served an important coordinating function, some pointed to its inability to mobilize funds as evidence of its more limited role in ITN scaleup compared with other organizations that became active during this time. Former coordinator of the President’s Malaria Initiative Timothy Ziemer, for example, cited RBM’s “great recognition and advocacy,” but noted that “there was no cash for what needed to be done.” Similarly, Chavasse stated that RBM “never had any money but they had staff and kept a focus on malaria fundraising and delivery at [the] country level and [in] Geneva.”⁷⁵ Beyond fundraising challenges, RBM had other operational problems. Critiques of its effectiveness and coordination in its first several years of operation were featured in a 2002 assessment published in *The Lancet*.⁷⁶ The creation of RBM, then, was a necessary but insufficient step toward ITN scaleup.

Although RBM may not have delivered on fundraising, its function as a coordination and technical-support apparatus in particular became more important in ITN scaleup during the 2000s. Before the Global Fund was created in 2002, donor and implementing-partner support to endemic countries was more fragmented and piecemeal, according to Jallow. Moore-Sheeley also noted the piecemeal nature of implementation projects involving multiple donors and NGOs working in a country that most likely were “not coordinating their efforts.” Yet RBM created a platform for these different stakeholders—including also manufacturers and advocate groups—to convene and become “one common voice,” according to Jallow: “All those different voices will come together so that then the voice becomes very

loud. I think that's where the difference is now and also what contributed to the scaleup." According to Mwenesi, RBM's regional mechanisms in East, Central, West, and Southern Africa facilitated

all the projects that were being run by different funders and partners [to] come together quarterly to discuss what was going on. So there was leveraging funds, a lot of talking to one another and not reinventing wheels. It was really a powerful time. These [regional] groups would meet once a year to talk about what was working and what was not working and to think through some of the difficulties, which would then be fed to RBM, where all the constituents would be sitting—the manufacturers, the policymakers, the researchers, and so on. [Then you also had RBM's] technical working groups looking at all the issues, looking at the research and synthesizing that research and then trying to see what were the pressing things, what were the bottlenecks, and who was supposed to be doing something about the bottlenecks. So for example, if it's the issue of the uptake of nets, who is sleeping under the net in the household, if it was the issue of repurposing nets and using them for other uses, then the social and behavior change communication working group would take that up.

Rising Political Will and Use of Economic Logic for Addressing HIV/AIDS and Malaria

Other important contextual factors shaped contemporaneous discussions about global health and development policy, which in turn shaped how global policymakers thought about malaria control. In the 1990s, following the preceding global recession, contraction of foreign assistance, and in many parts of the world worsening health and economic crises, large multilateral organizations were paying more attention to the link between health and economic development. The World Bank's seminal *World Development Report 1993: Investing in Health* in part reflected this shift and brought in new philanthropists to global health, such as Bill Gates (Berkley et al. 1993).⁷⁷ The development sector also placed a growing emphasis on maternal and child health, particularly child survival (as seen in, for example, UNICEF's 1982–1995 "child survival revolution," which resulted in the immunization of millions of children).⁷⁸ This trend contributed to an enabling environment for ITN scaleup because most malaria deaths occur in children and pregnant people.

Consequently, there was growing attention on malaria's non-health-related impacts, including economic and educational outcomes. People most at risk for severe outcomes from malaria were (as they continue to be) the most vulnerable and marginalized members of society, including young children, pregnant people, people living with HIV, mobile and displaced populations, and people living in extreme poverty. But making the argument that it also went the other way—malaria *contributes* to poverty—became a galvanizing frame through which arguments for addressing malaria could be made. Making these linkages was an important part of mobilizing efforts to control malaria, as five malaria researchers argue in *Advances in Parasitology*: "Despite the unquestionable health burden posed by malaria, making an economic argument for its control has been necessary during each wave of international interest in funding its control and elimination since the 1930s" (Snow et al. 2012).

In particular, in January 2000 Brundtland formed the Commission on Health and Macroeconomics, which assessed the magnitude of global disease, the economic costs of the global disease burden, and the projected cost of addressing this burden. Sachs, who would go on to become an outspoken advocate for mass free distribution of ITNs, chaired the commission. In 2001, with another economist, John Gallup, Sachs published "The Economic Burden of Malaria," a paper that linked malaria to economic

growth and argued that malaria perpetuates poverty. David McGuire, former director of USAID's NetMark program, a public-private partnership that distributed and promoted ITNs through social marketing campaigns, described this paper as "beneficial" in making these linkages and as "really big," noting that it received "a lot of media attention and ultimately led to increased funding for malaria programs."⁷⁹ McArthur, who worked closely with Sachs in the 2000s, noted that before Sachs and coauthors published on the issue in the late 1990s, malaria had been "noticeably absent" in the economics literature for decades. He credited the 2000–2001 Commission on Health and Macroeconomics as "decisive in shifting" more attention toward "what it would take to solve the problem" of financing "basic health services for all."⁸⁰ This shift benefited malaria control and specifically ITN scaleup efforts by demystifying the actual cost of implementation.

By 2002, moreover, the HIV/AIDS pandemic had become an acute global crisis: nearly 3 million people were acquiring HIV a year, more than 40 million were living with HIV/AIDS, and almost 2 million were dying from AIDS a year.⁸¹ For the countries dealing with the worst of these trends in HIV/AIDS morbidity and mortality, there was an obvious need to change the status quo. For countries with fewer cases and deaths, most of which were rich countries, this crisis was "critical to putting global disease issues on the doorsteps of wealthy countries who might not otherwise think it's their problem to deal with, especially the US," according to Moore-Sheeley. At the turn of the century, spurred in large part by the HIV/AIDS pandemic, the US government also took a greater interest in "global health security" (as indicated by its investments).⁸² This shift constitutes another enabling-policy-environment factor for ITN scaleup.

In response to the HIV/AIDS crisis and the broader health and development challenges facing the world, Kofi Annan, in his capacity as UN secretary-general (1997–2006), spearheaded the creation of the Millennium Development Goals. In late 2000, world leaders committed to the MDGs at the United Nations General Assembly, setting eight goals for reducing human suffering through better health, education, nutrition, and welfare. Goal 6 included a target to bring down the incidence of malaria and other infectious diseases to be measured by, among other indicators, the "proportion of children under 5 sleeping under insecticide-treated bednets."⁸³ The inclusion of malaria in the MDGs reflected recognition among policymakers that like the worsening HIV/AIDS crisis, malaria required global coordinated action to address.⁸⁴ And, crucially, the inclusion of ITNs in Goal 6 suggests global policymakers recognized ITNs as a critical tool for reducing malaria incidence and mortality.

Following a period of historically low levels of foreign aid investments in the 1990s, however, many in the development sector, particularly many development economists, expressed skepticism about the feasibility of achieving the MDGs, and, notably, of providing HIV/AIDS treatment everywhere, not just in rich countries.⁸⁵ Demonstrating the clinical feasibility of treating HIV/AIDS patients in poorer parts of the world, as Paul Farmer did through his "accompaniment" model, helped shift assumptions in the development sector about what was actually possible to achieve with the necessary resources.⁸⁶ According to McArthur, however, it "was a slow shift." Sachs visited Farmer in Haiti in January 2001 to see how Farmer's accompaniment model, which included the free provision of antiretroviral treatment (ART) for people living with HIV (among other health services) in remote Haitian communities, worked.

According to McArthur, this visit directly influenced Sachs's subsequent advocacy for AIDS treatment and universal health services more broadly: Sachs then led an effort to bring together more than 100 other Harvard University faculty members to sign a consensus statement in April 2001 advocating for providing AIDS treatment in poor countries.⁸⁷ "The fact that that [model] existed disproved the argument that antiretroviral treatment couldn't be successfully delivered in low-income settings," McArthur said of Farmer's Partners in Health (the program Farmer established in Haiti), while the consensus statement "changed the narrative of an impossible problem to a solvable problem."⁸⁸

It seems that this change in narrative for addressing AIDS in turn helped galvanize political will for malaria control. Feachem thought there was a "noticeable shift in ambition between '96 and the 2000s, predating the widespread availability" of new tools to combat malaria, namely ITNs, artemisinin-based combination therapy, or rapid tests. Although policymakers and funders acknowledged the promising potential of ITNs in preventing malaria, manufacturing capacity for ITNs could not meet global demand when world leaders committed to the MDGs. Around this time, Feachem stated that there was also

widespread fatalism about malaria in Africa. You could speak with many senior health professionals in a variety of African countries and they would say, "we're keeping the lid on malaria, but it's still the main killer of kids under 5 in our country, it's part of Africa, part of the tropics." The level of ambition was extremely low. Not everywhere or among everybody, but widespread. That changed in the late nineties to a realization that "we've got to do better than this, and we can do better than this. There are countries outside Africa that are eliminating malaria and we can learn from their success."

Feachem added that "higher ambition has to be accompanied by increased resources. Enter the Global Fund. So no excuses Africa; let's get on with it." Indeed, the WHO African Region malaria-control director Déogratias Barakamfityé posited in a 1997 *Nature* article that "countries seem to accept that living with malaria is inevitable, that there will always be dead children."⁸⁹ This position most likely had roots in the politics around the Malaria Eradication Programme several decades prior. At the 1955 World Health Assembly where the WHO approved the resolution to proceed with the MEP, "few of those who supported eradication believed that it could be achieved in sub-Saharan Africa in the foreseeable future, even though the overwhelming majority of malaria cases and deaths occurred in this region" (Packard 2007, 154). As a result, the MEP was launched in only a few African countries.

Other experts interviewed for this case study echoed the sentiment that by the turn of the century and in the context of rising malaria cases and deaths globally, there was a growing sense among malaria researchers, policymakers in endemic countries, and health program implementers that something had to change. The scale of the malaria burden by itself, then, arguably constituted a necessary factor in ITN scaleup, though sadly an insufficient one—the need for change is seldom enough to compel change, and malaria had been a growing problem in African countries especially for decades by that point. Other factors contributed to this increasing recognition of the extent of the problem and the accompanying decision to address it. The magnitude of the AIDS crisis, which was affecting many of the same countries experiencing surges in malaria, seems to have been one crucial enabling-environment factor. When asked what role the HIV/AIDS pandemic may have played in galvanizing global support for malaria,

experts interviewed for this case study either agreed or thought it was plausible that malaria benefited from that increased attention and the resulting funding mobilization for HIV/AIDS.

Specifically, the geographic distribution of HIV/AIDS made a difference in rich countries' willingness to act. Rich countries (such as the US, which historically has been one of the largest funders of development assistance for health) shaped the priorities on the global policy agenda through their investments and multilateral involvement. Melanie Renshaw, former senior malaria advisor at UNICEF and current African Leaders Malaria Alliance (ALMA) principal director, thought malaria was "largely out of sight at the time" on the global policy agenda because of malaria's concentration in Africa.⁹⁰ O'Meara suggested that "malaria was devastating Africa long before HIV emerged, but we didn't have it [in Europe or the US] anymore, so maybe it didn't feel like an urgent problem." HIV/AIDS, meanwhile, was spreading in most countries around the world, including in the US and Europe, so "maybe HIV changed our way of thinking about how we engage with global health threats," she added. Chavasse expressed a similar opinion on this question:

Malaria had always been there; it was tolerated because of the sad reality that children's deaths were not having the same impact as adult deaths on social structures and economies as AIDS. The AIDS pandemic woke the West up to the utter misery of what was going on and that got voters making sure their politicians put their hands in their pockets, and malaria definitely benefited from that. But malaria numbers were really starting to ratchet up in the nineties; it was going to be hard to ignore even absent an AIDS pandemic. But perhaps it took AIDS to get the sort of numbers that you then saw [in the size of Global Fund grants].

Indeed, as will be elaborated on below, the Global Fund became a critical causal factor in the ITN scaleup story. The US government "provided the Global Fund with its founding contribution" of \$200 million and has remained one of the largest single contributors to the fund since 2002.⁹¹ Consequently, getting the US government and its taxpayers invested, both politically and financially, in the fight against malaria represented an important, strategic shift. According to O'Meara,

There have been a couple brilliant marketing strategies in the course of global health that have changed the field a lot; one is the consolidation of the "big three," or putting HIV, TB [tuberculosis], and malaria together. Malaria and TB are really diseases of poverty, diseases that I think most Americans don't think of as being priority problems in our country. But HIV can affect anyone. You also have the additional factor that there was a lot of stigma early in the HIV pandemic. I do not think that programs like PEPFAR [the US President's Emergency Plan for AIDS Relief] and the Global Fund would have garnered bipartisan support without the realization that those affected by the HIV pandemic were many and diverse, and not only those infected but their families and social network. So, TB and malaria needed HIV to get on the global agenda and, in a way, HIV needed malaria and TB to move into our consciousnesses as a global, universal problem. That marriage of the three motivated or spurred global action in a way that each of them could never have achieved alone. HIV really did change things in the global arena in terms of how people invested in problems outside their immediate borders, outside their experience.

Looking more widely at trends in the development sector, the creation of the Global Fund in 2002 came alongside growing attention to how to actually pay for and sufficiently resource development goals, which helped shift global political will to invest in and prioritize malaria control. March 2002, for

example, marked the first-ever International Conference on Financing for Development in Monterrey, Mexico. Known as the Monterrey Conference, “it was the first United Nations–sponsored summit-level meeting to address key financial and related issues pertaining to global development,” with over 250 total heads of state and foreign affairs, trade, development, and finance ministers in attendance.⁹² Before the Monterrey Conference, according to McArthur, many policymakers and economists considered addressing HIV/AIDS, TB, and malaria in the poorest parts of the world an intractable and impossible problem, in part because of the financial requirements involved. McArthur, who managed the UN Millennium Project starting in early 2002, recalled feeling like “the radical one in the room a lot of times” in his efforts “trying to actually achieve the MDGs rather than just reference them” in the early aughts.⁹³ Changing the atmosphere around the MDGs, then, constituted an enabling-environment factor in ITN scaleup.

When Lee Jong-wook took over as director-general of the WHO from Brundtland in 2003, he carried on this level of ambition, notably in addressing HIV/AIDS. Jim Yong Kim worked closely with Lee as director of the WHO’s HIV/AIDS department from 2004 to 2005 and together they introduced the “3 by 5” goal, which aimed to get 3 million people living with HIV on ART by 2005 (WHO 2005b).⁹⁴ Considered an impossible goal by some North American and European academics and policymakers, the act itself of setting such a goal further challenged standing assumptions about what the global community could achieve vis-à-vis global health and development. Before his untimely death in May 2006, Lee alluded to applying a similar shift in ambition to malaria in a draft World Health Assembly speech: “We accept our responsibility for [failures in malaria control]. Now is not the time for shyness. W.H.O. will exercise much greater leadership in malaria control.”⁹⁵ Lee had also appointed Arata Kochi as the WHO’s malaria director; Kochi would become a decisive actor for ITN scaleup later in the decade.

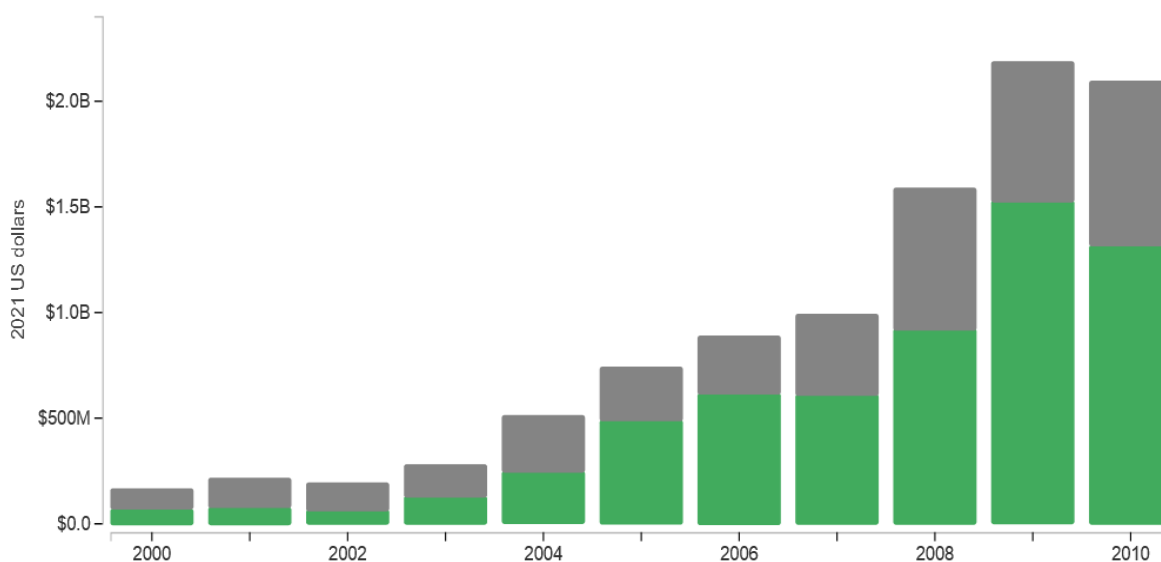
By 2005, the development financing and policy landscape looked remarkably different than it did just five years earlier. Several new bilateral and multilateral financing mechanisms had been established, which mobilized millions of new aid dollars for HIV/AIDS, tuberculosis, and malaria. Targets discussed and set by leading health and development agencies reflected a level of ambition and political will that would have seemed inconceivable to many in 2000. This context contributed to an enabling environment for ITN scaleup, which people advocating for scaleup leveraged. For example, in January 2005, the UN published *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals* (UN 2005). The report’s list of “quick wins,” or interventions “that can and should be implemented right away,” included distributing “free, long-lasting, insecticide-treated bed-nets to all children in malaria-endemic zones to cut decisively the burden of malaria.” According to McArthur, who served as the report’s lead editor, that list “was one of the last things added” to the report, prompted by a suggestion from fellow Secretariat member Margaret Kruk in a final meeting with UN Millennium Project task force leaders in late 2004. McArthur recalled that following the report’s publication, “journalists everywhere wanted to hear about bednets; it was the example people kept using to motivate doubling aid and cutting poverty in half.”⁹⁶

Unprecedented Resource Mobilization for Global Health: The AIDS Crisis and Creation of the Global Fund, PEPFAR, and PMI

Unquestionably—confirmed by the literature and the consensus that emerged across interviews⁹⁷—the main constraint to any action on malaria, not just ITN scaleup, up to and through the early 2000s was the severe funding shortfall and lack of financial resources for implementing malaria programs. Jallow, for example, stated that in the early 2000s there was “some early utilization of the nets, but it was not to the large scale one would expect simply because the funding was not there.” A 2003 survey found that in 2000, official development assistance for malaria control totaled only \$98.9 million.⁹⁸ A decade prior in 1990, the WHO Malaria Action Programme had just \$4.8 million available for malaria (Moore-Sheeley 2017).⁹⁹ Against a backdrop of constrained domestic health budgets, Chavasse noted that a lot of “public money [came] from western voters.” This lack of resource mobilization, then, reflected a lack of political will on the part of rich countries to prioritize controlling malaria outside their own borders, which in turn fueled a pervasive mindset of scarcity.

A critical turning point, then, in the ITN scaleup story was the increase in available funding for malaria control, particularly development assistance for health, which was directly linked to a broader mobilization of resources for global health that occurred in the early 2000s. Total programmatic DAH for malaria (shown in green in figure 5) hovered below \$100 million through 2003, while nonprogrammatic DAH for malaria (i.e., administrative costs and global/unallocable projects, shown in gray in figure 5) ranged from an estimated \$97 to \$150 million between 2000 and 2003.¹⁰⁰ Estimated programmatic DAH for malaria rose to \$130 million in 2003, to \$250 million in 2004, to \$490 million in 2005, to \$620 million in 2006, to \$610 million in 2007, and to \$920 million in 2008.¹⁰¹

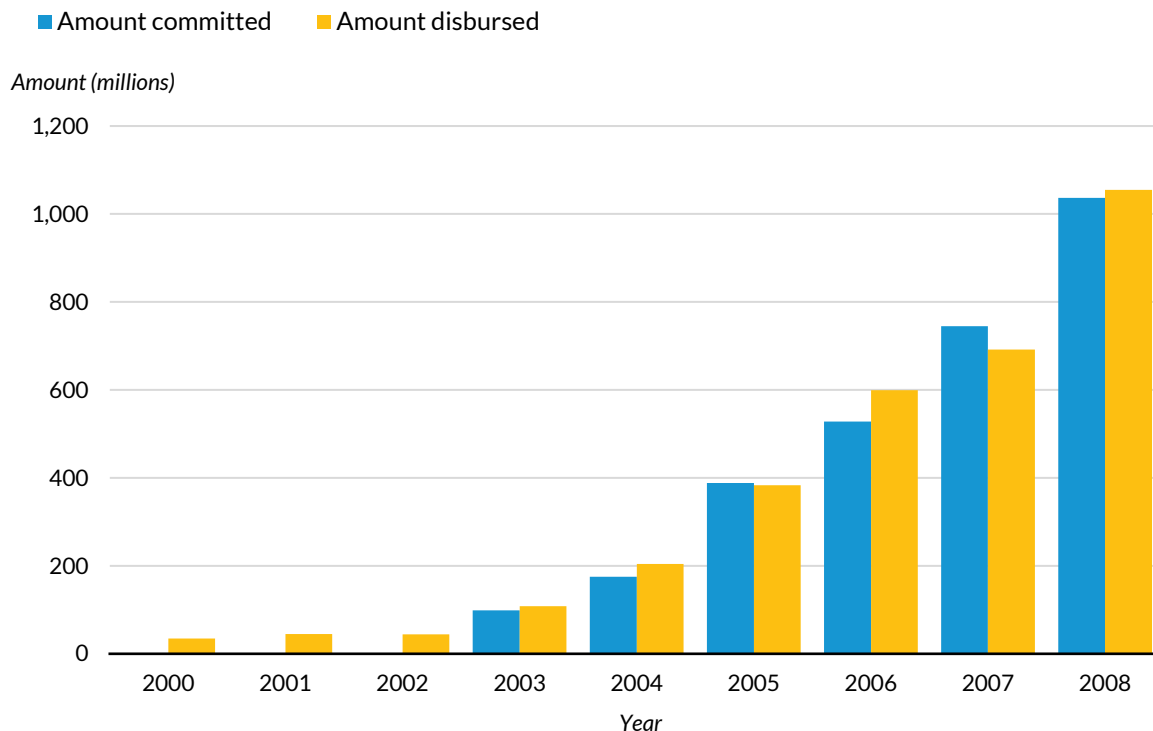
FIGURE 5
Total Development Assistance for Health Spending on Malaria, 2000–2010



Source: “Financing Global Health,” University of Washington Institute for Health Metrics and Evaluation (IHME), accessed April 2023, <http://vizhub.healthdata.org/fgh/>.

DAH spending on malaria surpassed \$1 billion in 2008, with the Global Fund driving much of this growth (figure 6). Other forms of spending, such as domestic health financing and out-of-pocket expenditures, also increased during this period (figure 7), but not to the same magnitude. Since 2008, external funding for malaria control has consistently been greater than \$1 billion. This mobilization of money constituted a critical mechanistic causal factor for ITN scaleup.

FIGURE 6
International Donor Disbursements and Commitments to Malaria-Endemic Countries, 2000–2008

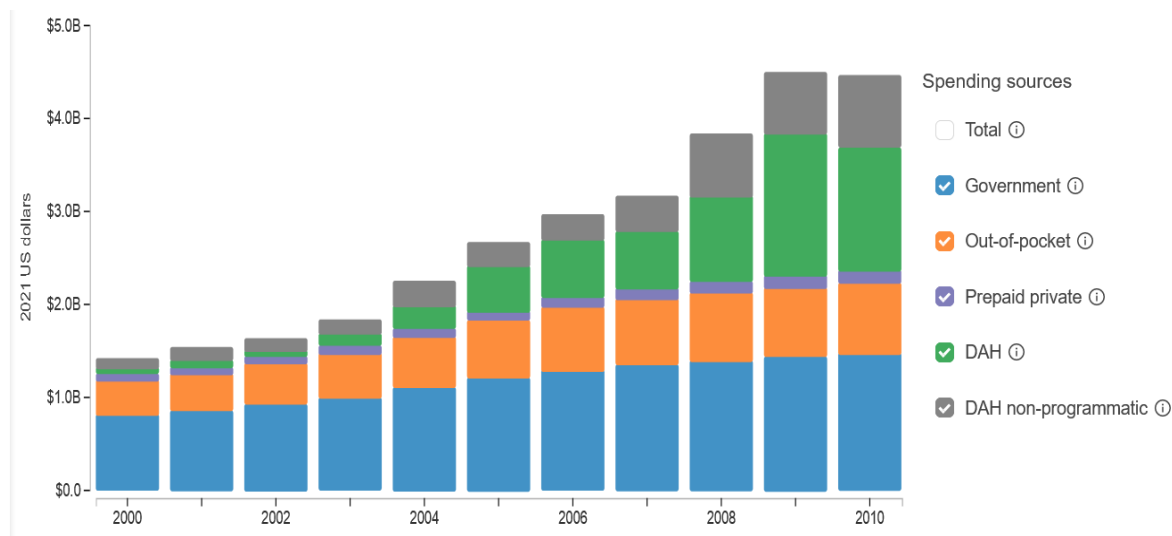


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Source: Emily White Johansson, Richard Cibulskis, Richard W. Steketee, and Global Partnership to Roll Back Malaria, *Malaria Funding and Resource Utilization: The First Decade of Roll Back Malaria* (Geneva: World Health Organization, 2010). License: CC BY-NC-SA 3.0 IGO.

FIGURE 7

Total Global Malaria Spending, 2000–2010



Source: “Financing Global Health,” University of Washington Institute for Health Metrics and Evaluation, accessed April 2023, <http://vizhub.healthdata.org/fgh/>.

This surge in DAH, in turn, was a direct result of an unprecedented mobilization of resources to address the HIV/AIDS crisis at the turn of the century. Sustained, coordinated activism and advocacy around this crisis led to the creation of the Global Fund in 2002 and the US President’s Emergency Plan for AIDS Relief (or PEPFAR) in 2003. The United States Leadership Against HIV/AIDS, Tuberculosis, and Malaria Act of 2003 authorized \$15 billion in new funding for these three diseases, largely channeled through the Global Fund and PEPFAR.¹⁰² The creation of PEPFAR, which celebrated its 20th anniversary in 2023, set the precedent for targeted, disease-specific USG health aid (a template the Bush administration would again follow in 2005 with the creation of the President’s Malaria Initiative). Unlike the previous two decades, which saw a global recession and debt crisis, this period benefited from a “context of prosperity around the world,” according to Binka, which more readily enabled this kind of spending.

The Global Fund, PEPFAR, and subsequently PMI were all also set up as funds for distributing health commodities, which reflected a novel approach to DAH, or “a new way of thinking about health aid,” in O’Meara’s words. “Humanitarian and economic reasons,” namely the magnitude of the growing infectious disease burden and the toll that burden exacted on social and economic development, contributed to this “sentiment to just deliver health commodities,” according to Moore-Sheeley. Delivery targets (i.e., the numbers of health products delivered during specific reporting periods) accompanied this health commodities focus, which McArthur credited with taking HIV and TB, and then malaria, “from a big, hard, hairy problem to a delivery issue to report on periodically.” This conceptual shift benefited ITN scaleup efforts. HIV/AIDS, moreover, had emerged only two decades earlier, so the initial HIV/AIDS response revolved around treatment (i.e., drugs), making it a “very commodity-intensive pandemic,” according to O’Meara. The Global Fund, PEPFAR, and PMI “have a huge influence

on the price of commodities because of the volumes [of health commodities that] they work with,” according to O’Meara.¹⁰³ This ability to procure large volumes and the market signal that sent to manufacturers became critical in ITN scaleup.

Certainly, malaria benefited from this resource mobilization and emphasis on health commodities. A broad lack of financing for malaria was far and away the biggest initial constraint to ITN scaleup, in part because malaria was (and to a certain extent still is) a neglected tropical disease.¹⁰⁴ So the “consolidation” of HIV, malaria, and TB (with the creation of the Global Fund) “really helped push open the doors to funding,” according to O’Meara. And although researchers, advocates, and implementers initially encountered challenges in generating enthusiasm for nets, nets were nevertheless a health commodity, and a relatively simple and cheap one at that. That marketability as a simple, cheap, lifesaving health commodity contributed to donors’ (eventual) willingness to get behind nets (Moore-Sheeley 2017). “Donors love nets,” in McGuire’s view, “because they are proven to be cost-effective and relatively easy and inexpensive to distribute compared with other tools such as IRS [indoor residual spraying].”

THE GLOBAL FUND

The Global Fund to Fight AIDS, Tuberculosis and Malaria was officially launched as a novel health financing mechanism in January 2002. Although the fund was initially conceived of as an emergency response to the AIDS crisis, TB and malaria were added following sustained advocacy efforts (discussed below). Annan led the Global Fund’s creation, spurred on largely by HIV/AIDS advocates; he formally proposed the idea for the Global Fund to African leaders at the African Summit on HIV/AIDS, Tuberculosis, and Other Infectious Diseases in April 2001.¹⁰⁵ First discussed at the G8 summit in Okinawa in 2000, the idea for a “global fund” was officially endorsed at the G8 summit in Genoa in July 2001.¹⁰⁶ Feachem stated that, as late as 1999, the Global Fund’s creation was “unlikely” and that it happened “very rapidly against the odds.” Contributing to this dynamic, he explained, was that “such a fund, with new ways of working, additional transaction costs, and restricted purpose, would not have been supported by most ministers of finance and health, had they been asked—which they weren’t.”

Because donor governments already invested in aid—and specifically in HIV, TB, and malaria, to varying degrees—there were also political hurdles to overcome in convincing donor governments to support a new institution. And in other ways, the Global Fund’s creation “was flying in the face of the mainstream orthodoxies in development economics,” Feachem said.¹⁰⁷ (Though this section attempts to identify mechanistic factors that led to malaria’s inclusion in the Global Fund and aspects of the fund’s early operations that facilitated ITN scaleup efforts, additional research in this area would likely yield more insights.)¹⁰⁸ Feachem underscored HIV as the initial driving force behind the Global Fund:

The creation of the Global Fund was driven primarily by the HIV pandemic. Malaria was serious, and worsening in Africa, but the crisis was HIV. There was a mood of desperation around HIV, particularly in southern Africa, which generated a remarkable consensus among disparate interested parties. Activists, the governments of southern Africa, people living with HIV, NGOs, foundations, donors, and public health experts, found themselves aligned in their conviction that a new large innovative global response must be launched. In southern Africa, the house was burning down, and there was no fire brigade in sight.

So how did tuberculosis and malaria get included in the Global Fund? Several experts indicated that “advocates for specific diseases” worked to ensure “prioritization of those diseases,” in the words of McArthur. Multiple experts framed TB as an “obvious” addition, given that it is the leading cause of death among people living with HIV/AIDS in the absence of antiretroviral therapy. Notably, when Annan presented the idea of the Global Fund to African leaders in 2001, malaria was not named, instead grouped under “other infectious diseases.” Prioritizing malaria, then, was by no means assured; Feachem characterized it as “fortuitous” and said that there was “nothing intuitive or necessary about that” decision. Moore-Sheeley posited that in the conversations leading up to the formal launch of the Global Fund, policymakers “realized that HIV is not the only disease like this; malaria impacted indebted LICs [low-income countries] in similar ways and was hitting the same countries with the same lack of access to health commodities.” Given the Global Fund’s focus on mass distribution of health commodities and the marketability of ITNs as a health commodity, Moore-Sheeley suggested that “donors felt that nets were an efficient way to tackle this crisis.”

Other experts pointed to two main groups responsible for malaria’s inclusion in the Global Fund: African leaders and RBM. Jessica Rockwood, a public health consultant who has worked with the Global Fund, RBM, the World Bank, and others, stated, “I’ve heard so many people take credit for the forming of the Global Fund, but it was that there were African countries and the African Union that were really calling for assistance in the reduction of malaria. That’s why I think all of these various funding channels were created” for malaria.¹⁰⁹ Renshaw similarly pointed to African heads of state: “When Kofi Annan presented the idea [for the Global Fund] to the heads of state, they said yes, excellent idea, but malaria has to be there,” and they “made sure [malaria] was integrated into the Global Fund.” The other “very significant” factor, according to Renshaw, were the efforts of the RBM under WHO director-general Brundtland; the RBM “helped to a certain extent” raise what had been “a very limited profile” for what was “the biggest killer of children under 5.” Lengeler likewise pointed to “early RBM lobbying,” stating that RBM “worked really hard to make sure malaria was included.”

One of the unique aspects of the Global Fund’s operational model, which also helped ITN scaleup efforts, was what Feachem called a “radically passive,” demand-driven, results-based model. “Our message was: here is a pot of money; here is, in broad terms, what it is for; over to you—what do you want, make your case, send it to the Global Fund,” according to Feachem. Unlike now, the Global Fund did not have any predetermined allocation formula for the three diseases in the early days of operations; the allocation of funds reflected what the Global Fund approved, which was driven by what countries themselves included in their applications. This approach, according to Feachem, “allowed malaria to get a significant piece of the pie,” which again was not guaranteed.

In its first two years, 2002 and 2003, more than 59 percent of Global Fund funding was allocated to HIV/AIDS, 19 percent to TB, and 21 percent to malaria (Global Fund 2004). By 2004, 31 percent was allocated to malaria (Global Fund 2005a). In the first funding round, the fund approved 12 countries’ applications for malaria, totaling \$200 million (for five-year grants) (Johansson et al. 2010). The following year, it approved another 28 malaria grants, totaling about \$500 million (Johansson et al.

2010). In these early days, the speed and quality of applications made the key difference, and the malaria community helped serve as a sort of mediator in this process. As Feachem noted,

Everyone thought that the vast majority of the money would go to HIV, but it didn't turn out like that at all. Those who got in quickly with strong applications dictated where the money went. It went to countries either well-prepared to make those applications or who had good advisers around them. Malaria was well-prepared for this because RBM was up and running. Malaria came in with a strong response and captured a significant share of Global Fund resources. It hasn't changed much since.

On the other hand, Rockwood suggested that “at that point there was a lot of different folks trying to get the Global Fund to recognize that they were not only the Global Fund for HIV, which was very much felt by a lot of people.” A source who reviewed countries' applications while on the Global Fund's Technical Review Panel described malaria applications as subpar and not aligned with best practices in the first several rounds of funding. But because the Global Fund was a new mechanism that countries had to learn how to interact with, countries had varying levels of preparedness to apply. “In the first applications to the Global Fund, countries were struggling to put together proposals because it was a new concept,” Jallow explained. Regina Rabinovich, previously the Bill & Melinda Gates Foundation's Infectious Diseases Division director, described it as a time of “building of the country coordinating mechanisms, the national strategic plans, the submission requirements—language we all know [now], but we were inventing it at that time.”¹¹⁰

The indicator that the Global Fund tracked for its progress on malaria was the number of ITNs distributed; the fund reported a “baseline coverage of insecticide-treated nets based upon UNICEF and WHO purchases in 2003” of just 4 million by 2004 (Global Fund 2004). Because of the demand-driven model of the Global Fund, countries could put whatever they needed in their applications; Awa Marie Coll-Seck, RBM's executive director from 2004 to 2011, noted that many countries did include ITNs.¹¹¹ At the same time, the context of what was happening with malaria and what countries' priorities were within that context is necessary to understand why ITNs were not necessarily the first priority in malaria applications. In Jallow's view,

When the Global Fund first started, it was small (for the Global Fund, especially when compared to funding levels now, which are magnitudes larger). So, for this smaller pot of money, you're thinking about treatment. Because remember also this was established as an emergency response to HIV, malaria, and TB, so obviously treatment would take priority over prevention. I, from the country perspective at that point in time, would rather get the money for the treatment because there was high morbidity from malaria. People were dying of malaria, so you want to treat them first. And then especially the fact that for the prevention, you're talking about introducing a tool that was not necessarily accepted by all. A lot of communities had never used bednets in their life.

On the treatment side, a parallel revolution was happening: what ITNs did for malaria prevention, artemisinin-based combination therapies did for malaria treatment. Artemisinin-based combination therapies were much more effective antimalarial drugs than the antimalarial chloroquine. But supply chain challenges, including inaccurate demand forecasting, raw material shortages, and price gouging, created shortages of this revolutionary drug class (Shretta and Yadav 2012). Resistance to chloroquine

was widespread by the early 2000s, but chloroquine was cheaper, so some countries still included it in Global Fund applications. Approving applications requesting the more affordable (but less effective) chloroquine, however, meant approving things out of line with “best practices,” which had the consequence of costing people’s lives. The Global Fund’s “radically passive” approach came under fire for this; the fund, alongside the WHO and the US government, was accused in 2004 of “medical malpractice” in *The Lancet* for continuing to support substandard treatment by approving funding applications for chloroquine (Attaran et al. 2004).

In interviews for this case study, experts were presented with the hypothesis that this accusation put pressure on the Global Fund to do more on malaria—by, for example, remedying barriers to ITN scaleup created by the fund’s application process and allocation decisions. Experts stated that they did not know whether this accusation impelled faster ITN scaleup, but they agreed it was a plausible conclusion to draw. In any case, the Global Fund faced external pressure to improve access to the newer, more effective antimalarial ACTs. Shortly thereafter, it “took on a formal policy of refusing to fund drugs where evidence of ineffectiveness was strong, so saying to countries: with your own money, you can do whatever you like, of course, but if you’re applying for Global Fund [funding], we have a constraint on drug choice,” Feachem explained. In that way, the Global Fund “forced a switch to ACTs, whereas it didn’t force anything on bednets,” he added.

Mark Grabowsky, who was a malaria officer in the Global Fund’s procurement unit in 2007 and 2008 and who had previously led a multiagency effort to integrate net delivery into childhood immunization campaigns, emphasized that not all countries would have necessarily viewed ITN scaleup as a top priority.¹¹² “Countries would design programs to achieve optimal impact according to their own priorities and experience,” which may or may not be an “optimal or effective [ITN] scaleup strategy,” according to Grabowsky. Furthermore, the WHO had not yet adopted a formal position on an optimal ITN scaleup strategy. As Feachem noted, the Global Fund did not tell or urge countries what to include in their applications, save for the case of ACTs; instead, as Grabowsky said, “it was: you choose whatever approaches you want, and often those approaches had competing interests” (reducing malaria was and is one among many health challenges).

The Global Fund, moreover, did not offer countries technical support or advice as a strategic, intentional choice outlined in its founding principles, a choice intended to strengthen country ownership and international partner accountability (Global Fund 2001). “This innovation was essential because of the failure of existing bilateral and multilateral agencies to stem the tide of HIV,” Feachem stated. In contrast to the normative, standardized guidance that accompanied vaccine delivery through immunization programs, net delivery through the Global Fund did not have comparable standardized guidance. This made the Global Fund, in Grabowsky’s view, “unable or perhaps uninterested in providing the technical support, which its grantees needed and often asked for, especially in the case of ITN scaleup” in its initial years.

The RBM Harmonization Working Group and the Global Fund’s Application Support for Countries

By 2005, still more than half of the Global Fund’s allocations were going toward HIV, but the size of the pot was also growing, so “malaria allocations on a five-year basis now [totaled] about US\$1.8 billion.” In

comparison to just five years earlier, this sum represented a relatively seismic shift in the scale of available financing for malaria. Although these figures were impressive, actual implementation and delivery were less so: “a longer than anticipated time lag in the implementation of [Global Fund] grants” in 2005 meant only “US\$130 million had been disbursed [as of September 2004]” while “only eight malaria grants totaling US\$33 million had already concluded one year in operation” (RBM, WHO, and UNICEF 2005). Compounding challenges in implementation, application approval rates for malaria funding were low: multiple experts interviewed cited an approval rate of only around 23 to 30 percent in the Global Fund’s sixth round of funding.¹¹³

The Global Fund increased available funding for malaria, which in turn enabled ITN scaleup; an important dimension that facilitated countries’ access to these funds, then, was improving what was a relatively low application success rate in 2006. According to Rockwood, “donors were concerned through the RBM board mechanism that countries were not receiving their adequate share of Global Fund funding” for malaria. This concern led RBM to form the RBM Harmonization Working Group (HWG).¹¹⁴ Development partners such as the Global Fund, the UN Foundation, UNICEF, the WHO, the World Bank, and others, according to Rockwood, became HWG members alongside countries. Through the HWG, Rockwood explained, it became “clear that countries needed the assistance to understand the complexities of the Global Fund from a malaria aspect, what the Global Fund was looking for, what they should be applying for, and how they should be applying for it.”

From 2007, RBM began supporting countries through the HWG with their malaria funding applications to improve the applications and their likelihood of approval. In response to the low application success rate in the sixth round, RBM through the HWG set a target of “80% success for 19 or more countries in Africa” in the next (seventh) funding round.¹¹⁵ Coll-Seck stated that “we at RBM created a working group specifically to support countries with their grants to be presented to the Global Fund, which had almost all the partners involved for countries to be able to give quality applications.” Multiple experts interviewed described the Global Fund’s application in the beginning as “difficult,” “not very clear,” and “a nightmare” for countries applying for malaria support; Coll-Seck thought that a contributing factor here was that the “ways the Global Fund was working was adapted more so to the HIV community’s way of doing things.”

The HWG helped harmonize technical approaches to malaria across implementing agencies, donors, and countries. According to Mwenesi, it was the “same people who formed technical working groups in the WHO/RBM, who the Global Fund largely depended upon as technical reviewers, [and] who supported countries to write applications that are fundable.” According to Renshaw (who, according to multiple other experts, spearheaded this effort through her role with UNICEF), the HWG provided

significantly stronger support to the countries in the preparation of their Global Fund malaria proposals. This included international and local consultants, an orientation meeting on the application process, funds for local meeting costs, and then country peer review meetings, where countries reviewed each other’s proposals to provide helpful comments for improvement. This also included final expert review of near complete proposals.

This “mock Technical Review Panel (TRP) process,”¹¹⁶ together with broader Global Fund application support, was “massive” and “critical,” according to Erskine (IFRC senior health officer, malaria). Erskine also credited Renshaw as “one of the driving forces behind” the mock TRP process and as “instrumental in moving more towards a country-tailored approach.” Martin Edlund, current CEO of Malaria No More, similarly credited Renshaw and stated that the mock TRP process meant that countries “looked through the same lens that the Global Fund would look and helped strengthen those plans before the Global Fund reviewed applications.”¹¹⁷ Coll-Seck said that the HWG created a “sort of revolution” and “put into place a very important system” for coordination that became a “model for application support” at the Global Fund and beyond. McArthur similarly characterized the technical review process as “pretty revolutionary,” as it impelled the Global Fund to rely on “evidence and peer review to drive decisions rather than politics.” Over time and with training, according to Coll-Seck, countries required less and less support, but “you can see the change when people decided to harmonize and support countries in a proper way.”

And indeed, the malaria application approval rate jumped from 30 percent in 2006 to 76 percent in 2007 among countries that received HWG support.¹¹⁸ In 2007, as a share of the Global Fund’s funding for the three diseases, the allocation for malaria increased to 42 percent, up from 24 percent in 2006.¹¹⁹ Then-executive director of the Global Fund Michel Kazatchkine said that “where [technical support] was available countries most often succeeded in securing grants. We welcome the concerted effort by the RBM Partnership to help countries gain access to the resources they need to roll back malaria.”¹²⁰ Mwenesi, who was with USAID/NetMark at the Academy for Educational Development (now FHI 360) at the time, stated, “Without RBM backing and working very closely with the Global Fund to ensure implementation of programs in malaria-endemic countries was going well, it would have been very difficult to achieve what was achieved in the 2000s” with regard to ITN scaleup. By 2007, the Global Fund claimed to have supported the distribution of 46 million ITNs (Global Fund 2008). Only 18 million ITNs had been distributed globally through the Global Fund the preceding year.¹²¹

Purchasing Power, Market Shaping, and Procurement

By 2007, the Global Fund provided 64 percent of global malaria funding;¹²² this share increased to 70 percent by 2010.¹²³ Unquestionably, the funding made available through the Global Fund “made scaling easier,” in Binka’s words. Or, according to Feachem, “no Global Fund, no bednet explosion.” Although the funding mobilized through the Global Fund incontrovertibly enabled rapid ITN scaleup by the end of the decade, Global Fund financing itself took time to scale. A smaller initial funding envelope curtailed efforts to rapidly scale ITN delivery, both practically (as the Global Fund mobilized the largest share of global malaria funding, so without it, fewer nets moved) and politically. In McArthur’s view,

The size of the pot [for the Global Fund and other investments] was very influential in what people thought was possible. You have to make the argument for what resources are needed and why that’s possible to mobilize. Do the work to show what the money can do if the money is raised. You will never achieve anything if you’re only focusing on a small existing pot of money. You have to make the case for why more money is needed. People had to be persuaded of that argument, but they got there.

Additional evidence suggests that in the context of this initially smaller pot of money, Global Fund TRP members and others may not have viewed mass ITN distribution as feasible or preferable, which may have inhibited application approval rates for mass ITN distribution campaigns. “Countries would apply and be rejected because the proposal funding ask was too big,” according to McArthur. The documented rejection of at least one country (Kenya) that had applied for funding for a universal net campaign in 2002 supports this claim.¹²⁴ Other factors, such as still-nascent or else nonexistent guidance regarding what countries should include in malaria funding applications and still-limited net production capacity, also likely contributed to rejected applications in this early period. Additional research quantifying how many countries applied for universal campaigns before 2005 but were rejected would shed further light on this dynamic.

Since its outset, though, the Global Fund has been results- and performance-based; as a health commodities fund, there was an attractiveness to the Global Fund (as to other donors) in being able to report large numbers of commodities being distributed (Moore-Sheeley 2017). This model meant the Global Fund had to be able to “show this number of nets have been purchased, this number of people have been protected, this number of deaths have been averted,” according to Jallow. With this new multilateral channel and the scale of pooled investments for malaria, the Global Fund not only helped mobilize funding broadly but played a critical role in shaping the *availability* of nets.

When the Global Fund was established, though, two overarching factors prevented large-scale net procurement and distribution. First, at about \$5 per net on average, nets were too expensive for many African governments to procure enough to cover their entire populations (in the context of constrained domestic health financing and other competing health priorities). According to O’Meara, “countries were investing in nets, but the power to buy the volumes required to drive down the prices wasn’t there.” Second, ITN manufacturing capacity was insufficient to meet the global demand. Moreover, with the development of long-lasting insecticide-treated nets (which either impregnate an insecticide directly into the net fiber or coat the fiber), initially only two companies had the capability to manufacture this innovation through 2005: the Japanese company Sumitomo Chemical and the Danish company Vestergaard. This meant LLINs initially cost more than other ITNs.

Once the Global Fund started funding the procurement of millions of nets, this situation changed. Most experts indicated that they thought the Global Fund’s market-signaling to net manufacturers helped enable net scaleup. “Once manufacturers saw all the donors coming in, it definitely gave some signal that there was a market emerging,” according to Rockwood. O’Meara similarly stated that “the Global Fund consolidated resources that could encourage production and bring down prices,” as it had done with ART and eventually ACTs. Feachem put it this way: “This would not have happened if there wasn’t a large pot of money saying ‘if you make these things, we’ll buy them,’ and that was the Global Fund. Purchasing power has to be a primary driver, and without that, this would never have happened.” Evidence included in this case study supports this view. In addition, the Global Fund, through its large volumes, helped nearly halve the average LLIN unit cost between 2005 and 2012 (Wafula, Agweyu, and Macintyre 2013).

The relationship between the supply of and demand for nets, however, was nuanced. According to Jallow, there were “not enough manufacturers who were actually able to meet the demand at that time in terms of the scaleup.” This dynamic created a bit of a “catch-22,” according to Rockwood: countries could not scale because the unit cost of nets prevented countries from procuring large volumes, but large volumes had to be procured in order to bring down the unit cost. Amid calls for new suppliers and increased production capacity, there were also challenges in forecasting demand, according to Rockwood, and in the Global Fund’s approach to procurement (the fund “believed they were just a financing institution and didn’t need procurement oversight in those days”). “The Global Fund could scale up funding, which only inefficiently translated into procurement and delivery and impact,” according to Grabowsky, “but funding scaled up because the commodities came online.” In other words, the Global Fund also needed a signal from suppliers that there were ITNs available to procure in the first place.

Rockwood, Jallow, and several others interviewed thought that the Global Fund’s operations vis-à-vis health product procurement were inefficient and ineffective during this period, which curtailed implementation. Contemporaneous Global Fund annual reports and World Malaria Reports hinted at procurement and logistical challenges as well. Jallow, who spearheaded the creation of the Global Fund’s pooled procurement mechanism in 2008, put it this way:

It’s a two-way traffic: the Global Fund cannot be deemed successful if they do not disburse money; if they do not disburse any money, I don’t think any donor country will give them more money. You need to have the flow on both sides. If the countries are not utilizing the money, the Global Fund will not be successful. One of the reasons the Global Fund established the voluntary pooled procurement, which is now the pooled procurement mechanism, is because there was a board decision in 2006 where they were looking at performance in grants. And they realized grant performance was not as optimal as they wanted, and one of the biggest problems, or challenges, was actually linked to procurement of the health products. A significant amount of the money was for the health products—between 45 and 50 percent. If the health products are not purchased, procured, and delivered for them to continue with the program, the program cannot be successful.

Through 2007, challenges with product procurement impeded ITN scaleup. In the Global Fund’s 2005 midyear report, the authors wrote that “procurement remains a major issue, particularly for HIV and malaria grants” (Global Fund 2005b). As another indication of the Global Fund’s procurement challenges, the fund’s 2008 annual report noted “unprecedented growth in the distribution of insecticide-treated bed nets ... in the last 24 months, as programs have resolved initial capacity constraints in procurement and management.” This growth translated to “distribution of 52 million insecticide-treated bed nets, almost three times the number reported in the preceding four years” (Global Fund 2009). Grabowsky, who worked with the Global Fund’s procurement unit at the time through the Measles Initiative, described Global Fund procurement through its grantees as

inefficient and unpredictable. There were three major procurement issues. First, each large ITN order was bespoke, with country-specific requirements for size, shape, and color, requiring a semi-transparent bidding process. Only then would the winning company start ITN manufacture, resulting in a 6-12-month lead time in procurement. Secondly, it was unpredictable when a

tender would go out and they often went out at the same time, meaning that instead of pooling buying, [companies] were competing against each other for a scarce resource, driving up prices, or at least inhibiting the reduction in prices. Third, organizing delivery was a massive, multi-agency, expensive, and seasonally dependent activity. With the Global Fund model, the procurement of nets or transfer of funds for delivery costs was often unreliable, meaning that the nets arrived too late to synchronize with all of the other [implementation] activities. So, for example, if nets were going to be integrated into a vaccination campaign, the nets would arrive too late and the distribution window would be missed.

Reliable demand forecasting, storage (warehousing) and transportation, and other supply chain logistics were aspects of net procurement and delivery that were not well executed early on, Grabowsky further explained. Of ITNs, he noted, “A lot of this stuff sat in warehouses and rotted or was never used; being able to get funding is different from procurement.”

Through the Global Fund’s oversight mechanism, the Office of the Inspector General, reports of “corruption” also surfaced in the mid- to late aughts, which may have negatively impacted ITN scaleup efforts by discouraging public donors from increasing funding commitments to the Global Fund to fund scaleup. Corruption in this context could include diverting funds earmarked for health commodities for other purposes. McArthur, for example, recounted, “It was very common to come across criticisms of the Global Fund that the Global Fund was dealing with as reason not to increase scale” of support. Using an application process to access funding for health was new; in Grabowsky’s view, the Global Fund may not have adequately accounted for the reality “that the grant process imposed an administrative accounting infrastructure which these countries simply did not have, forcing the countries to figure out creative ways to get anything done, some of it corrupt, some of it extralegal, but some of it desperate measures by countries just to try and get something done.”¹²⁵ Rockwood, who was involved in a five-year evaluation of the Global Fund in 2007, noted that she “pushed for including procurement as a subtopic in the evaluation” because “around that time there was not a real understanding of what procurement processes and oversight needed to be put in place to ensure that you didn’t have a lot of these issues around corruption at country level.”

While the Global Fund worked to address these procurement and operational challenges, another substantial shift external to the fund took place that influenced the trajectory of ITN scaleup. In mid-2007, the WHO called for universal coverage of LLINs, ideally provided for free; previously, it had called for coverage among people most at risk of severe malaria and death and had not taken an official position on a delivery model. Several experts interviewed underscored the importance of WHO guidance in informing what the Global Fund approves (according to Renshaw, for instance, the fund “takes guidance from two things: country demand, or what countries are asking for, and WHO recommendations”). Before 2007, the WHO had limited technical guidance regarding nets (it “didn’t really exist,” according to Erskine). Erskine, who worked with the IFRC on integrated campaigns (i.e., campaigns that integrated ITN delivery with childhood immunization campaigns), also recalled the Global Fund’s initial hesitancy to support large-scale distribution campaigns “on the basis of very limited data” on such campaigns. It took “a fair bit of advocacy” from the Red Cross, according to Erskine, to get the Global Fund grant for Niger approved in 2005, which the Global Fund called the “most ambitious in Africa to date” (Global Fund 2006).¹²⁶ With the WHO’s 2007 policy shift, however, “all of those

applications were going for campaigns by that point,” according to Renshaw; “everyone threw in that they wanted a universal campaign.”

A subsequent surge in Global Fund funding for malaria, in turn, enabled countries to implement those universal campaigns. In the Global Fund’s 2008 funding round, more than half (51 percent) of funding (\$1.4 of \$2.75 billion) that year went toward malaria and was specifically intended to “help close the bed-net gap (providing 100 million additional nets)” (Global Fund 2009). By December 2010, the Global Fund reported a cumulative total of 160 million ITNs distributed globally.¹²⁷ A driving force behind that increased funding for malaria in 2008 was Ray Chambers’s advocacy. UN secretary-general Ban Ki-moon appointed Chambers as UN special envoy for malaria in early 2008; in this capacity, Chambers made a joint presentation with RBM’s Coll-Seck to the Global Fund that funding round “to make sure they wouldn’t reject the idea to get more money than HIV that round and that everybody was aligned with universal coverage,” according to Renshaw.¹²⁸ Other experts interviewed also credited Rajat Gupta, Global Fund board chairman from April 2007 to March 2011, as being “decisive in replenishment rounds to support [ITN] scaleup,” in McArthur’s words. According to Edlund, Gupta created “buy-in at the top.”

The HWG (cochaired by Malaria No More and UNICEF) coordinated country demand and application support through the mock TRP process. Renshaw characterized this moment as a “perfect storm—a nice combination of lead agencies coming together, communications and advocacy getting behind that, strong country demand, and alignment with funders” to ensure that malaria received “adequate resources to fund the necessary ITN scaleup and that this was allowed by decision-makers despite it exceeding the HIV/AIDS allocation in the 2008 funding round.” Exactly how much weight to assign to these different components, however, is not entirely clear; it seems possible that the cumulative effect of these actions carried the most weight.

THE US GOVERNMENT’S RESPONSE TO MALARIA: USAID’S NETMARK PROJECT AND THE PRESIDENT’S MALARIA INITIATIVE

Alongside the Global Fund, two global health initiatives created by the US government in the early 2000s, PEPFAR and the President’s Malaria Initiative, contributed to the unprecedented growth in global health financing in this period, notably for HIV/AIDS and malaria. The creation of PEPFAR in 2003, and more specifically the initiative’s scale of financing and bipartisan support, set the precedent for increased, targeted USG funding for malaria. “Once the Bush administration created PEPFAR, the diplomacy avenues that it opened up [together] with the advent of the Global Fund,” according to Rockwood, “probably prompted [the administration] to look at malaria within those countries [considered] ‘priority.’” In Ziemer’s view, moreover, “PMI piggybacked on PEPFAR recognition.” PEPFAR had, by 2005, mobilized \$3.2 billion for HIV/AIDS prevention, care, and services in over a dozen “focus” countries with high HIV/AIDS burdens, with \$15 billion total authorized for FY2004–FY2008.¹²⁹ Similarly, PMI started with several “focus” countries and eventually became the second-largest global funder of ITN distribution behind the Global Fund.

It was not guaranteed, however, that the USG would assume greater leadership on malaria.¹³⁰ Before the creation of what would become the USG’s primary agency for malaria, PMI, in 2005, USAID

was the main source of US foreign assistance for malaria control. Indicative of the USG's approach to malaria at the time, Rabinovich recalled meeting with a senior USAID official about the agency's malaria programming in the early aughts and the individual stating that "the model here is we deeply believe in people investing in their own future as a way of achieving sustainability and building markets slowly." Alan Court, who worked with UNICEF before joining the UN Special Envoy for Malaria office, similarly recalled the USG as "very resistant" to free net distribution before 2005, following instead "strong arguments from within USAID to go the PSI [Population Services International] route" of social marketing and Africa-based manufacturing.¹³¹

Before 2005, moreover, the Bush administration had resisted explicit references to the Millennium Development Goals; US ambassador to the UN John Bolton, appointed in August 2005, suggested "the deletion of MDG references from the [2005 UN World Summit] outcome document" (McArthur and Zhang 2018).¹³² The MDGs, according to McArthur, "became this allergy" within the USG, "this allergy of, 'we didn't sign up to that.' It became this whole bureaucratic ghost of a narrative." Achievement of malaria-related MDG indicators hinged on ITN scaleup. The USG's apparent initial resistance to the MDGs, together with its initial prioritization of social marketing and commercialization of nets, limited its causal role in ITN scaleup before 2005.

USAID's NetMark Project

Before PMI, the USG's main approach to malaria control in the late 1990s through the mid-2000s was social marketing and building private markets for ITNs. USAID's main program to this end at the time was NetMark, formed in 1999 and contracted through the Academy for Educational Development, which intended to create a sustainable, private market for ITNs through social marketing. David McGuire, the former director of NetMark, recalled working on USAID's flagship child survival project (BASICS) as its public-private partnership manager and having a conversation with Dennis Carroll (USAID's malaria lead) and Mike McDonald (BASICS malaria advisor) about the "great research" on ITN efficacy yet the lack of "funding to procure the nets." This conversation, according to McGuire, led to the idea of "partnering with international and African net manufacturers to develop commercial markets for ITNs in Africa and to use private sector channels for targeted subsidized distribution to the most vulnerable populations." In 1997, according to McGuire, he and McDonald were then "asked to go to Ghana to work with the national malaria program and other stakeholders to develop a pilot that served as a template for the NetMark project."¹³³

The rationale for this approach, given that there was virtually no funding for malaria, was to build up African ITN distribution and marketing capacity so African countries would not need to rely as much on external funding for malaria control and therefore would be sustainable in the long term. McGuire stated that the project also "included the provision of vouchers for free or subsidized nets through commercial channels (depending on need and the availability of funding), and the development of a transferable technology to treat nets manufactured in Africa to simplify supply chains and promote local ownership and self-sufficiency." Through this \$65 million, 10-year program (1999–2009), according to McGuire, "we worked with all the major net and insecticide manufacturers to optimize and promote these products based on extensive consumer research" within the nine African countries in

which NetMark was active. Mwenesi, technical manager for NetMark’s Africa Region, who worked closely with McGuire on NetMark implementation, further explained,

We were everywhere, making a lot of noise in terms of social and behavior change, communication, raising people’s awareness on malaria and ITNs, and sensitizing them about the importance of sleeping under the ITNs consistently. We were working with manufacturers, both insecticide and net manufacturers. We were at the same time working to see how we could best transfer the technology to Africa so that nets could start being produced in Africa.

Within those first five years of the aughts, meanwhile, evidence showed that the main barrier to people’s access to and use of nets was net cost, even with subsidies (WHO and UNICEF 2003).¹³⁴ It seems reasonable to posit that the socialization efforts of NetMark and other social marketing groups like PSI may have helped build a culture of net use, which was necessary for scaleup. Net cost, however, stood in the way of scaleup. Mwenesi stated that “it was clear at the time nets are expensive”; following “research into who was actually using treated nets,” it became “very clear that if nothing was done, it would be hard to reach populations at highest risk of malaria; it wouldn’t be easy to ensure those who really needed nets would be able to afford them.”¹³⁵ McGuire said NetMark “saw the need to segment the market,” with the basic idea to “complement fully commercial distribution with targeting subsidies while building up local manufacturing capacity.”

Evidence that the poorest segments of the population—those most at risk of severe disease and death from malaria—were unable to afford nets, however, led some to question social marketing as a scaleup strategy. Social marketing was “increasingly perceived as a flawed strategy,” according to Rabinovich. With these concerns growing, Grabowsky, who was with the Centers for Disease Control and Prevention (CDC) at the time, led research into whether free distribution was “better or worse than the existing scaleup strategy” of social marketing. “We could test all of these claims” regarding the “added value” of social marketing, such as providing local employment for net vendors, according to Grabowsky, “to see if they held up.” Grabowsky found that NetMark’s program costs were about \$6/net and \$14/net for operational/marketing costs.¹³⁶ “It was cheaper to give the nets for free than to try to sell them, so it was an unsustainable program, but their rationale was that this was the pathway to sustainability. But they couldn’t scale fast enough to overcome their fixed program costs,” including personnel costs for US-based staff, according to Grabowsky.

A critical tipping point was on the horizon: public scrutiny on how USAID supported malaria control was beginning to make social marketing of nets untenable. Simon (former senior director for relief, stabilization, and development on the White House National Security Council staff) stated that around this time, the “effectiveness of social marketing was being called into question, including by folks in Congress.” The American Enterprise Institute’s Roger Bate and Benjamin Schwab and Canadian academic Amir Attaran contacted two Republican senators, Sam Brownback and Tom Coburn, to spotlight the USG’s malaria spending, which overwhelmingly went toward technical assistance.¹³⁷ (What motivated or prompted this trio to analyze USG spending on malaria is unclear and would require additional research to determine.) In 2004, the USG spent about \$80 million on malaria, most of which (86 percent) went toward “implementation support,” which encompassed technical training, commodity

distribution programs, and fundraising. Only \$5.7 million went toward direct commodity purchases; this included \$4.1 million for LLINs and just \$500,000 for ACTs.¹³⁸

Subsequently, Congress began holding hearings on the USG's global health spending. In an October 2004 Senate hearing on public health programs, Senator Brownback and USAID assistant administrator for global health Anne Peterson discussed why USAID was primarily funding technical assistance over direct commodity purchasing (specifically, DDT), which is what countries reported wanting the USG to fund.¹³⁹ Ziemer (former PMI coordinator) recalled a congressional hearing (perhaps the same one) in which Senator Coburn "challenged [USAID] to prove that their \$90 million a year was having any effect, but it was not possible." Simon also recalled USAID deputy assistant administrator Michael Miller testifying about malaria, where he was challenged on social marketing; following the hearing, Miller "came back and talked to technical folks including Richard Greene [director of USAID's Office of Health, Infectious Diseases and Nutrition]; they said 'yeah, we should be doing free distribution, but we don't have the money.'"

The *New York Times* then in 2005 published an article critical of NetMark, reporting that USAID had spent just \$4.5 million on ITNs, antimalarial drugs, and indoor residual spraying combined out of \$90 million total spent on malaria, while 15 million nets had reportedly been delivered through NetMark as of 2005.¹⁴⁰ This *Times* coverage came out shortly after *The Lancet* accused the Global Fund, WHO, and USG of "medical malpractice" regarding the ongoing use of chloroquine in place of ACTs. This coverage, combined with the "USG's refusal to acknowledge ACTs," in Rockwood's view, helped force a change in the USG's approach to malaria: "It was basically the *New York Times* outing everyone, it was a lot of the stronger advocates making sure that that research to policy came out more in the media because it wasn't being listened to."

Around the same time, one of the worst recorded natural disasters took place in Asia in late December 2004, which further intensified public scrutiny on USG aid spending.¹⁴¹ The Bush administration initially contributed just \$15 million to the response to the tsunami, which prompted criticism from a UN official and a broader debate about the "stinginess" of Americans.¹⁴² A *New York Times* editorial published just a few days later critiqued the USG's tepid response, in addition to unfulfilled pledges to other humanitarian and development commitments.¹⁴³ It "started this whole global conversation around how much are we [the US and other donor countries] really giving," according to McArthur, which contributed to a widening policy window for the USG to do more on malaria and other development challenges—an important enabling-environment factor for ITN scaleup.

Against this backdrop, Sachs and McArthur met with then-deputy secretary of state Bob Zoellick in early 2005 to discuss ideas that the USG could pursue to this end. McArthur recounted that at the end of the meeting, Zoellick "said, 'send me more details about the green revolution in Africa idea and the malaria bednets.' I sent him our two-pager; he then said, 'talk to my colleagues.'"¹⁴⁴ Several weeks later, McArthur attended a meeting at the State Department with mid-level officials; he recalled participants referencing a large binder on the table consisting of "collected comments from across the US government as part of some interagency process" on a memo that Zoellick had sent based on Sachs and McArthur's two-pager. Highlighting the contingent nature of ITN scaleup, McArthur posed the

question, “What if Zoellick hadn’t sent the memo? As the deputy secretary of state, he was a particular character in a particular role exacting influence on the machinery in 2005.” He further stated that the group meeting “was one of the most contentious meetings of my career.” On mass distribution of nets, according to McArthur, USG staff made

all these arguments against it, arguments for why not do it. I remember getting quite animated. For example, [USG staff talked about] people using nets as wedding dresses and net misuse anecdotes. But let’s give pause, I said. Even if that were a valid concern, let’s think about how poor people would have to be to be using bednets as wedding dresses. I talked to Jeff [Sachs] after, who had just got off the phone with the [National Security Council]; he said it was also tough, it’s all tough right now. It was not clear what would happen.

Indeed, the USG, through 2005, had prioritized social marketing for nets and spent less than \$100 million on malaria annually; based on the evidence presented in this section, it seems the USG had to first overcome significant institutional and political roadblocks before it could become an enabling factor for ITN scaleup. Edlund (Malaria No More CEO) recalled “John and Jeff screaming into the wind about malaria and nets.” He added that “once [we] broke the bottleneck of social marketing, that was a critical factor” for rapid ITN scaleup. McArthur suggested that Sachs was “not the favorite person of the Bush administration by 2005” on account of his criticism of the Iraq War.¹⁴⁵ Sachs and McArthur were not the only people advocating for free mass distribution, but Sachs in particular certainly was vocal and high profile; many experts interviewed either named Sachs unprompted or agreed when asked whether he was among the most outspoken, visible advocates for free nets in this era. It is possible that Sachs’s criticism of the Bush administration may have tempered USG officials’ enthusiasm for ideas he promoted, such as free nets.

Nevertheless, an uncommonly aligned bipartisan congressional coalition seemed to be forming around malaria. McGuire stated that malaria “started to get a lot of political attention in the US [and] to this day is one of very few issues that has full bipartisan support.” Senators Coburn and Blackburn in particular were vocal advocates in Congress; they led the hearings on US malaria spending and, according to McGuire, were the ones who “started to push for more investment in procurement of bednets and free distribution.” Coburn advocated for spending US foreign aid on “drugs and nets rather than consultants.”¹⁴⁶ McGuire also noted the Congressional Black Caucus and Tim Rieser, Democratic staff director of the Senate Appropriations Subcommittee on State and Foreign Operations, as being “very influential” in garnering USG support for mass ITN distribution. With this advocacy, “more resources were getting put into malaria,” according to McGuire; by the time the USG established PMI, USG foreign assistance for health “began to shift from focusing the bulk of its support from HIV/AIDS to increased expenditure on malaria programming.” This shift, in McGuire’s view, “was clearly a direct result of all this bipartisan political traction.”

Establishment of the President’s Malaria Initiative

The Bush administration announced PMI in June 2005. As PEPFAR “started building momentum,” according to Ziemer (who led PMI from 2006 through 2017), staff in the Bush administration, such as Bush’s senior policy aide Michael Gerson,¹⁴⁷ started calling attention in the White House to the effects of malaria on economic and education outcomes in PEPFAR countries. Gerson was the “person closest

to the president advocating for these issues,” according to Simon. Ziemer further noted that repeated bouts of malaria keep children out of school and parents out of work; so “if you want to talk about economic impact, that’s a stark example.” And indeed, making these linkages between health impacts and economic and education impacts of malaria became central for reauthorizing funding for PMI, according to Ziemer: “My job was to continue to beat the drum that this was a good foreign assistance public health intervention and oh, by the way, it kept kids at school and moms and dads at work.”

A critical catalyst for the decision to create this new initiative was the 2005 G8 summit in Gleneagles, Scotland, which was hosted by UK prime minister Tony Blair. Among the main items on the agenda were debt relief for heavily indebted countries, global poverty reduction, and doubling aid to Africa. Leading up to the event, Bush had opposed the idea of doubling aid for Africa,¹⁴⁸ yet apparently due in part to external pressure, he requested that his staff come up with ideas for new initiatives his administration could launch. “With Gleneagles approaching,” according to Simon, “Bush really wanted to do something to show Tony Blair that he was committed to making poverty history,” which was the tagline of the summit.¹⁴⁹ Simon recalled Gerson approaching him (Simon) about this and having subsequent discussions about what the announcement should be. Priorities such as girls’ education were initially considered, according to Simon, but in the case of malaria, it was “very clear what we could do”: nets, antimalarial drugs (ACTs and chemoprevention), and spraying.¹⁵⁰

The creation of PMI was “a little bit of a lightning strike,” according to Simon, in that disparate influential threads came together all at once. For one, Gerson was a vocal, powerful advocate in the White House who became a “huge fan” and “big supporter” of nets once he “saw the impact they could have on malaria,” according to Simon. Second, there was what both Simon and Ziemer classified as robust, convincing evidence that nets—together with spraying and ACTs and treatment in pregnancy (PMI was “founded on the idea of doing all three, not just one,” according to Simon)—would make a difference in malaria incidence and mortality. “It was a data-driven policy,” in Simon’s view. Third, President Bush was “very decisive” once he saw the data on nets, the implementation plan, and the budget that Simon had put together to present the idea for PMI to Bush. Simon recalled making it only two-thirds of the way through his presentation before “[Bush] said, ‘this is great, we’re doing it.’” Fourth, with “Congress beginning to question the value of social marketing,” according to Simon, there was a bit of “serendipity” in “USAID folks looking at their strategy at the same time [the Bush administration was] looking for something to announce at Gleneagles.” Taken together, “all that made for one of the lesser controversial issues” within US foreign policy, in Simon’s view.

In 2005 following Gleneagles, the Bush administration launched PMI, initially as a \$1.2 billion, five-year interagency initiative (namely of USAID and the CDC) targeting direct commodity purchasing in three initial “focus” countries. Simon noted that “in aid dollars, it seemed like a lot,” especially given that USAID had been spending less than \$100 million annually on malaria. This budget reportedly created some resistance: Bush initially faced opposition from the State Department, the Office of Management and Budget, and Vice President Cheney, according to the Boston Consulting Group (which RBM contracted in 2006 to assist with a reform process).¹⁵¹ In parallel, the budget needed to be able to provide nets for free as part of the USG’s malaria-control efforts generated resistance; McArthur noted

that “there are a whole set of legitimate reasons why public agents might be skeptical about new ideas, but we received lots of pushback” on free distribution. Before PMI, in Simon’s view, “fighting malaria was going to cost a lot of money, and people didn’t have the imagination to think we could go get that money.” Simon credits President Bush with “recognizing it’s worth the money to spend,” which he did because there was strong scientific evidence showing that nets worked.

Widening the lens, another important causal mechanism at play were the broader incentives shaping global health and development policy choices. The WHO, along with the Global Fund and others, emphasized the role of health systems in health outcomes and the need to strengthen health systems. “There were no health systems” to speak of in Ziemer’s view, however; “Our job was to bring down malaria cases and deaths without systems.” More specifically, “Nobody was going to give us the blue ribbon for investing X in building the health structure [system] in a country. They were going to give us more money if the malaria incidence and mortality rate went down.” By PMI’s formation, amid a “tremendous amount of political will to do something” on malaria—at this point, malaria deaths were still increasing, despite the availability of a robust toolkit to combat malaria—the “easiest and most quantifiable thing to do was procure a proven tool like ITNs and distribute them,” according to McGuire. Here again, the marketability of nets as a lifesaving health commodity most likely contributed to net scaleup in the 2000s. And in the context of criticisms around NetMark and USAID’s social marketing approach, “a strategic decision was made to go free nets early on,” according to Ziemer.

In terms of actually distributing nets, PMI, like the Global Fund, had to balance the pace of funding scaleup with net manufacturing capacity. “PMI went up in a sort of stepwise fashion because we knew we would create giant supply chain shortages if not,” Simon said; “the idea was to ramp up spending in line with ramped up production” and “absorptive capacity.” Simon recalled “frequently fielding questions of ‘why aren’t we spending more?’”; total USG spending on malaria (of which PMI accounted for the majority) in the first few years increased; from \$225.7 million in 2006, to \$397.7 million in 2007, to \$521.8 million in 2008, to \$534.5 million in 2009, and to \$754.5 million in 2010.¹⁵² The creation of PMI and the Global Fund “increased [demand] dramatically,” according to Simon, but “manufacturers at first had to be convinced that [that] demand wouldn’t disappear.”

2006 White House Summit on Malaria

After Bush established PMI, he and First Lady Laura Bush hosted the first White House Summit on Malaria in December 2006, where he announced eight more PMI target countries.¹⁵³ As the first-ever White House summit on the disease, it was “a pretty significant moment in terms of gaining public attention and congressional commitment” on malaria, according to Ziemer. Other experts consulted agreed that the primary purpose of the 2006 summit was advocacy and US political mobilization. McArthur recalled that “people were saying there’s nothing new there, but the point was that it was new people saying it. Insiders are not the target audience for these things.” Indeed, Edlund thought that the “summit sent a signal to the [USG] system. PMI had been created before the summit, but it was still fledgling and coming out of [the summit], House and Senate working groups started up, the engine started on the USG side.”¹⁵⁴

The 2006 White House summit also debuted a new malaria advocate who would become important for deepening and sustaining global investments in malaria: Ray Chambers. Chambers, together with News Corporation CEO Peter Chernin, founded and launched the NGO Malaria No More at the 2006 summit.¹⁵⁵ Edlund, who currently leads Malaria No More, noted that the Bush family had a “strong existing relationship” with Chambers that was “strengthened” through the summit. “Sustaining funding was my biggest challenge while running PMI for 10 years,” according to Ziemer; “when Bush launched PEPFAR and PMI, he had a clear understanding that the government couldn’t do this alone, so he made a strong appeal to the private sector” through Chambers and Chernin (in the case of PMI). Several experts consulted for this case study who worked with Chambers thought his advocacy played a definite role in accelerating the pace of global ITN scaleup. In Ziemer’s view, for example, Chambers’s “advocacy was significant from day one.” McArthur similarly indicated that Chambers’s “political savvy was important” with the Bush administration; Chambers “made PMI and malaria control scaleup a win for everyone.”

Multiple experts credited Sachs with introducing Chambers to malaria’s toll in Africa. As part of Sachs’s advocacy at the time, he frequently featured a photo in presentations of “kids who were lying sick with malaria; people thought the kids were sleeping at first. It was shocking to people, it was galvanizing,” according to McArthur.¹⁵⁶ In 2005, Sachs and Chambers worked together through Millennium Promise (a US antipoverty nonprofit Sachs founded and Chambers chaired); McArthur recalled that at one point Sachs described the MDGs and development challenges in Africa to Chambers and showed the picture of children in malaria comas. After that, “Ray becomes single-mindedly committed to this issue. He ultimately gets the White House more engaged in a more collaborate spirit.” In Edlund’s view, Chambers “viewed [bednets] as too big a leverage opportunity to [not] do something around malaria. He saw it as a way to amplify an issue and move it up the policy priority list.” According to Court, moreover, WHO director-general Margaret Chan “suggested that there should be a special envoy for malaria because it’s neglected. When Ban Ki-moon asked who should do it, Margaret Chan suggested Ray, and that was because of the [White House] Summit and what Ray did.”¹⁵⁷ As special envoy, Chambers also exerted influence on the Global Fund’s 2008 funding round for malaria (as previously discussed).

By PMI’s fourth year in 2009, the US government supported 15 focus countries with net procurement and delivery, antimalarial drug procurement and delivery, and other malaria-prevention and malaria-control activities. The Tom Lantos and Henry J. Hyde US Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act of 2008, which broadly helped cement global health as a nonpartisan issue within the USG, authorized “up to \$48 billion in funding over five (more) years (FY 2009–FY 2013) for [HIV, TB, and malaria] efforts and for U.S. contributions to the Global Fund.”¹⁵⁸ In its first year, PMI procured more than 1 million ITNs; by 2009, it had procured more than 15 million (PMI 2010). Most of these nets were then delivered through mass distribution and child survival campaigns, per PMI’s 2010 annual report: “ITNs are distributed principally through antenatal and child health clinics or through integrated campaigns that include other interventions, such as vitamin A supplementation or vaccinations” (PMI 2010, 6). An additional ~771,000 and ~687,000 nets were distributed in 2009 through voucher programs and marketing schemes, respectively.¹⁵⁹

THE IFRC AND THE CANADIAN GOVERNMENT

Multiple experts interviewed cited the role of the International Federation of Red Cross and Red Crescent Societies, and in particular the Canadian Red Cross (funded by the Canadian International Development Agency, or CIDA), as influential to ITN scaleup through the mid-2000s. Chavasse described the IFRC as “critical for scaling, coordinating and supporting campaigns and fund raising” for ITNs. The IFRC funded large-scale implementation campaigns in the early 2000s, which helped generate willingness among donors such as the Global Fund to support national distribution campaigns, or what would become the main distribution model for nets. According to Renshaw, the IFRC “championed the roll-out of mosquito nets through measles campaigns,” which “helped start the [national] campaigns, especially to under-fives.” Erskine, who led much of the IFRC’s work in this space at the time (and who was, alongside her supervisor Jason Peat, “instrumental in linking [Global Fund] policy and funding with on the ground delivery infrastructure from NGOs like PSI and [government] infrastructure,” according to Chavasse), stated that the earlier RCTs and Cochrane review were helpful in demonstrating net effectiveness, but “not at any scale,” or with “enough community coverage to see a mass effect.”

According to Erskine, from about 2002 through 2006, the Red Cross and the Canadian government were the biggest players “in that space moving things forward; that’s where the money was coming from to prove scale” through ongoing surveys and evaluations, which were important in getting other donors willing to fund large-scale ITN distribution campaigns.¹⁶⁰ Erskine stated,

When the Canadian government [CIDA] was giving money to the Canadian Red Cross, they mandated the Red Cross to use a certain percentage to do evaluations and generate further data. Part of CIDA’s objective was to get other donors to get behind this approach; Canadian CIDA didn’t want to be alone in the long run on this. For USAID or Global Fund or other donors, there probably wasn’t enough evidence. A whole bunch of data pieces were really the focus of the investment from the Canadian government because they just didn’t want to be caught holding the bag in the long term. I think they could see where we were going, but they wanted the data to show other people to put their money in the same place.

Indeed, before 2005/2006 other donors were not as active as they would become. The Global Fund was navigating operational and procurement challenges that prevented large-scale net distribution before 2006. PMI had not formed until 2005 and reported procuring only 1 million ITNs in its first year of operation. USAID was still promoting and pursuing social marketing, which had relatively low coverage rates. Grabowsky, who was seconded to the Red Cross from the CDC through 2005 working with Erskine implementing these national distribution campaigns, stated that “throughout this process, while we never engaged the perceived ‘leading donors’ like Gates or USAID, they were perfectly willing to cite our data on impact and claim they were having an effect on malaria, even though the effect was due to something they weren’t funding.” By the end of the 2000s, the Global Fund and PMI had become far and away the largest funders of ITN distribution; yet, as Erskine noted, “people forget that the Red Cross [and CIDA] did all that early investment.”

OTHER NOTABLE DONORS

Though funding mobilized by the Global Fund and PMI drove the bulk of the growth in available funding for malaria during the 2000s, numerous other donors made important financial contributions. In

addition, UNICEF, with funding from other partners including the Global Fund, was among the leading net purchasers through the aughts and remained a significant procurement agent into the following decade.¹⁶¹ Additional notable funders identified through expert interviews and desk research are discussed below; this section is not an exhaustive account of every funding source for ITN scaleup, however, and no effort has been made to weigh those sources' relative impacts.

The World Bank

Although a major source of financing for countries' malaria-control efforts before 2000, the World Bank's tangible impact on malaria seemed less measurable in the 2000s. The World Bank had "historically been one of the larger donors for malaria control (larger than all the bilaterals combined from 1994–1998)" through loans (Narasimhan and Attaran 2003). Although it committed up to \$500 million for achieving targets laid out in the 2000 Abuja Declaration, by 2005, it had "failed to follow through on its pledges to spend up to \$500 million to combat malaria, let its staff working on the disease shrink to zero, [allegedly] used false statistical data to claim success and wasted money on ineffective medicines," journalist Celia Dugger claimed based on analysis published in *The Lancet*.¹⁶² McArthur shared the view that the bank had been "a major drag on the MDGs [in general], even after the G8 Gleneagles commitment of financing" in 2005, and "was not a decisive voice" on free nets.

The World Bank launched its global strategy and Booster Program for malaria control in 2005 and committed between \$500 million and \$1 billion over a five-year period for malaria control (World Bank 2005). Subsequent analysis, however, found that in practice, the bank included cofinancing of other malaria funding partners in its own stated commitments (Attaran et al. 2006). In 2008, it committed \$1.1 billion to expand its Booster Program to support "rapid scale-up of malaria programs";¹⁶³ by 2010, it provided 8 percent of total global malaria-control funding, behind the Global Fund (70 percent) and PMI (15 percent).¹⁶⁴ In Chavasse's view, however, the World Bank "got caught up in their own rules and red tape" in the early stages of ITN scaleup efforts, which meant that its funding "never really turned into massive net procurements and delivery which was all that was needed."

The Bill & Melinda Gates Foundation

The Bill & Melinda Gates Foundation, launched in 2000, invested in research and development and health technologies for malaria, particularly in developing a malaria vaccine and new vector-control tools.¹⁶⁵ Rabinovich, director of the foundation's Infectious Diseases Division from 2003 to 2012, stated that "the strategy that I built when I got there in 2003 was really, we need better vector tools; these are partially effective." Vector tool innovation aside, experts interviewed had mixed views on the Gates Foundation's role in ITN scaleup. Some sources credited it for mobilizing health financing more broadly, from which malaria benefited, and for potentially attracting more scientists to the field to develop new tools.¹⁶⁶ On the other hand, Rockwood thought that the foundation "came more on board around 2010 when a lot of those MDGs weren't met."

The Gates Foundation's "soft funding around malaria," per Rockwood's description, may not have directly or significantly funded ITN scaleup or delivery specifically, but it did support other malaria organizations and may have influenced other entities' approaches to malaria. Chavasse, for example, thought the foundation "came in with a lot of power, money, and influence," particularly over the WHO

and other donors such as the UK Department for International Development and PMI.¹⁶⁷ The Gates Foundation pledged millions to the Global Fund,¹⁶⁸ and when the UN Foundation first launched its Nothing But Nets campaign, the Gates Foundation committed to match individual donations to the campaign “net for net.”¹⁶⁹ In these and other examples, the Gates Foundation evidently invested in malaria-control efforts including nets, though to a more minor degree with regard to direct ITN procurement and delivery compared with other donors’ funding activities.¹⁷⁰ “They weren’t really involved in doing this, even though they were in the consciousness of most people as the main player,” in Grabowsky’s view. The foundation was also, according to Grabowsky, “often a barrier to funding because people would say, ‘well, if this was worth doing, Gates would be funding it,’ so we had to deal with that a lot, but we could sometimes use it to our advantage. We could say to a group like the Latter-Day Saints that wanted to make a difference in global health, ‘you can make a mark here in a space that Gates is not involved in.’”

It seems reasonable to conclude that the Gates Foundation did not have a significant causal role in ITN scaleup, though its other activities may have had some effect on broader malaria-control efforts. Notably, for example, the foundation convened the Malaria Forum in October 2007, where Melinda Gates called on participants including WHO and Global Fund executive staff members to reinvigorate the effort to eradicate malaria.¹⁷¹ Multiple experts consulted thought this call helped further elevate the visibility of malaria control; Ziemer, for example, said of the announcement, “When people like Bill Gates say, ‘I want to see malaria eradicated before I die,’ you don’t get better advocacy than that.” On the other hand, Grabowsky, who “was part of the team negotiating the terms of reference for that meeting,” thought that it “caused harm” because there is “usually policy consensus that happens before leadership comes together to make an announcement” as complex and ambitious as setting an eradication goal. This call for eradication, in any case, prompted new debates about the future of malaria control; available evidence, however, does not support the conclusion that it had a meaningful causal effect on ITN scaleup efforts.¹⁷²

UK Department for International Development

DFID was a significant source of funding for malaria control from the late 1990s through the early 2000s.¹⁷³ Prime Minister Blair made a \$100 million pledge to RBM at the G8 summit in Birmingham in 1998; no other world leaders made financial commitments at that summit.¹⁷⁴ DFID was also among leading funders of RBM in RBM’s first five years, as well as a leading funder of total global malaria funding before 2003 (Narasimhan and Attaran 2003). It, alongside the USG, initially funded ITN delivery through social marketing and voucher scheme programs before the mid-2000s. “DFID were critical in the early days before [the Global Fund] as they invested more than any other donor in delivery,” including “most of the early PSI projects,” according to Chavasse. DFID funded, for example, PSI to implement Kenya’s social marketing campaigns before 2005.

In the later aughts, DFID remained an important funder for ITN scaleup.¹⁷⁵ Shadow chancellor George Osborne, for example, made a \$1 billion (£510 million) pledge to malaria following a trip to Uganda with Sachs. *The Guardian* quoted Osborne saying, “Tackling malaria is one of the great central challenges. It’s something where aid money can have a really direct impact, because you can actually pay for interventions, like bed nets, which make a direct practical difference on the ground.”¹⁷⁶ Gordon

Brown (UK prime minister from 2007 to 2010) “pledged 100 million pounds, or nearly \$200 million, to purchase insecticide-treated nets to help fight malaria in Africa” as part of “Idol Gives Back,” a televised charity campaign, in 2008.¹⁷⁷ This amount was intended to “provide 20 million extra bed nets to help in the fight against malaria—one sixth of the estimated world shortage.”¹⁷⁸ The author of this case study did not trace the outcome of these pledges; other evidence, however, suggests that by themselves, these pledges helped signal an emerging market for nets to manufacturers.

African National Governments

African national governments were also investing in malaria control and ITN scaleup in addition to and before any external donors. In 2002 through 2003, African governments provided 71 percent of the funding for their malaria-control programs (RBM, WHO, and UNICEF 2005); amid other competing health priorities, however, particularly for heavily indebted countries, this financing was insufficient to scale ITN distribution, let alone other malaria-control measures. Health spending in general was low, and nets were relatively expensive: a 2003 WHO/UNICEF report on malaria in Africa noted that most countries spent “only US\$4 per capita a year on health—the equivalent of the average cost of an untreated net.” In addition to “synergy between public and private sector activities” to meet “the Abuja target for expanding ITN use in Africa,” foreign assistance was an important component of many health budgets at that time (WHO and UNICEF 2003, 27).

Although, according to Moore-Sheeley, there were scientists working in Africa “who were adamant that donors needed to support ITNs” and who were “making strong public arguments for donor involvement,” Binka critiqued what he perceived as a “failure of African governments” to “take the lead to find the solutions to these problems.” Indeed, neither domestic nor international financing materialized before 2005 to meet the financing need for ITN scaleup in that period. The WHO wrote in its *World Malaria Report 2005* that “few countries are likely to reach the 60% target for coverage of access to prompt and effective treatment for ITNs and [preventive treatment] for protection of pregnant women by 2005 because, until very recently, control efforts remained too fragmented and major international investment materialized too late” (RBM, WHO, and UNICEF 2005, 22). Constrained domestic resources for health, combined with an inadequate response from the international community, delayed many countries’ ability to scale.

Cost-Sharing and Health User Fees: The Net Price Debate

HEALTH USER FEES UNDER NEOLIBERAL ECONOMIC POLICY PROMOTED BY DONOR COUNTRIES

The broader global political and economic context leading up to the early 2000s shaped both domestic health spending in malaria-endemic countries and donor countries’ ideological approach to donor financing for health. Both factors in turn influenced the debate around, and possibilities for, ITN scaleup. World Bank / International Monetary Fund structural adjustment policies forced many African governments to privatize services and cut social spending, which resulted in many of these governments adopting user fees¹⁷⁹ for public services including in the health and education sectors, or displacing the costs of providing health and other social services to service “users.” Indeed, as noted by Rob Yates, former DFID senior health economist (2000–05 and 2007–11) and current executive director of the

Centre for Universal Health at Chatham House, “countries had to introduce user fees” because they were “conditions on World Bank loans” throughout the nineties.¹⁸⁰ Aside from Malawi, adoption of user fees “swept the continent,” Yates said.

This idea to “push the health financing burden on households,” according to Yates, “drove the health financing debate” and “became the accepted norm” among both recipient and donor countries before 2000. Neoliberal economic theory underpinned this approach: “A lot of funders were pushing more neoliberal policies” in the 1980s and 1990s, according to Moore-Sheeley, which meant that “a lot of wealthy countries, development agencies, and African governments were thinking about ways to support health care services by tapping into individual ability to pay for health services and health interventions.”¹⁸¹ Neoliberal economic thinking also promoted the (now more contested) idea that the private sector is more efficient than the public sector (Moore-Sheeley 2017). This emphasis on the private sector informed the USG’s interest in “sustainability” and building the African net manufacturing sector, with the idea that this strategy would limit dependence on foreign aid in the long term. Using commercial markets as a path to sustainability, in Grabowsky’s view, was an appealing rhetoric to donors “because it is an exit strategy, even if it is a problematic delivery strategy.”

A sub-strand of this economic argument that underpinned the rationale for adopting health user fees, or making people pay for health services or products, was a pervasive economic theory that people will value a health product or service more if it costs them money.¹⁸² This idea of creating “rational consumers” through “cost-sharing,” or the idea that by charging for health care “people will pay for what they really need,” supported the logic to “transfer the burden of health care provision from the public to the private sector,” according to Moore-Sheeley. Though there were exceptions—Yates cited as examples Oxfam, Médecins Sans Frontières, Save the Children, Jeffrey Sachs, and Paul Farmer—the aid community, including many in academia,¹⁸³ “coalesced around the idea that people should pay for health services” in the early 2000s, according to Yates. This thinking may have fed into or exacerbated concerns expressed by US- and Europe-based economists and policymakers that people would not use nets or would not understand their value in malaria prevention, thereby justifying arguments against free nets and using a social marketing / subsidized net strategy.

This economic theorizing, combined with limited resources for malaria control before and into the 2000s, influenced what donors were willing to fund, according to multiple experts consulted for this case study and the literature. The US and the UK, which collectively contributed nearly a third of total DAH in the late 1990s and early 2000s, supported social marketing and cost-sharing approaches to ITN delivery: USAID with NetMark and DFID by funding PSI’s social marketing programs.¹⁸⁴ The early 2000s—once the Global Fund, PEPFAR, and PMI all came online—were also the “heyday of global health financing,” in Yates’s view, and “many donor agencies supported this policy” of displacing the health financing burden onto households. In the context of constrained domestic health budgets, “the power that the donor agencies had during that time was quite extraordinary,” according to Yates; “basically what the donors wanted happened when it came to health financing.” And at this time, donors largely wanted some form of “cost-sharing.”

These economic theories had not been tested in the health sector, however, and with time, it became clear that charging for nets was impeding ITN scaleup. The idea that people value health products more if they pay for them has since been disproven, but it held sway in development policy in the 2000s and shaped the way donor-funded malaria-control programs operated, according to multiple experts consulted. The reality that soon emerged through research and monitoring of ITN uptake was that net cost was a major inhibiting factor to uptake (RBM, WHO, and UNICEF 2005; WHO and UNICEF 2003). “Target users really struggled to afford even the very cheap [subsidized] price of ITNs,” Moore-Sheeley said. As mentioned previously, the poorest segments of the population are the ones most at risk of malaria.¹⁸⁵ The dominant ITN distribution model at the start of the decade was subsidized nets through social marketing; if cost prevented most people who needed a net from accessing one, then scale was not possible under this model, or at least not rapid scale. The purpose of ITNs, ultimately, is to prevent malaria mortality (which was still rising by 2004); many in the malaria community made arguments for rapid scaleup.

Showing this reality conclusively by generating evidence around ITN access and use, however, took time, but—perhaps more importantly—also called into question the legitimacy, appropriateness, and health benefit of a policy for which many leading development institutions were advocating. According to Yates, there were “mighty battles” over health user fees, which can be seen in the debates around whether ITNs should be distributed for free or through voucher/subsidy schemes. As noted, though, voucher/subsidy schemes would not by themselves enable rapid, global ITN scaleup. Yates recalled facing “tremendous opposition” in DFID while he was there to efforts to shift thinking around user fees; “it was not seen as a sensible thing to do” to abolish these fees. McArthur similarly recalled facing “pushback” against the argument to eliminate user fees.¹⁸⁶ To overcome this pushback, advocates for abolishing health user fees went “directly to the top to political actors who intuitively knew this was right,” per Yates. Resistance to eliminating user fees, then, likely contributed to delays in being able to scale ITN distribution globally, most apparently before 2007.

Throughout the 2000s, however, things started to shift in favor of abolishing health user fees and pursuing instead universal health coverage (UHC), an important context for understanding the debate around net price during that period. Yates (who was working in Uganda’s Ministry of Health through a DFID secondment mid-decade), noted the increasing number of countries that started abolishing user fees, citing as examples Thailand in 2001, Uganda in 2001, Zambia in 2006, Liberia in 2007, Nepal in 2008, and Sierra Leone in 2010. Yates thought Thailand’s 2001 tax and health policy reform in particular was “hugely influential,” noting that “people were paying attention to” the results of abolishing user fees.¹⁸⁷ In March 2006, moreover, economists Michael Kremer and Edward Miguel published results of a randomized evaluation of a deworming program that found “an 80% reduction in treatment rates” after introducing a nominal fee. Yates recalled using this and other available evidence demonstrating the same effect “on a weekly basis to say: look at this graph—why are we charging these fees?”¹⁸⁸

The momentum building around the UHC movement reflected an important shift in organizing principles in the global health and development sector, which constituted an enabling-environment

factor for ITN scaleup. Of President Museveni’s decision to abolish user fees in Uganda in 2001, Yates noted that the “results were astonishing”: following the decision, Uganda saw a “remarkable uptake of services” that benefited “the poor the most” (Yates 2009). Whether a direct causal line can be traced between countries’ positive experiences with pursuing UHC in the 2000s and ITN scaleup is unclear. It is reasonable to infer, however, that as more policymakers responded to evidence showing that UHC enables access to health services and products, particularly among the poorest people—amid more evidence that ITN cost was the main barrier to ITN access and use, particularly among the poorest people most vulnerable to malaria—the UHC movement helped accelerate ITN scaleup.

The shift toward UHC and abolishing health user fees accelerated around 2009 and into the 2010s. Yates, for example, called the UN General Assembly in September 2009 a “pivotal moment,” with the launch of the Task Force on Innovative International Financing for Health Systems, cochaired by then-World Bank president Zoellick and UK prime minister Brown. By 2010, the WHO had published a report calling for publicly financing health (WHO 2010). By this point, though, ITN scaleup had started to take off with 101.7 million nets distributed in 2009, followed by 165.7 million in 2010 (see figure 1).¹⁸⁹ Nevertheless, health user fees were an impediment to ITN scaleup; therefore, the abolition of user fees can be considered a necessary step on the path to global ITN scaleup. The broader UHC movement, moreover, most likely helped accelerate and sustain scaleup efforts.

SOCIAL MARKETING CAMPAIGNS AND SUBSIDIZED NETS: ITN DISTRIBUTION THROUGH THE MID-AUGHTS

Distributing nets through social marketing campaigns and subsidy models was among donors’ and implementing partners’ principal strategies for ITN scaleup going into the mid-2000s. Also, preference for cost-sharing guided donor countries’ decisionmaking in the context of limited malaria funding (both international and domestic). People agreed by the early 2000s that ITNs should be scaled, and the question had become how to do so, which was informed by this lack of funding. “Before 2004, the situation was that there was no money, so you have to understand the [net price] debate in that light,” Lengeler (who was pro-subsidies) stated. Chavasse, former Population Services International senior vice president and chief evidence officer, said that in this context, a “segmented market approach” was “what seemed like the most pragmatic approach at the time.”¹⁹⁰

Because severe malaria cases and deaths are concentrated among vulnerable groups including young children and pregnant people, subsidy models and social marketing campaigns targeted the largest subsidies toward these groups. This targeted approach also aligned with WHO recommendations (until the WHO officially changed its policy to universal coverage in mid-2007). Although several experts consulted for this case study reported that governments of malaria-endemic countries generally supported free mass distribution of ITNs, constrained domestic resources meant external financing largely dictated choices regarding ITN distribution models in many contexts. The US government (through USAID’s NetMark program) and PSI (mostly through DFID funding) were the main entities pursuing and promoting commercialization of ITNs.

Starting in the late 1990s, PSI distributed ITNs through health facilities and the commercial retail sector at varying levels of subsidization. The cheapest available nets provided through PSI’s market

segmentation approach were about 50 cents, sold to pregnant women at health clinics during antenatal visits. PSI did not distribute any nets for free before the formation of the Global Fund in 2002; evidence suggests PSI continued to charge for nets through 2007 (though it did increase subsidization of nets during that time).¹⁹¹ Chavasse, who oversaw PSI's ITN distribution efforts throughout the 2000s, acknowledged that the segmented market approach did not reach everyone and was an imperfect model, but—as several others consulted for this case study also emphasized—it was seen as the most practical approach to ITN scaleup in the context of limited global malaria funding. “In those days, I never thought that there'd be enough money to do free delivery,” Chavasse said; “it doesn't reach the poorest and subsidized the richest, but it was kind of the best we had to go with.”¹⁹²

Once the Global Fund was established in 2002, PSI “harnessed its wagon” to it to become one of the Global Fund's principal recipients for malaria in many countries, according to Chavasse.¹⁹³ Rockwood credited Chavasse with leading efforts to “get PSI to be the procurement agent for malaria for the Global Fund.” The Global Fund was “looking for people who knew how to do this at scale,” according to Chavasse; PSI was “in all malaria-endemic countries at that point with well-established platforms for distribution” because of PSI's ongoing social marketing campaigns, he said. Numerous other partners also received funding from the Global Fund to implement malaria grants, such as UNICEF, and other organizations, such as the IFRC through CIDA funding, led ITN distribution efforts in the early aughts. A detailed analysis of the Global Fund's malaria grants between 2002 and 2006 would shed additional light on the extent to which the fund supported social marketing (if it did) versus fully subsidized nets during that period, and to what extent other donors funded social marketing scaleup approaches.¹⁹⁴

In the early aughts, however, health researchers and program implementers also started exploring alternative distribution models for nets as an overlapping vocal advocacy coalition grew around free net distribution. Discussions around ITN distribution models fell along a spectrum, with commercialization on one end and nets as a public good that should be provided for free—the same as vaccines through mass immunization campaigns—on the other end. Sachs, Curtis (a malaria researcher), and others fell on the latter end, “saying lives need to be saved now, we should be investing in just getting these [nets] out there,” according to Moore-Sheeley. “There were lots of conferences where people said nets are a public good, we need to give them away for free; but no, there's no money, so do it through the commercial sector, but there isn't enough demand and consumers don't have any money to buy the nets,” Chavasse said; “that debate went round and round and round.”

Compounding the intractability of this debate, however, were also manufacturing constraints. “There was an incredible tension between social marketing and free nets; part of the issue was most of the nets being distributed were not insecticidal. That was a problem,” stated Court, who currently works as senior advisor to Ray Chambers and previously worked with UNICEF in multiple leadership capacities for several decades. With only two quality-assured LLIN suppliers before 2005—Sumitomo Chemical and Vestergaard—country demand for LLINs exceeded production capacity. Court recalled meeting in 2003 or 2004 with Ethiopia's minister of health, Tedros Adhanom Ghebreyesus, who expressed that

they couldn't access the right drugs or the right nets through the Global Fund. At the time, there were only 7 million insecticide nets being made in the world in 2003; Tedros wanted 20 million just for Ethiopia. We [at UNICEF] agreed, said we will make sure you get your nets within three years. Just put the demand out there, that will signal manufacturers to ramp up production and other companies will want to come in as well.

Meanwhile, in line with a “nets are a public good” approach, CDC epidemiologists such as Grabowsky began testing free ITN delivery campaigns integrated with measles immunization and other large-scale child survival campaigns. In partnership with the Red Cross, the Measles Initiative, and the relevant African ministries of health, Grabowsky and others led the first of such campaigns in Ghana in 2002 followed by Zambia in 2003 and Togo in 2004.¹⁹⁵ These studies explored whether integrating ITN campaigns with other early childhood interventions could achieve comparable ITN coverage at a comparable cost to social marketing. The initial results were promising: not only did integrated campaigns achieve intended scale at cost, but integration also demonstrated spillover benefits of incentivizing women to go to antenatal clinics earlier, Dupas (health economist) explained. Dupas noted that these experiences also “showed it was possible to rely on the health sector” for ITN distribution, which some in the development sector at the time did not think was possible.¹⁹⁶ Free net delivery through integrated campaigns represented a “disruptive innovation” that “worked incredibly well,” in Chavasse’s view.

With these promising results, debates around the optimal ITN scaleup strategy intensified. It was clear to Expanded Programme on Immunization staff who were delivering “measles vaccinations, deworming pills, and vitamin A that a lot of the kids they were reaching were sick and dying from malaria, so that was when they started to integrate these campaigns,” according to Rockwood, “and it became clearer as we went to scale that these subsidy-type approaches were pretty difficult.” For Chavasse and many others, however, the question of “where is the money coming from” to run mass distribution campaigns made such campaigns seem infeasible as an optimal ITN delivery strategy. With public funding for malaria still relatively limited and while the CDC, Red Cross, and others kept “banging on that drum” of free mass distribution, according to Chavasse, PSI continued “pushing for clinic-based subsidized delivery.” The shift from social marketing to mass free distribution campaigns as the primary ITN scaleup strategy over the aughts is discussed at greater length in subsequent sections; the key points to highlight here are the growing tension between the two scaleup approaches and the mix of social marketing / subsidies and free campaigns used through 2005 (table 2).

TABLE 2

Initiatives to Scale Up ITN Coverage in Africa between 2001 and 2004

Countries	Delivery strategy
Togo, Zambia	Free distribution to children under 5 during broader health campaigns (e.g., measles immunization)
Malawi	Social marketing and distribution of highly subsidized ITNs through mother and child health clinics
Tanzania	Subsidies (i.e., discount vouchers) delivered to pregnant women through antenatal clinics, in collaboration with the commercial sector
Benin, Eritrea, Ghana, Mali, Nigeria, Senegal	Distribution of free and highly subsidized ITNs through routine antenatal and child-immunization clinics; free mass (re-)treatment campaigns in Eritrea
Ghana, Malawi, Uganda, Zambia	National Child Health Days for distribution of ITNs and (re-)treatment, along with vitamin A and/or deworming medication
Benin, Kenya, Madagascar, Mali, Nigeria, Rwanda, Tanzania	Social marketing

Source: Adapted from *World Malaria Report 2005* (Geneva: Roll Back Malaria and World Health Organization, and New York: UNICEF, 2005).

Note: ITN = insecticide-treated net.

Shifting into the Mid-Aughts: Intensifying Debates around ITN Scaleup Strategies

By the mid-2000s, the malaria community lacked consensus on an optimal ITN scaleup strategy, while the social marketing approach to scaleup was starting to fall out of favor among development agencies. Before President Bush established PMI in 2005, according to Simon, “within activist and technical communities, a lot of questions were being raised around social marketing for several years.” Bilateral financing from the US and UK “was difficult because they were trying to create a private market through the distribution of vouchers where there were all these different payment schemes for cost recovery, but costs were not always being recovered, and nets were not always reaching the poorest of the poor,” according to Rockwood. To reach more people, Rockwood explained, “an argument was made to take away the cofinancing requirement.”

Indeed, experts interviewed, such as Mwenesi, who was working with NetMark at the time, noted that “opinion went the other way” on social marketing once “findings that only the wealthier segments of the population could afford nets” emerged. Renshaw (of UNICEF) similarly noted that “even when really highly subsidized,” social marketing achieved low coverage for nets, which meant “we were never going to achieve universal coverage this way.”¹⁹⁷ The author of this case study did not explicitly ask experts which specific reports or papers provided this evidence; evidence from the literature, however, demonstrated this dynamic at least as early as 2003. A WHO/UNICEF report published that year cited poverty as the main barrier to scaleup and net price as the main barrier to net ownership: “The most common reason cited for not possessing a net is lack of money: the price of a net represents a large proportion of the income of a poor household” (WHO and UNICEF 2003, 27).

The World Malaria Report 2005 reiterated this fact: “The cost of an ITN is a major barrier to ownership and usage for a large proportion of Africans who are among the poorest of the poor and also the most highly affected by malaria. Although the malaria burden is highest in rural areas and among the poorest people, ITN coverage tends to be generally higher in urban areas and in wealthier households” (RBM, WHO, and UNICEF 2005, 25). Selling nets in this context “didn’t work,” Binka said, because “people were too poor to buy them.” According to Binka, the concern that selling nets would “drive mosquitoes to poor households” also deterred UNICEF from supporting nets in the earliest phases of scaleup (as did initial concerns of delaying but not preventing deaths in high-transmission areas, which did not happen). Subsidy models also did not adequately account for the “realities of competing priorities at the household level,” according to Jallow, as “nets were seen as a luxury in the context of pharmacy stockouts or exorbitantly priced treatments.”

A contributing factor to the apparent delay in ITN scaleup caused by development agencies’ decision to prioritize commercialization and subsidy models over free mass distribution was insufficient data and evidence. Several experts interviewed noted that PSI in particular relied on “willingness to pay” studies, which were intended to assess health care users’ willingness to pay for health products or services, to justify using cost-sharing for nets. When it came time to test these studies’ findings, however, people did not buy nets as projected, and net ownership and use among target groups remained low. Binka recalled conducting a baseline study of net ownership in northern Ghana and finding only 3 percent coverage of secondhand nets; only an estimated 5.1 percent of children under 5 in 44 endemic countries had ITNs in 2003 (Flaxman et al. 2010). ITN coverage through the mid-aughts remained well below 50 percent. “No one demonstrated any data,” according to Binka, and “when nets arrived and now it’s time to demonstrate willingness to pay, people wouldn’t buy the nets.” Yet, he added, this idea “had a stronghold.”

Other evidence further suggests a lack of adequate accounting for local realities, along with institutional resistance to change course on user fees and cost-sharing, as impediments to scaleup. Dupas, whose research with fellow health economist Jessica Cohen tested whether free distribution could improve ITN access and use, referenced unpublished research she conducted around this time in which she asked retail shops about different price points. She found that shops were “not interested in stocking products that are not going to move.” In other words, retailers “knew demand was very low at these higher price points,” according to Dupas. Using commercialization and subsidy models as a leading strategy for ITN scaleup in the aughts, then, could not achieve rapid, equitable scale. Dupas also recalled meeting resistance when she initially approached PSI to collaborate,¹⁹⁸ noting they were “very opposed” to the idea of experimenting with free delivery. She also noted they “didn’t want to share their data” with her when she asked how they decided on the 50-cent price point for clinic-based purchases among pregnant women.

On the other hand, the relationship between net supply and demand also created challenges for all ITN scaleup strategies. For one, there were too few manufacturers in the first half of the decade to meet the global demand for LLINs, which created concern that demand was being generated without assurances to meet that demand. “When marketing something and putting lots of effort into advocacy

to increase the demand, you better make sure that the supply is enough to meet the demand or else it will be a crisis,” Jallow said. “Product promotion and product availability need to go hand-in-hand,” Mwenesi similarly noted. Larger volumes were needed to increase coverage, yet social marketing alone would not be able to bring up volumes to close the coverage gap. In parallel to debates around ITN delivery models, then, manufacturing and production capacity constraints also impeded scaleup.

The lack of funding was the main rationale for cost-sharing and social marketing and was the overarching constraint to ITN scaleup, so the advent of the Global Fund and PMI shifted the frame of the debate around ITN delivery strategies. The scale of funding made available through the Global Fund was “really the gamechanger,” in Chavasse’s view. By about 2007 or 2008, according to Renshaw, “countries, through Global Fund applications, abandoned the social marketing approach when they realized they could fund a full campaign through Global Fund rounds system, supplemented by PMI.”¹⁹⁹ It was not increased funding alone, however, that enabled countries to pursue large-scale ITN distribution campaigns; net production capacity was also increasing, making mass campaigns feasible. According to Simon, regarding scaling up ITN distribution, “the real question became, is there money available,” and “once President Bush made the money available, the argument for social marketing went out the window” in the USG context. This point was underscored by several experts consulted for this case study who had compared the costs of net marketing activities with the costs of fully subsidizing nets and found that commercialization activities were more expensive.²⁰⁰ The rationale had been to invest now for longer-term sustainability, but the surge in malaria funding in the years following 2005 made this argument somewhat moot.

Both the Global Fund and PMI also gradually scaled funding, so even though both had been established by 2005, an estimated \$740 million of total DAH for malaria flowed that year, followed by \$890 million in 2006 (see figure 5). Of the estimated \$3.2 billion needed annually “to support the minimum set of malaria interventions required to achieve the 2010 Abuja targets and the [MDGs] for malaria by 2015 for 82 countries with the highest burden of malaria,” per the *2005 World Malaria Report*, ITNs made up just 10 percent (RBM, WHO, and UNICEF 2005). Fully subsidized net distribution campaigns, then, may not have yet seemed feasible or preferable in 2005 or 2006 to donors amid other competing needs. Though the Global Fund and PMI eventually mobilized billions of dollars for malaria, this was not the case as of 2005. At the fourth annual Multilateral Initiative on Malaria conference in November 2005 in Yaoundé, Cameroon, members of the RBM Partnership expressed in the Yaoundé Call to Action that they were “alarmed that current levels of global spending on malaria control are only 20% of the estimated \$3 billion needed annually, and deeply concerned about the lack of long-term predictability of funding that is provided” (Diara, Lee, and Tetteh 2005).

Reaching a Tipping Point: 2005–2007 in Focus

Multiple threads came together between 2005 and 2007. McArthur, for example, characterized this period as a “fulcrum moment of going to scale,” in part because “this hard, ambitious thing that seem[ed] unachievable [became] oh, here’s how we can do it. Lots of pieces made it much more possible.” Several experts consulted for this case study pointed to the 2005 Multilateral Initiative on Malaria conference in Cameroon in particular as an inflection point in the debate around the optimal ITN scaleup strategy and net price point. Rockwood recalled a session of that conference where this topic was “greatly

debated,” with the “point that many made was that you were creating more equity when you’re giving them [nets] for free and actually, you’re going to have a greater effect of demonstrating malaria reduction by scaling up as much as possible.” Erskine similarly recalled this “huge debate” (for which she prepared slides for the “free distribution” argument).

McGuire participated in the panel for that session, advocating for giving “free nets to certain people while also tapping into the private sector for certain segments,” while Grabowsky provided the argument for free mass distribution through large-scale campaigns. McGuire expressed dissatisfaction with the panel in that he felt it flattened the nuances of the arguments for including the private sector in scaleup strategies and reduced the discussion around distribution models to an “either/or” scenario. This sentiment seems to have been shared; McGuire, Grabowsky, Lengeler, and epidemiologist Don de Savigny cowrote a paper in 2007 exploring the advantages and disadvantages of public and private sector approaches to scaleup. In it, they argue, “Among the many considerations that are important for supporting large-scale ITN deployment, there is one that is central to our debate: the need to have rapid gains in coverage in all endemic countries, while at the same time, setting up systems that will ensure long-term availability (quick wins versus long-term sustainability)” (Lengeler et al. 2007).

By 2007, however, the scales had tipped in favor of free mass distribution in part because of the epidemiological need to rapidly increase net coverage to bring down malaria cases and deaths. The basic impetus to scale ITNs was to prevent malaria mortality; if further scaling was at least partially conditional on seeing that health impact through the selected scaleup strategy, scaleup strategies needed to show enough people who needed nets could access them. Social marketing approaches to scaling were not reaching enough of the population to see those numbers, while mass campaigns were. “In the early days, social marketing was so small-scale and the impact was so negligible, so there was no way we would reach the scale needed to have an impact on malaria,” Erskine said. That is why she thought that the 2005 debate was a “fairly pivotal moment; countries were standing up and saying no, social marketing is not working, we need to get more nets out.” “It made sense” to “start small-scale with the most vulnerable groups,” according to Jallow, “and then with availability of funding, we need to go big” to realize the goal of decreasing the malaria burden.

That bigger picture can help explain why ITN scaleup was conditional on consensus around an ITN distribution model, and why free mass distribution became the dominant scaleup strategy. Renshaw, who was a proponent for free distribution, cited the measurable difference in the health impact of free distribution as among reasons that social marketing “gradually collapsed.” McGuire remembered meeting with Hill staff and providing testimony on malaria and “what the private sector can bring,” but “the idea that you needed to give away all nets for free took over.” Recipient countries themselves also favored mass free distribution campaigns in Global Fund applications: a source familiar with the Global Fund’s application review process recalled zero country demand for social marketing. Following the publication of Dupas and Cohen’s research in late 2007 showing free distribution increased ITN coverage and access, moreover, Dupas recalled multiple policymakers from malaria-endemic countries saying a variation of “thank goodness, we’ve been making this point all along, now we have the evidence to substantiate our point.”

Evidence generation around increased ITN access and use through free distribution helped cement the argument for free mass campaigns as the way forward for global ITN scaleup. Of particular importance and relevance was Dupas and Cohen's RCT on cost-sharing for nets, the results of which were initially published in a December 2007 Brookings Institution working paper and subsequently in a peer-reviewed publication in *The Quarterly Journal of Economics* in February 2010 (Cohen and Dupas 2007). The study focused on assessing whether people would use nets (as bednets for malaria prevention) if they were provided for free, whether cost was a barrier to use, whether free distribution creates an expectation for free health products, and the relationship between free distribution and health workers' behavior. The resistance to free distribution "was based on rational economic arguments that were not put to the test," according to Dupas. The idea that people would misuse or not "value" nets if they were provided for free "empirically does not hold up," Dupas explained.

Other experts consulted for this case study, when asked, thought that this specific paper corroborated the argument for free distribution and may have accelerated the pace of scaleup but that it was not itself a causal factor in scaleup. Nevertheless, having that evidence served a purpose: Dupas and Cohen's research was "useful ammunition in advocacy" for mass free campaigns, Renshaw said, and it was "still super helpful to be able to point to papers like that." According to Yates, "Those of us who were championing universal free services just grabbed that and said, *look*" (emphasis his). Several other experts expressed a similar view. The tipping point toward free distribution and UHC more broadly was under way, Yates further noted, but this paper "definitely accelerated it." It may have helped accelerate ITN scaleup by getting finance ministers and others who take cues from economic evidence, for example, more on board, as they "function as centers of power that decide what resources everyone else gets," in McArthur's view. He further explained, "Even after the WHO policy change [in 2007], EconLit-focused people resisted free distribution, but once it had economists' blessing, they said this is a good idea, too, and started catching up to the public health arguments for free mass distribution."

DIFFERING OPINIONS ON OPTIMAL ITN DELIVERY STRATEGIES AND INSTITUTIONAL RESISTANCE TO CHANGE

The relative merits of private and public sector approaches to ITN distribution are beyond the scope of this study; debates around these relative merits, however, slowed the pace of ITN scaleup efforts. In August 2007, several months before Dupas and Cohen's RCT results were published, the WHO published a press release announcing a formal policy preference for mass free distribution of LLINs. The announcement cited this debate around cost-sharing and ITN delivery strategies as a reason for delayed ITN scaleup. In the release, the WHO stated,

At around US\$ 5 per net, LLINs are a simple and cost-effective intervention against malaria. Until recently, progress in scaling up insecticide treated mosquito nets has been slow in many countries, *due in part to the inability of the international community to reach a consensus on how to deliver them to achieve and sustain high coverage.*²⁰¹ (italics added)

The factors leading up to this policy shift are discussed further below. This section further considers the factors underlying the inability to reach consensus referenced in the WHO's statement. "I can't be sure that our work directly impacted governments or policy choices, but I am sure that there was this

resistance to making things free,” Dupas said.²⁰² On whether the at-times contentious debate around net price prevented faster scaleup, Rockwood agreed that it was a “fair statement to make” and that “that debate definitely created some problems,” but also noted that “that debate was also wrapped up in available financing.”

A contributing factor undoubtedly was institutions’ resistance to change positions on user fees and cost-sharing. In the context of scant global funding for malaria, “lots of people at PSI were saying no, we don’t do stuff for free; but the measure of an organization’s impact is based on health impact,” Chavasse said. “Once we saw the health impact of nets—and had the money to do free delivery—[that institutional position] had to change,” he said. Internally, however, it was “incredibly hard to get that massive philosophical shift,” according to Chavasse. Several other experts consulted shared this view. Dupas, for example, recalled PSI representatives regularly attending presentations her coauthor Cohen gave on their research at organizations such as the Center for Global Development to contest the research findings. “The PSI folks were very reluctant to accept the results of our study,” Dupas said; at such policy forums, PSI staff “would make the same point” challenging Dupas and Cohen’s research findings, which was “that it was *thanks* to the years of social marketing by PSI that Kenyan households had learned ITNs were valuable and so that is why usage was high even when nets were free. They were concerned that outside Kenya, in contexts where PSI had not previously operated, our results would not hold.” Subsequent studies in other contexts, however, disproved this claim, Dupas explained.

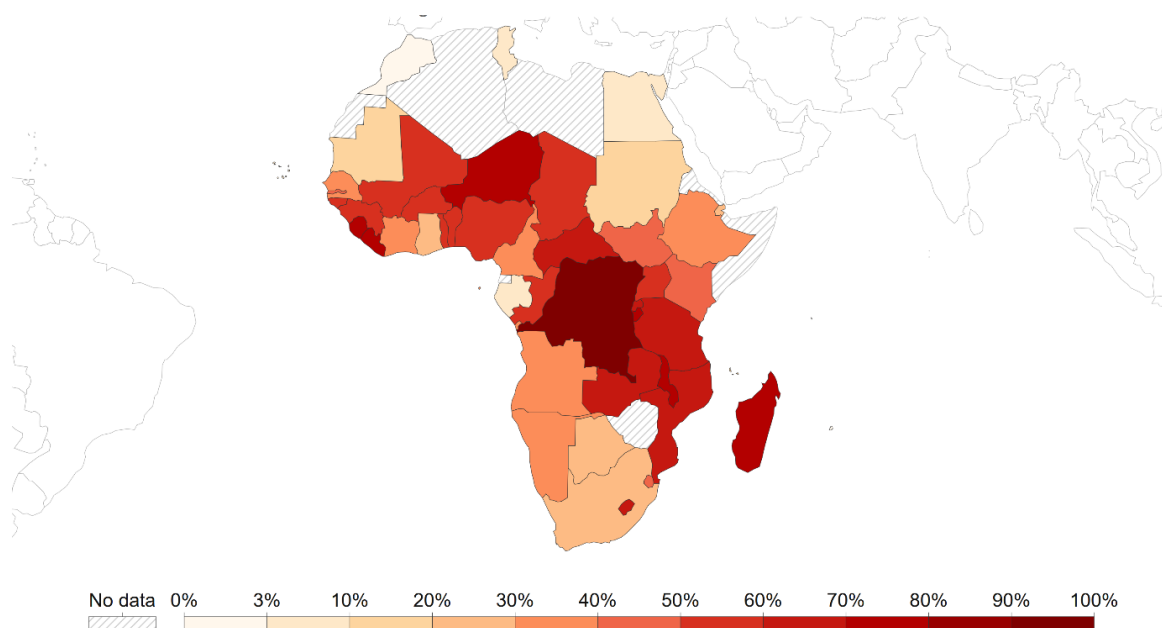
A concern around net misuse, of which there was some anecdotal evidence, also contributed to resistance to free distribution. PSI invested in behavior change initially to ensure “better quality of [net] use,” but once “evidence showed that the biggest driver of correct usage was net access and ownership,” that evidence “quell[ed] the debate” around where to channel available funds, in the view of Chavasse. Indeed, Dupas and Cohen’s research demonstrated that it was “simply not true” that people misused nets in this way, according to Yates, and “people were actually more likely to use the nets correctly if they got them for free.” Although numerous other factors propelling ITN scaleup forward were well under way by mid-decade, a vocal minority of academics, implementers, and others resisted free distribution, which made the evidence generated by Dupas and Cohen on net access a vital ingredient in resolving this resistance.

Compelling arguments for universal health coverage, alongside outspoken advocates for free nets, also created an enabling environment for ITN scaleup by shifting the frame of debate for free ITNs. For one, the “HIV community pushed for universal free services very effectively and very fast” by mid-decade, according to Yates. In 2006, for example, African heads of state released the Abuja Call for Accelerated Action Towards Universal Access to HIV and AIDS, Tuberculosis and Malaria Services in Africa, which formally extended the goal of universal access for HIV/AIDS services to TB and malaria.²⁰³ That same year at the UN General Assembly, policymakers “committed to scale up towards the goal of universal access” for HIV/AIDS services by 2010 (Joint United Nations Programme on HIV/AIDS 2006, 8). “Malaria’s switch to a universal free approach was helped greatly by similar [dynamics] happening in HIV five years earlier,” in Yates’s view. Mwenesi noted that this was “where the HIV side of things

started influencing what was going on in malaria; CSOs [civil society organizations] started making noise, saying ‘the malaria community can’t be riding on the backs of the poor.’”

Multiple experts consulted referenced this kind of language, which was also used in contemporaneous media coverage of malaria and ITNs, as influential in shifting donors’ preferences, in particular on ITN delivery models. In 2005, about one-fifth of the world lived in extreme poverty (then defined as living on less than \$1.90 per day); in many African countries (where the malaria burden was and still is the highest), this share was much higher (figure 8).

FIGURE 8
Share of the Population in Africa Living in Extreme Poverty, 2005



Source: Max Roser and Hannah Ritchie, “Malaria,” Our World in Data, last revised February 2022, <https://ourworldindata.org/malaria>.

Notes: Per Our World in Data, “extreme poverty is defined as living below the International Poverty line of \$1.90 per day. This data is adjusted for inflation and for differences in the cost of living between countries.” Moreover, “this data is measured in international-\$ at 2011 prices. Depending on the country and year, it relates to disposable income or consumption per capita.”

In this context, scaleup could not proceed even with highly subsidized nets, because many of the people who needed nets the most could not afford them. Evidence that demonstrated this reality, taken together with a growing UHC movement, contributed to the eventual consensus across the malaria community and the broader aid sector that delivering ITNs for free through mass distribution campaigns was the optimal ITN scaleup model in the aughts. Mwenesi further stated,

Before we completed the [NetMark] project [in 2009], the policy changed sort of overnight, because there was a lot of noise: “you cannot be asking people to pay [when] they can’t afford to pay—you will be the ones responsible for deaths of children if you can’t get the nets to people”

and all that sort of talk. That led to the global community—USAID, DFID, and the rest of them—deciding maybe it is time to start giving nets out for free.

The Role of Manufacturing and Technological Innovation in Global ITN Scaleup

THE ADVENT OF LONG-LASTING INSECTICIDE-TREATED NETS

The development of LLINs likely enabled the rapid pace of ITN scaleup over the course of the aughts by remedying a major impediment to large-scale ITN coverage: the need to re-treat nets. With LLINs, the insecticide is woven directly into or coated on the fiber, thereby obviating the need for re-treatment and extending the lifespan of the net from six months to up to three years. Although experts consulted did not universally agree whether this innovation played a definitive causal role in scaleup, many thought that the pace and magnitude of scaleup seen in the 2000s would not have been possible without LLINs. Chavasse, for example, stated that “ITNs couldn’t have done what they did for malaria without a permanently treated net.” Grabowsky, on the other hand, thought that “having LLINs created efficiencies in the system,” but he did not “think that it made a difference in the way the programs were run or the funding levels or the policy issues. Many mass delivery campaigns used non-LLINs but required some sort of costly follow-up for retreatment. When the cost of LLINs declined incorporating them was an added efficiency.” In any case, most experts agreed that LLINs accelerated the pace at which scaleup occurred. The advent of LLINs “came in at the right time,” in Binka’s view.

Re-Treatment Challenges before LLINs

Indeed, it could be argued that re-treatment challenges presented a barrier to scaling ITNs, and until that barrier was overcome, scaling could not happen. Through the mid-2000s, many ITNs on the market had to be re-treated with insecticide every six months to be effective at killing *Anopheles* mosquitos. Previously done in communal settings, re-treatment was made easier with the development of individual insecticide sachets by PSI’s Jane Miller through her doctoral research in the 1990s, but it remained a barrier to large-scale ITN implementation and use.²⁰⁴ ITN effectiveness was still constrained to a six-month window, and re-treatment was “perennially challenging,” according to Moore-Sheeley. As Binka noted, re-treatment “added another element of behavior” that had to be accounted for: teaching people how to re-treat nets to ensure the nets still provided protection through an active insecticide. Evidence showed that in practice, most people were not re-treating nets regularly: only about 5 percent of nets were re-treated (Guillet et al. 2001). This situation, in turn, negatively impacted the effectiveness of ITNs in curbing malaria incidence and mortality; “insecticide is a key part of that intervention to have public health impact,” Moore-Sheeley explained.

For this reason, ITNs requiring re-treatment may not have seemed like a good public health bet to donors at the start of the 2000s, or at least not as good a bet as LLINs, according to several experts consulted. Combining the insecticide with the net “made nets much more enticing to donors. Donors weren’t explicitly saying they were not investing in nets because people weren’t re-treating nets, but I imagine that this new technology gave them more confidence in investing in nets as a public health intervention,” in Moore-Sheeley’s view. Indeed, it does seem donors found this combination more enticing. On LLINs, Feachem stated that there was “something very sellable and effective about” LLINs and that “it was very fortuitous that the new technology of impregnated bednets came along at the time

that the Global Fund was gearing up and making large sums of money available.” In the Global Fund’s Price and Quality Reporting database, transactions reported for vector-control products before 2006 exclusively consist of LLINs, suggesting that LLINs were indeed more “sellable” to donors than other ITNs.²⁰⁵ For CIDA, which funded numerous ITN distribution campaigns before 2005, LLINs were “a massive part of the decisionmaking,” according to Erskine, because not re-treating nets meant “not having the intended [health] impact.”²⁰⁶

Private Sector Innovation and Corporate Social Responsibility, Elevated

Sumitomo Chemical developed the first LLIN, branded as Olyset, in 1993 as part of its corporate social responsibility activities (Gradl 2013),²⁰⁷ while Vestergaard came next with its PermaNet, made commercially available in 1999.²⁰⁸ Sumitomo’s Olyset received WHO Pesticide Evaluation Scheme (WHOPES) approval in 2001 (making it the first LLIN to receive WHOPES approval), followed by Vestergaard’s PermaNet 2.0 in 2004 and German chemical company BASF’s Interceptor in 2007 (UNICEF Supply Division 2020).²⁰⁹ Numerous other manufacturers produced insecticide-treated and untreated nets, but only Sumitomo Chemical and Vestergaard were WHOPES-approved LLIN suppliers in the early aughts until Interceptor also received WHOPES approval in 2007. Following Sumitomo Chemical’s WHOPES approval in 2001, “WHO asked Sumitomo Chemical to increase the capacity for producing LLINs to meet the surging demand from international donor agencies and funds” (Gradl 2013, 8). In Rockwood’s view, “To invest in R&D beyond the sachets for re-treatment was a concern of entering a market without financing to back it up” before the Global Fund and PMI were established.

These two pioneering companies’ responsiveness, then, to the net re-treatment challenge was fortuitous and benefited ITN scaleup efforts by making a longer-lasting, more effective version of ITNs (i.e., an easier one to sell to donors, policymakers, and net users). These companies’ investments in malaria control were not guaranteed, as multiple experts pointed out—highlighting again the contingent nature of some aspects of ITN scaleup. Vestergaard’s first LLIN, for example, PermaNet, did not work as intended, yet the company continued developing the net until it received WHOPES approval five years after PermaNet’s product launch, when they released PermaNet 2.0.²¹⁰ Other insecticide companies that controlled or owned insecticide molecules “had no incentive to come up with a longer-lasting” technology, in Chavasse’s view. Rabinovich thought that it was “a couple of people who understood the impact that they could have. It wasn’t a business decision, it wasn’t quite charity; it was corporate social responsibility plus championing within companies keeping any of these product lines moving forward.” Indeed, Sumitomo Chemical also donated \$2 million worth of LLINs to 10 Millennium Villages in Africa in 2006; previously, it had also “transferred the technology for manufacturing Olyset—with a no-fee license—to” Tanzania-based A to Z Textile Mills Limited.²¹¹

Because there were only two quality-assured LLIN suppliers until 2007 (whereas as of 2020 there were 12 WHOPES-approved manufacturers) (UNICEF Supply Division 2020), however, global LLIN production capacity constraints inhibited scaleup efforts. “It really was a technology lag,” in Rockwood’s view, and “a lack of real commitment and forecasting to suppliers and incentives for them to undertake R&D for better technologies.” Rabinovich classified the situation as a “classic market failure,” noting also that documenting safety in human health research and WHO product prequalification more broadly introduce expensive, complex processes to any discovery process, which, combined with a limited

anticipated return on investment for LLINs specifically, would have likely deterred some companies from entering the market.²¹² The assurance of a market for LLINs, then, created by Global Fund and PMI funding, contributed to ITN scaleup by incentivizing greater global LLIN production capacity. In Ziemer's view, "If the market [for LLINs] wasn't there, all these companies in Thailand, Vietnam, and India wouldn't be incentivized to keep developing effective bednets." Ongoing research on user preferences also informed manufacturing, important for scaleup as user preferences mediated net uptake. On the RBM board, according to Mwenesi, "there were different constituencies, including the private sector, who knew what questions people were asking and set about to respond to the market."²¹³

This research and development context also meant that it took time before LLINs became widely available. Rockwood thought that the "big shift" occurred around 2005 or 2006 to "not really focus on re-treatment kits because of the use issues; it was really a research-to-policy approach that ultimately worked to ensure countries were only buying LLINs." In Erskine's view, there was "not really a major transition point from re-treated nets to LLINs; it was more of a slow and silent phase-out of re-treatment kits," which was a function of manufacturing and production capacity.²¹⁴

MANUFACTURING AND PRODUCTION CAPACITY

Africa-Based ITN Manufacturing

Part of the rationale used by USAID (via NetMark) and others for commercializing nets early on in scaleup efforts was to build manufacturing capacity on the African continent alongside a commercial market for nets to support the long-term sustainability of national malaria-control programs. Textile manufacturing already existed on the continent (in, for example, Ghana, Kenya, Nigeria, Tanzania, and Uganda), so "there was this sense in the nineties that African countries could potentially become at least partially self-sufficient in the manufacturing of nets with the hope that this could be sustained through the private sector," Moore-Sheeley said. "The original logic around social marketing was to make this system operate independent of donors" by expanding African companies' manufacturing capacity, building a commercial market for nets, and then reinvesting returns to further grow both the manufacturing and retail sectors, Moore-Sheeley explained.

Once LLINs came into the mix, however, ITNs were largely imported; Tanzania-based A to Z Textile Mills Limited and later Vector Health International (a joint partnership between A to Z and Sumitomo Chemical) were among the few Africa-based LLIN manufacturers in the aughts.²¹⁵ Given the preexisting textiles industry on the continent, "theoretically you did have a market of local net sellers that would be disrupted by a massive infusion of free nets," Simon stated, but concern about undermining local markets "became a lot less relevant when LLINs came on the market because the vast majority were not produced locally."²¹⁶

Net Unit Cost, Volumes, and Production Capacity: LLIN Supply and Demand

An ITN cost on average about \$5 through 2010; LLINs, however, cost much more initially. Between 2002 and 2004, for example, UNICEF procured about 4 to 4.5 million nets annually, yet in 2004 it paid nearly \$6 million more for that number of nets because a larger share of those nets were LLINs.²¹⁷ "Any time you're going from a base technology to an improved technology, that costs more money. Without

incremental resources, shifting to a new replacement product means you cover fewer people,” Rabinovich explained. At a time when “we couldn’t even afford \$5 net scaleup,” in Renshaw’s words, LLINs may have initially seemed infeasible to scale without bringing down the unit cost.

Bringing down the unit cost was necessary for scaleup, then; to bring down the unit cost, larger volumes of nets needed to be procured and more suppliers needed to enter the market to increase competition.²¹⁸ Numerous ITN suppliers existed in the 2000s (though there were only two WHOPES-approved LLIN suppliers until 2007); “it became quite a messy landscape on the supplier side for a while there,” according to Rockwood. Complicating things further, challenges with demand forecasting may have also inhibited manufacturers from scaling production. As Jallow explained, “It’s not like pharmaceuticals or even other clothing textiles; you can’t just produce as many nets as possible and keep them in the warehouse. You have to produce according to the demand.” Although country demand for LLINs was high,²¹⁹ malaria-endemic countries generally could not procure enough nets directly from manufacturers to bring down prices, given the price points and relatively low average per capita health spending.

External financing mechanisms, then, such as the Global Fund and PMI, played a critical role in signaling to manufacturers that large volumes of nets would be purchased. “The private sector does not need a lot of push; all they want is to be certain that what they manufacture will go, notwithstanding the issues of taxes, tariffs, and nontariff barriers, which plagued importation [into] as well as manufacturing of ITNs in Africa,” Mwenesi said. The volume guarantee created by the Global Fund and PMI was key to the scaleup of production capacity, in Erskine’s view. Erskine also pointed to the role of integrated campaigns in providing this volume guarantee (discussed below). The Togo integrated campaign and CIDA’s decision to give \$20 million to the Canadian Red Cross for LLIN distribution in Africa in 2005,²²⁰ according to Erskine, “immediately gave a bit more of a volume guarantee to suppliers.” By 2006, there were “at least five or so [integrated] campaigns going on at a given time,” according to Erskine, which created “a fairly viable market; suppliers have the capacity to scale up if they can see volumes are there in the forecast of the big donors.” Once the Global Fund started procuring more than a million nets for a single country (beginning with Niger in late 2005), those volumes gave suppliers more confidence in increasing production capacity, according to multiple experts consulted.

Global LLIN production capacity, however, remained an impediment to ITN scaleup through the mid-aughts (or, in Jallow’s words, “you have to make sure you actually have the nets before starting campaigns”).²²¹ Although “more LLINs were coming on the market” around this time (the period of about 2005 through 2007), according to Rockwood, “there was this kind of trap where donors would commit to procure them, should there be scaleup. Manufacturers were requested to increase their capacity, there were calls for new suppliers coming into the market, all of that was happening, but donors just didn’t follow through on the procurement.” The WHO’s official recommendation in 2007 for universal coverage of LLINs helped shift this dynamic, but importantly, the scale of available financing for malaria itself had increased, to about \$1 billion in 2008.²²² If net manufacturers were not seeing the financing behind the supply, in Rockwood’s view, it “wouldn’t trigger a focus to increase scale” in production. Jallow recalled meeting with manufacturers in 2009 in her capacity as senior manager with

the Global Fund about this, noting that “one of the discussion points was how to actually increase their production capacity at a time when actual funding for the Global Fund increased and the Global Fund had just set up the pooled procurement mechanism.”

As Global Fund financing was increasing, UNICEF, with support from Unitaid,²²³ also supported universal coverage goals in countries by procuring large volumes of nets, which was “another way of getting more manufacturer confidence” to produce millions more nets, according to Renshaw. Court and others noted the importance of these large procurement volumes, given how relatively few insecticide-treated net manufacturers existed at the time; larger volumes helped signal the presence of a market, which helped bring in new manufacturers, increase competition, and bring down prices. Erskine also underscored UNICEF’s procurement role as important in this era, noting also that before 2010, there were “a lot of smaller procurers who were procuring smaller amounts” to fill in gaps. Enhanced coordination among the donors in ITN procurement toward the end of the decade also helped to get donors and implementing partners to “really look at a lot of these different aspects around ensuring supply versus demand,” according to Rockwood. Challenges in reliably forecasting demand up to and through the early 2010s, however, made suppliers less able to “scale up comfortably and confidently,” in Rockwood’s view.²²⁴

WHOPES and the Regulatory Environment

Experts consulted for this case study also broadly agreed that the regulatory environment around LLINs contributed to limiting the number of approved suppliers, which limited production capacity, which limited the number of available ITNs for scaleup efforts in the aughts. The Global Fund exclusively procured from WHOPES-approved suppliers, and other procurers often did the same.²²⁵ With only a handful of WHOPES-listed LLIN manufacturers in the mid-2000s (who themselves had relatively limited production capacity), what several experts described as a “slow,” “long” regulatory process may have stalled scaleup by contributing to supply constraints. “At one point, the WHO was under quite a lot of fire for being slow” in approving LLIN suppliers, according to Erskine. The limited number of “approved suppliers of high-quality, affordable products” affected the rate of scaleup; it is “why it’s not until 2008, 2009 you see huge Global Fund and PMI procurement numbers,” in McGuire’s view.²²⁶ Chavasse similarly thought that it “took years to get to a place where we had a competitive market between quality-approved suppliers,” in part because of the WHO’s “slow” approval process.

Changing Coverage Goal, Changing Delivery Strategy: Integrated Campaigns and Universal Coverage

INTEGRATED CAMPAIGNS: DELIVERING NETS WITH OTHER CHILD SURVIVAL INTERVENTIONS

The shift to mass distribution through integrated campaigns from social marketing and commercialization was a necessary step on the path to rapid ITN scaleup and reaching people most at risk of malaria. Informing the decision to integrate ITN delivery with antenatal and early child health programs was a broader focus on maternal and child health in the aughts. This decision was also strategic: “I’m not sure that nets alone would have been a good seller; it was more compelling to sell as part of a campaign for ending under-five mortality,” Erskine explained. “Integration probably drove a lot of the push until people could see a disease-specific effect,” she added, so “to get the scaleup initially,

integration was key.” Ziemer also noted that for PMI, the “target audience was women of childbearing age and kids under 5,” and in the context of “no infrastructure or methodology, we piggybacked on [maternal and child health] programs, which wrapped up measles inoculations and other annual and semiannual health campaigns.”

Building on successes of measles immunization campaigns in the early 2000s and recognizing the need for ongoing campaigns to sustain health benefits, CDC epidemiologist Grabowsky and others started exploring integrating other public health interventions into these immunization campaigns.²²⁷ The Red Cross, with other partners, funded the first pilot to integrate nets with measles campaigns in the Lawra District in northern Ghana in late 2002.²²⁸ The Red Cross, according to Erskine, “relied on the CDC to do a lot of the measurement and get the data to show what could be achieved over a very time-limited period” of seven days. Indeed, measuring and evaluating results of the pilot enabled by newly available handheld computers provided evidence in real time of the feasibility of integrating campaigns (Kanne et al. 2004). Grabowsky, who led this study, recalled meeting opposition to integration within the malaria community, noting a “focus on research and theory” over “just looking at delivery.” He further explained, “The malaria community did not have a current knowledge base on mass delivery so they did not feel they had a basis to act. Many other programs, such as vaccines, micronutrients, and deworming, had such knowledge and we felt that we could apply it to bednets.”²²⁹ Monitoring and survey results enabled Grabowsky to “test these concerns,” which was important for getting donors behind mass distribution.

Following the 2002 Ghana pilot, the Red Cross, the CDC, and others led a series of large-scale integrated delivery campaigns “to show proof of concept and then proof of scale,” according to Erskine, who joined the Red Cross in 2004. CIDA, through the Canadian Red Cross, then funded a six-day campaign across five districts in Zambia in 2003, implemented in partnership with over 18 other entities, including UNICEF, NetMark, and PSI (Kanne et al. 2004). In the writeup, Grabowsky and coauthors noted that “in both [the Ghana and Zambia] studies, 93 percent of total ITN program component funds were spent on ITN procurement instead of operational costs. These findings suggest that linking ITN distribution to measles campaigns may be an important opportunity to achieve ITN coverage targets” (Grabowsky et al. 2005). These successful experiences of integrating ITN distribution with other health intervention campaigns demonstrated the feasibility of investing in mass distribution as an ITN scaleup strategy—important evidence for convincing donors to get behind this delivery model.

The results from Zambia, followed by results from a national campaign in Togo in 2004, did indeed influence the Global Fund’s decision to start supporting mass distribution campaigns, with advocacy from the Red Cross.²³⁰ Niger’s mass distribution campaign in December 2005 was among the Global Fund’s first approved grants for free mass distribution; described as “the most ambitious in Africa to date,” the campaign was cofinanced by CIDA and the Canadian, American, and Norwegian Red Cross Societies (Global Fund 2006). In the Global Fund’s 2005 annual report, it explicitly acknowledges this evidence and the Red Cross’s advocacy: “Building on similar programs in Zambia and Togo, the Red Cross worked with other partners in Niger to secure Global Fund funding for a massive distribution of long-lasting nets in tandem with regular vaccinations for polio.”²³¹ According to Erskine, “All that money

that came through [the American or Canadian] Red Cross was really focused on generating the evidence base, including for the costing for donors to then take that and take a position” on mass distribution through integrated delivery.²³²

Aside from Niger, the other largest mass distribution campaign funded by the Global Fund through 2006 seems to have been Kenya’s 2006 campaign (approved in April 2004 for \$17 million and 3.4 million LLINs) (Noor et al. 2007). “Once there was enough money, proof of concept [for large-scale campaigns], and data to show we weren’t doing what we could be doing [for malaria control] was when the Global Fund got more on board,” in Erskine’s view. Evidence and funding—along with increased LLIN production capacity, consensus around delivery strategy and net price, and the WHO’s policy shift to universal coverage—all came together in the late aughts to enable rapid ITN scaleup.

UNIVERSAL COVERAGE: THE WHO’S POLICY SHIFT IN RESPONSE TO NEW EVIDENCE IN 2007

The final piece in the (operational) puzzle in the ITN scaleup story came in the form of the WHO’s official policy stance on universal free coverage for nets in 2007. Before 2007, the WHO had no unifying formal policy recommendation for net type (i.e., ITNs requiring re-treatment versus LLINs) or delivery model (i.e., subsidies versus mass free distribution) and an official policy stance of targeted delivery (pregnant women and children under 5). In August 2007, however, it announced a shift in its official policy recommendations, citing new evidence generated during a series of net distribution campaigns in Kenya between 2004 and 2006. That evidence showed definitively that Kenya’s free mass distribution campaign, launched in 2006 and funded by the Global Fund, achieved far greater ITN coverage and in turn had a far greater effect on malaria mortality than previous (DFID-funded, PSI-implemented) social marketing and subsidized net campaigns (Noor et al. 2007).

In the WHO’s press release, subtitled “Recent data from Kenya ‘ends the debate’ about how to deliver the nets,” the WHO declared, “For the first time, WHO recommends that insecticidal nets be long-lasting, and distributed either free or highly subsidized and used by all community members.”²³³ The press release continued:

This is the first demonstration of the impact of large-scale distribution of insecticide treated mosquito nets under programme conditions, rather than in research settings, where, in different parts of Africa, reduction observed in overall mortality has ranged from 14% up to 60%. ... These achievements can be attributed to three principal ingredients, which all need to be present for malaria control efforts to succeed—high political commitment from the government, strong technical assistance from WHO, and adequate funding from bilateral and multilateral donors.²³⁴

Official WHO guidance²³⁵ now promoted “campaign-like mass distribution strategies” alongside “delivery through routine health services,” such as antenatal visits and EPI campaigns, “to achieve and maintain high levels of coverage.” The WHO adopted this new stance in direct response to new evidence demonstrating that mass distribution to communities to achieve widespread community-scale coverage was more effective at preventing malaria morbidity and mortality than individually targeted coverage. With the WHO’s new recommendations on optimal delivery model and net type, it “changed the game completely on net needs and quantities,” according to Erskine. Combined with scaling up available financing via the Global Fund and PMI, as discussed elsewhere, and the apparent increased

global demand for LLINs, the WHO's recommendation for universal coverage also helped signal the existence of a large market for LLINs to manufacturers, which helped stimulate production capacity.

“This data from Kenya ends the debate about how to deliver long-lasting insecticidal nets ... No longer should the safety and well-being of your family be based upon whether you are rich or poor. When insecticide treated mosquito nets are easily available for every person, young or old, malaria is reduced.”

—Arata Kochi, head of the WHO's Global Malaria Programme [emphasis added]

The WHO's Global Malaria Programme director at the time, Arata Kochi, seems to have been particularly influential in this policy shift. In a 2006 *New York Times* profile of Kochi, journalist Donald G. McNeil Jr. described Kochi's ambition to “standardize mosquito nets so that, instead of a welter of competing styles that must be home-dunked in pesticide, a few makers of factory-coated nets, which kill insects for years longer, are left to compete on price.”²³⁶ As discussed elsewhere, LLINs had been on the market for over five years at that point yet were not used at scale because of, in part, price and too few quality-assured suppliers. ALMA's Mnzava, who was with the WHO Regional Office—Eastern Mediterranean at the time, recalled Kochi summoning him and his vector-control colleagues from the other regional offices, saying “‘please come up with a short document, not more than four or five pages, outlining the rationale for scaling up use of nets’; that made a huge difference, in my opinion.” Mnzava added that “things he did within the WHO in other areas of work made a huge difference. I wouldn't say credit goes to Kochi alone, but certainly he steered this in the right direction.”²³⁷ Mnzava also credited Kochi's successor, Robert Newman (WHO Global Malaria Programme director from 2009 to 2014), with sustaining commitment to ITN scaleup: “Until only last year, recommendations made during his time of universal coverage of nets also helped in terms of getting the support that was needed from donors to scale up the use of nets in countries.”

In 2008, less than a year after the WHO's policy shift on nets, the UN further raised the goalpost in malaria control more generally. In April 2008, UN secretary-general Ban Ki-moon set a new deadline for universal coverage of “locally appropriate interventions” to the end of 2010 and announced April 25 as the first World Malaria Day.²³⁸ Previously, between 2000 and 2007, April 25 had been observed as Africa Malaria Day globally.²³⁹ Additional interviews with Secretary-General Ban, his staff, and others involved in the decision to announce a universal coverage goal would shed further light on the dynamics behind the decision. African Union president Jakaya Kikwete endorsed the UN's universal coverage goal, sharing the following message in Coll-Seck (RBM executive director) and Chambers's (UN special envoy) April 2008 presentation to the Global Fund board:

The announcement today by the UN Secretary General is the answer that we in Africa have been waiting for. On behalf of the people, leaders and governments of Africa, I welcome and support

Secretary General's call for action. Africa seeks—and actually deserves—universal coverage of malaria control interventions, with access for all, including the poor who suffer the most.²⁴⁰

A few months later alongside the UN Malaria Summit in September 2008,²⁴¹ RBM launched the Global Malaria Action Plan for a Malaria-Free World, “the first single comprehensive blueprint for global malaria control and elimination” (RBM and WHO 2008). Calling the period “a critical tipping point in the global fight against malaria,” the action plan reaffirmed the UN’s goal for universal coverage of locally appropriate interventions such as LLINs, indoor residual spraying, intermittent preventive treatment in pregnancy, and treatment and diagnostic tools. The plan estimated around \$5–6 billion needed per year from 2009 through 2020 to reach universal coverage targets, and estimated a global financing gap of over \$4 billion in 2008. At the action plan launch, the Global Fund, the World Bank, the Bill & Melinda Gates Foundation, DFID, and Marathon Oil/Global Business Coalition on HIV/AIDS, Tuberculosis and Malaria/Equatorial Guinea collectively committed nearly \$3 billion in new funding for malaria control.²⁴²

The scale of these investments—combined with the level of ambition of new UN targets—represented a “sea change moment,” in Edlund’s view. Indeed, the political will, scale of investment, and level of ambition was higher in 2008 than it had been in decades. By 2009, total net distribution surpassed 100 million for the first time, while total annual DAH for malaria surpassed \$1 billion. Though still below the figures required to reach everyone who needed a net or to fund the full suite of interventions required to achieve global malaria control, these numbers nevertheless reflect what would have been unimaginable just a decade prior. Since then, moreover, ITN distribution and coverage have continued to climb, and by 2015, over half of all people in Africa slept under an ITN. Sustaining funding and collective action for global malaria control remained (and remains) an ongoing challenge; for the purposes of this case study, however, 2010 marks the endpoint of analysis.

The Making of a Cause: Public Advocacy and High-Profile Champions for Free Nets in the 2000s

Throughout the decade, sustained advocacy, coalition-building, and politically savvy champions of malaria broadly and free nets specifically helped accelerate the pace of ITN scaleup efforts. Multiple experts consulted for this case study credited policymakers in African countries—including leaders of malaria-control programs, ministers of health, heads of state, and members of the African Union—with “putting malaria more and more on the political agenda,” in Coll-Seck’s words. This “alignment at the senior level”—including also among heads/directors of leading agencies and partnerships such as RBM (Awa-Marie Coll-Seck), the WHO (Arata Kochi, Gro Harlem Brundtland), and the UN (Kofi Annan)—“was key,” in the view of Renshaw and others. The UK government (under prime ministers Tony Blair and Gordon Brown) and US government (PMI through Ziemer) were also credited with raising malaria’s political profile.

Two African ministers of health seemed to have played particularly important roles in global ITN scaleup. First, Tedros Adhanom Ghebreyesus in his capacity as minister of health of Ethiopia (2005–12) set a target in 2005 of distributing 20 million LLINs in Ethiopia to achieve universal coverage. By July 2007, Ethiopia had purchased, procured, and distributed all 20 million LLINs with support from UNICEF,

the Global Fund, and others; between 2005 and 2008, LLIN coverage increased from just 6 percent to almost 70 percent.²⁴³ Renshaw credited this scaleup experience with “showing proof of concept of rapid scaleup on a campaign basis,” which “gave confidence to LLIN manufacturers to ramp up production.” Second, Charity Ngilu, minister of health of Kenya (2003–07), oversaw the country’s mass free campaign in 2006, which was, as previously highlighted, influential in shifting the WHO’s policy stance on LLIN scaleup strategy. According to McArthur, Ngilu “became a huge champion” of ITN scaleup early on.²⁴⁴

Although numerous others in the health and development sector were also calling for free nets, Sachs’s “high profile and personality were incredibly influential in mobilizing people around this free distribution campaign,” in Moore-Sheeley’s view. Distributing nets for free “was a position shared by a number of other people, but Sachs was very high profile, talking about this in high profile settings.” Sachs served as special advisor on the MDGs to UN secretaries-general Kofi Annan (2001–07) and Ban Ki-moon (2008–16) and also directed the UN Millennium Project (2002–06). Other experts consulted similarly thought Sachs “really went out on a limb on this” (Yates) and “got the attention of [US] politicians [together with academics Attaran and Tren], which led to more political will and increased funding” (McGuire). To achieve rapid ITN scaleup, “you needed someone pushing all the time and [Sachs’s] pushing made a huge difference,” in McArthur’s view. McArthur shared the opinion that Sachs’s “arguably biggest contribution was reframing the debate” around what was possible in terms of scaling aid for health and broader MDG development outcomes—which had tangible implications for how agency leaders and policymakers viewed the feasibility of rapid ITN scaleup.

Sachs also led the Millennium Villages Project,²⁴⁵ which included free net distribution; though he received “a lot of flak in the academic community” for the project for various reasons, the impact on malaria cases was compelling, according to Yates. For example, Ngilu credited the project and “Sachs’s advocacy” specifically for enabling “a breakthrough in malaria control” in a 2011 statement: “The Millennium Villages Project, and Professor Sachs individually, had a huge effect in enabling Kenya to pursue a policy of mass distribution of bed nets and the shift to community-based treatment of malaria.”²⁴⁶ As another example of Sachs’s high-profile advocacy, he made multiple appeals to global leaders to support bednet distribution at the 2005 World Economic Forum in Davos. At a panel titled “The G8 and Africa” featuring four heads of state and others, Sachs stood up from the audience and directed the following question at panelists during the Q&A session:

I wonder whether we might agree to make this a historic session by agreeing that, with your leadership, we’ll reconvene in Davos in two years guaranteeing that every African in a malarious region has received a bednet that will keep them alive. That will cost us three dollars per year per person in the rich world. Would you take the leadership for that?²⁴⁷

Among the panelists, Bill Gates (of the Gates Foundation) responded, stating that “bednets are a very cheap way to save lots of lives in the meantime while [a malaria vaccine and new medicines] come along,” though he made no formal commitment to Sachs’s proposal.

At a subsequent panel titled “Funding the War on Poverty” featuring Sachs, Gordon Brown (former UK prime minister), Gates, Tanzania president Benjamin Mkampa, and others, President Mkampa spoke

on the burden of debt in his country and argued for canceling debt. He said, “If you were to cancel that ... it gives me that same amount of money to deal with mosquitos, with mosquito nets, with HIV, care, treatment, testing, you name it—why don’t you do that, while talking about an additional fund? ... Let’s put our money where our mouths are.”²⁴⁸ During the subsequent Q&A portion, American actor Sharon Stone stood up from her seat in the audience, pledged \$10,000 for bednets, and asked others to join her in supporting President Mkampa in procuring nets for Tanzania. A man a few seats over immediately stood up and pledged \$50,000. All told, Stone’s plea resulted in 30 pledges totaling \$1 million.²⁴⁹ McArthur, who was in the audience, recalled “running around trying to grab pieces of paper from other audience members writing down their pledges” and remembered it as a “public plea in the moment being broadcast around the world—help get nets out. It went from no one talking about it to everyone talking about it.” He added that “for it to become a comprehensive undertaking, people who were not malaria specialists had to start getting involved—that breakthrough happened between 2002 and 2006.”

It is unclear to what extent these two events—and Sachs’s question in particular—directly contributed to accelerating bednet scaleup; it is reasonable to conclude, however, that Sachs’s and Stone’s pleas intensified both the attractiveness of bednets as a poverty alleviation tool and the public pressure on aid donors to fund bednets. It is also evident that Sachs “would argue in the face of institutions and institutional powers with a fearlessness that a lot of people didn’t like. He might have rubbed some people the wrong way enroute,” in McArthur’s view. Indeed, multiple experts interviewed described Sachs as polarizing; some posited that his approach might have repelled some from the cause. Yates, for example, lamented that some in the development sector would dismiss Sachs’s ideas simply because they came from Sachs.²⁵⁰ Contributing to this dynamic, others “also felt strongly that nets should be free,” according to Moore-Sheeley, but Sachs “was more extreme and critical in his arguments.”²⁵¹ Although several experts consulted did not endorse the idea that Sachs’s advocacy was a causal factor in ITN scaleup, most agreed that Sachs had a high profile and was an outspoken advocate for free nets. As scaleup efforts evolved over the course of the 2000s, moreover, “different styles and different approaches for different phases” may have been needed, in McArthur’s words; perhaps in the context of scant resources, malaria needed someone as outspoken as Sachs. Based on the evidence presented in this case study, it is reasonable to conclude that Sachs’s advocacy for free nets played a causal role in accelerating the pace of ITN scaleup in the aughts.

Sachs also recruited another important US-based advocate for rapid ITN scaleup: Ray Chambers.²⁵² Multiple experts consulted for this case study cited Chambers’s advocacy as an important factor in scaleup (further details of Chambers’s specific roles are discussed elsewhere).²⁵³ McArthur, who credited Sachs (among numerous others discussed in this section) with carrying forward the pro-free distribution argument through key junctures from 2005 to 2007, thought that Chambers “then helped figure out how to get to the next level. Ray carried it forward as a consummate diplomat.” Through his UN special envoy role, Chambers could “unlock things in the system,” in Edlund’s view, through weekly meetings “convening advocacy, technical, and implementing partners.” Court also thought that Chambers’s “convening power and use of that convening power” (emphasis his) contributed to ITN scaleup by also engaging agency heads in the effort. Toward the end of the decade, for example, “linked

up communication between the WHO, UNICEF, and Malaria No More was particularly valuable” for scaleup, in Renshaw’s view.

Sachs’s and Chambers’s high visibility and leadership positions in the UN system make their roles amenable to analysis, but visibility does not necessarily translate directly to influence, and low visibility does not preclude significance.²⁵⁴ Lengeler, for example, noted that there are the advocates “you see and the ones you don’t see,” mentioning specifically Norwegian researcher Tore Godal, whom Lengeler described as “always in the shadows but very influential.” Godal oversaw the Special Programme for Research and Training in Tropical Diseases, the agency responsible for carrying out ITN RCTs in the 1990s, and later became RBM’s acting project manager and WHO director-general Gro Harlem Brundtland’s special advisor.²⁵⁵ In a 2019 profile of Godal, writer Richard Lane wrote of him, “In the early 1990s, dismayed by WHO’s ambiguous position on bednets for malaria prevention, Godal put all of TDR’s malaria field budget into large-scale research, showing how insecticide-treated bednets could reduce malaria mortality” (Lane 2019). It is possible, and indeed probable, that there are many more such individuals who contributed in meaningful, if less obvious or visible, ways to scaleup efforts.

In terms of advocacy organizations, RBM seems to have been the most important during the aughts, according to experts interviewed and the literature.²⁵⁶ As discussed extensively elsewhere, RBM contributed to ITN scaleup by providing a platform for coordination between the many disparate actors involved (e.g., net manufacturers, endemic-country policymakers, funders, malaria researchers). As with several other entities discussed in this case study, RBM’s overarching classification as an enabling factor for scaleup does not mean it categorically enabled scaleup; yet most experts interviewed and most evidence reviewed in the literature supports the conclusion that the coordinating and advocacy mechanisms created by RBM enhanced scaleup efforts. Mnzava noted that the African Leaders Malaria Alliance and other agencies now take on the mandate of advocacy for malaria, but “during the time of scaling up nets, such organizations were not there, but the role was properly filled by the RBM Partnership.” Then-president of Tanzania Jakaya Kikwete, along with nine other African heads of state and government, launched ALMA at the UN General Assembly in September 2009.²⁵⁷ According to Court and others, ALMA’s creation “was a key moment for sustaining all of this” beyond the aughts.²⁵⁸

Public advocacy and charity campaigns for nets in North America and Europe also seemed to benefit ITN scaleup efforts going into the second half of the decade, though the magnitude of that benefit seems somewhat marginal in the scheme of other factors explored in this case study.²⁵⁹ The marketability of nets as a lifesaving health commodity seemed to transfer to broader charity campaigns in these regions as well. In May 2006, for example, *Sports Illustrated* writer Rick Reilly wrote about nets and their lifesaving potential; he called on readers to “donate \$20. Bang. You might have just saved a kid’s life.”²⁶⁰ This call to action would lead to the UN Foundation’s *Nothing But Nets* campaign, a “grassroots campaign” intended to raise money for nets and malaria more generally; celebrities, corporate sponsors, and individuals made contributions.²⁶¹ In 2007 and 2008, the “American Idol” franchise hosted a televised charity special, “Idol Gives Back,” which reportedly raised tens of millions of dollars for charities supporting a range of causes, among them malaria.²⁶² Though again not a major causal factor in ITN scaleup overall, these public advocacy and fundraising campaigns likely

nevertheless played an important role by raising additional funds, for one, and secondly, by furthering momentum and collective action for nets.²⁶³

Alongside Nothing But Nets, other organizations were created in this period for the sole purpose of distributing ITNs.²⁶⁴ Dupas noted that when the charity-assessment nonprofit organization GiveWell formed in 2007, it “used bednets as its first focus; that was very helpful to have a completely independent organization say this is a very good bet. It helped channel a lot of private philanthropy towards malaria.” By 2010, “it became a ‘thing,’” in Rabinovich’s view, to “buy a net, save a life; it was visible. You could understand it, it wasn’t a complicated drug, you could sleep under it. It became an advocacy target and it raised a lot of money for malaria.”²⁶⁵ In that way, then, ITN scaleup may have also benefited malaria-control efforts more generally. On grassroots advocacy among affected communities, however, Renshaw said, “There were limited grassroots-level advocates really demanding net coverage the way, for example, ARV coverage has been advocated for” by people living with HIV/AIDS.

Discussion

Between 2004 and 2010, the number of insecticide-treated nets distributed globally and particularly across the African continent grew at an explosive rate, alongside a similarly monumental growth in available financing for malaria. Globally, fewer than 5 million ITNs were distributed annually before 2004; in 2010 alone, over 150 million were distributed. Though this relatively rapid global scaleup of a lifesaving public health and vector control intervention represents a remarkable achievement in global health, the path to scaleup was by no means guaranteed. Rather, the road to scaleup was complex, contingent, and contested.

Before the ITN scaleup was a success story, it was a story of failure. Inaction on and neglect of malaria through the early 2000s, seen most visibly in the level of financing available for malaria control at that time (both from domestic health financing and development assistance sources), made rapid ITN scaleup virtually impossible before 2005. Previous missteps in global malaria-control efforts (e.g., in the Malaria Eradication Programme) combined with limited public spending on health in a contracted global economy in the 1980s created unfavorable global political and economic conditions for investing in malaria. Ideological differences and institutional resistance, moreover, delayed the ability to mobilize the necessary resources for scaleup at the start of the 2000s.

Part of what makes the ITN scaleup story remarkable, then, is that this context of neglect and inaction preceded rapid mobilization after 2005. Six overarching factors helped drive this shift:

1. **Imagination:** Leading up to and following the MEP in the 1950s, the WHO and others considered it impossible to control malaria in Africa. In the early 2000s, many development economists argued against providing AIDS treatment in poor parts of the world in part because they considered the cost impossible to fund. Before the formation of the Global Fund and PMI, many in the malaria community considered it impossible to raise the funds needed to distribute millions of nets for free to those who needed them. Yet great strides have been made in malaria control in Africa. Providing health services to the poorest people in the world is possible.

Raising millions and eventually billions of dollars for malaria is possible. Multiple mechanistic factors buttressed these shifts, of course; at the same time, enacting those mechanistic factors required a less tangible but still critical reimagining of what is possible in global health.

2. **The right people in the right places at the right time:** To realize that reimagining, individual actors leveraged whatever platforms they had in their respective domains to mobilize resources and political will in the direction of malaria control and free nets, at times at odds with the status quo. This case study highlights multiple examples of such individuals.
3. **Collective action:** At the same time, individual actors can only do so much on their own. Enhanced coordination between disparate actors—including malaria-endemic-country policymakers, aid donors, NGOs and program implementers, malaria researchers and epidemiologists, net manufacturers, net users, and multilateral agency leaders—consolidated and intensified pressure to act on malaria and fund free net distribution.
4. **Strategic framing:** ITN scaleup happened in part because of the strategic, convincing frame of ITNs as a simple, cheap, lifesaving public health commodity and vector-control tool. ITNs became the principal rallying point for malaria advocacy. This framing enhanced its marketability to donors and policymakers.
5. **Responsiveness:** The generation of evidence at various points over the past few decades shaped the trajectory of global ITN scaleup. Scaleup was also predicated on understanding and responding to local contexts and user preferences, and adapting net design and rollout accordingly. ITN scaleup also may not have happened at the pace it did had there not been substantial mounting public pressure to distribute nets for free through mass campaigns. The existence of evidence and public pressure alone, however, is often not enough—decisionmakers must be responsive to that evidence and pressure.
6. **Happenstance:** Some factors that helped ITN scaleup efforts had to do with chance and serendipitous timing, two things mostly beyond human control. The emergence of HIV/AIDS—and the swell of activism that accompanied it—happened to occur in the same period. Other critical malaria interventions, such as ACTs and rapid diagnostic tests, also either became increasingly available or were newly developed, the timing of which was fortuitous and not guaranteed. The emergence of a universal health coverage movement in the aughts happened to occur in the same period. People’s decisions and actions caused scaleup to happen, of course, yet there is also an element of “stars aligning,” a phrase multiple experts used to describe ITN scaleup in the aughts.

At the same time, the delays in global ITN scaleup must also be situated in the context of financing, logistical, and operational constraints. Financing for malaria and ITN production capacity remained well below the level necessary to realize universal coverage for most of the decade. Debates around scaleup strategy hinged on available financing, which was acutely limited before 2002, and though it improved through 2005, it was still insufficient to meet the need through 2007. The Global Fund, which became the leading net procurer, was a novel financing mechanism, and early challenges with its procurement practices prevented faster scaleup. There was also a limited number of WHOPES-approved LLIN

manufacturers before 2007, and ensuring adequate production capacity for quality-approved LLINs remained a challenge through the end of the decade.

Though this case study attempts to weave together the numerous threads that collectively caused ITN scaleup in the 2000s, additional case studies of each individual thread would very likely yield a richer, fuller accounting of the path to scaleup. Numerous areas seem ripe for deeper research. Some areas have been highlighted in previous sections; additional areas include advocacy efforts to get and keep malaria on global policymakers' radars, efforts to build African manufacturing sectors and ramp up LLIN production capacity, and the evolution of scientific debates and the relationship between evidence generation and policy/practice.

The ensuing four sections discuss the following: (1) synthesizing causal factors that enabled rapid ITN scaleup between 2005 and 2010; (2) synthesizing causal factors that prevented rapid scaleup before 2005 and undermined rapid scaleup between 2005 and 2010; (3) broader themes/questions raised by this case study; and (4) critiques of rapid scaleup and implications for future malaria-control efforts.

Answering the Mechanistic Causal Question: How Did ITN Scaleup Happen in the 2000s?

Most experts consulted for this case study described what enabled rapid ITN scaleup in the 2000s in terms of “multiple threads coming together” and “stars aligning” (or, in the case of the Global Fund's creation, a “snowball rolling down a hillside,” in Feachem's words). Increased available financing, robust evidence, technological innovation, evidence-informed policy changes, technical guidance and support, LLIN production capacity, high-profile/influential champions and advocacy, multisectoral partnerships, political leadership, and a tangible increase in ambition/willingness to address global health challenges spurred by the HIV/AIDS crisis were all necessary ingredients for global ITN scaleup that came together in the aughts.

In addition, the global malaria situation was becoming a crisis in its own right: malaria cases and deaths had been increasing since the 1990s and well into the 2000s, with hundreds of thousands of young children dying annually and many millions more contracting malaria multiple times per year. The syncing up of all these factors, in Renshaw's view, facilitated “much more convincing communication around scaleup.” On these disparate threads coming together and the role of coordinated action, Jallow stated,

That awareness that had always been there was actually consolidated into more of a collective, structured action where people started getting together, pushing for things to make sure it happens and getting the information that is needed. So it's not like oh we're just investing, but how much are you investing? Who are your target groups? What is the impact? It was partnership and collaboration for one common goal—how do we really fight and succeed against malaria? It's everything: from the scientists to the funders to the implementers, the ones who are actually making sure that these nets are actually distributed, to the communities, and monitoring them to make sure that they use [the nets].

Activism in response to the HIV/AIDS crisis prompted an unprecedented mobilization of financing for global health, along with an evolution in how the international community responds to global public health challenges. The surge in development assistance for health in response to HIV/AIDS—seen most notably in the creation of the Global Fund and PEPFAR—benefited malaria-control efforts; most experts consulted agreed that the global response to the HIV/AIDS pandemic in turn helped mobilize resources and political will for malaria control. The inclusion of malaria in the Global Fund is a testament to this point. Many experts consulted were skeptical that malaria would have seen such resource mobilization absent HIV/AIDS or the Global Fund. Binka, for example, stated, “HIV really helped the malaria cause; HIV had a lot of activists who were loud and in every country. They brought the roof down for the creation of the Global Fund. I’m not sure malaria would have ever gotten that far without” either HIV/AIDS or the Global Fund. The creation of the Global Fund and PMI, in Coll-Seck’s view, was “the result of very strong advocacy from NGOs and civil society saying this is not normal, we need to do things differently, and more for, malaria,” as had been done for HIV/AIDS. The activism around free HIV services before 2005 also seems to have inspired or perhaps provided a template for subsequent calls for free nets in the malaria community, as some experts suggested.

Before 2002, DAH for malaria was negligible. By the end of the aughts, the Global Fund, together with PMI, had mobilized billions of dollars for malaria (and for HIV/AIDS and TB). This new “money on the table,” in Edlund’s words, in turn enabled the “period of hockey stick growth in [ITN] distribution” after 2005. McArthur thought that “AIDS came first in this broad effort, malaria second; it was a cascade effect of these different breakthroughs, each one making the other one seem more solvable.” Indeed, the US government responded to HIV/AIDS first with the creation of PEPFAR in 2003 and then with the creation of PMI in 2005. The HIV/AIDS pandemic in a way forced American policymakers to face the reality that new health threats in a globalized world can come from anywhere, and choosing to ignore diseases that do not primarily affect Americans currently, such as malaria, reflected poor policymaking in its lack of imagination and evidence. Given the USG’s contributions to DAH through bilateral and multilateral channels, this shift was critical for malaria, which was an acutely neglected disease for several decades.

The focus of the Global Fund and PEPFAR—and later PMI—on health commodities as a form of health aid also benefited ITN scaleup efforts, as did net cost-effectiveness. These agencies are results focused; nets provided a relatively cost-effective, technically simple commodity on which to measure performance and results. “Now there’s a physical tool people could donate to countries” instead of giving money directly, which was among “major advantages” malaria had, in Binka’s view. Similarly, “ITNs mobilized such support because the science showed they were very effective at saving lives, which is the goal of health interventions, but also because they are pretty cheap and cost-effective, which was important in selling to charities,” Moore-Sheeley said. Indeed, McArthur thought that an enabling factor for the USG and other donor countries getting behind ITN scaleup was that “it was a lot cheaper than AIDS. The total cost for malaria scaleup within the broader envelope of infectious disease was becoming relatively modest as the pie kept getting bigger, which made it easier to justify.” Part of this, too, was reframing: “The big stumbling block was how are we going to do this at scale, and [having]

someone say the scale actually isn't that big [helped overcome that stumbling block]—\$500 million isn't that much money when we talk about the impact," Simon stated.

Technological innovation—both in the tool itself and in other components of the malaria toolkit—also helped enable rapid ITN scaleup. The creation of long-lasting insecticide-treated nets seems to have made nets more “sellable” to donors: LLINs obviated the need to re-treat nets every six months (removing a potential barrier to use) and extended the lifespan of the intervention to up to three years. Other concurrent innovations in antimalarials and diagnostics—notably ACTs, chemoprophylaxis in pregnancy, and rapid tests—along with existing IRS also likely benefited scaleup efforts. As Simon noted, PMI was formed on the basis of ITNs *plus* spraying and antimalarials, not ITNs alone. And the simultaneous development and availability of these multiple tools was mostly coincidental. “Suddenly there were three new technologies, any one of which would be a minor revolution in malaria. Having all three of them together and available at about the same time, was a huge momentum driver,” Feachem said of ITNs, rapid tests, and ACTs.²⁶⁶

The strong evidence demonstrating the lifesaving and vector-control potential of ITNs was also incontrovertibly a driver of ITN scaleup. Evidence generation in the 1980s and especially in the 1990s through RCTs served as the foundation on which scientists, implementers, and advocates based arguments for ITN scaleup. By the early 2000s, policymakers, researchers, and program implementers broadly understood ITNs as an effective, cost-effective tool to prevent malaria and save lives; the question was, by this point, not whether nets would work, but who would pay for them. Evidence from large-scale integrated campaigns throughout the first half of the 2000s, led by the Red Cross and CDC, demonstrated the feasibility of mass free distribution, which became the dominant scaleup strategy. In particular, evidence from Kenya's 2006 national campaign directly influenced the WHO's decision in 2007 to recommend universal coverage, free distribution, and LLINs. Subsequent economic research, especially research conducted by Dupas and Cohen, quelled the debate about net price, which further solidified the argument for mass free distribution.

Ongoing operational and implementation research on user preferences/needs fed into, via RBM and other mechanisms, manufacturing considerations and debates around ITN delivery models. Understanding the operational, anthropological, and cultural contexts around net use—which varied not only across countries but within districts and communities—was necessary on the path to scaleup. Multiple experts mentioned that nets were not necessarily that intuitive, particularly as a malaria-prevention tool; nets also have attributes that can make them less user-friendly (e.g., difficult to hang up or hot to sleep under). Engaging with communities to understand their specific needs and barriers to adoption, then, enabled scaleup by helping ensure nets were fit-for-purpose and would be accepted by the people for whom the nets were intended.

On a policy level, global policies and policymaking processes also had to be in dialogue with and adapted to each national and subnational context, which RBM helped facilitate. The WHO's “guidelines and recommendations are too general at [the] level” at which they are published, according to Mnzava, so “application or implementation of these at the country level really needs to take context into account.” RBM, in this way, was helpful for adapting generalized guidelines to countries' specific

contexts. It also supported countries in navigating the Global Fund’s application process. A critical component of the Global Fund’s ability to mobilize malaria financing in the 2000s was RBM’s creation of the Harmonization Working Group, which facilitated the provision of technical support to countries and nearly doubled the malaria application approval rate between the sixth and seventh Global Fund funding rounds. The alignment of key actors (e.g., RBM, the WHO, UNICEF, the Global Fund, PMI, LLIN manufacturers, malaria researchers, country policymakers, NGOs, and net users) through such mechanisms and other multisectoral partnerships was essential for sustaining collective action and global coordination on scaleup in the 2000s.

Because production capacity was initially constrained, dialogue among net manufacturers (e.g., Sumitomo Chemical and Vestergaard), procurers (e.g., the Global Fund and PMI), and national governments was also important for mobilizing funding and instilling confidence in existing and new manufacturers. “With that championing, it became easier for funding to actually come together and for manufacturers to feel assured that their products will be bought through the Global Fund, where most of the money was coming through,” according to Mwenesi. With funding assured from multilateral and bilateral sources and the resulting “assurance [to manufacturers] that nets would not just sit in a factory,” “engagement with the target population,” and “enabling policies,” in Mwenesi’s view, “all these arms were working together” to enable scaleup. By the end of the decade, volumes moved by the Global Fund and PMI and more WHO-approved suppliers entering the market brought down LLIN unit costs, which further advanced the ability to scale.

Political leadership and coordinated advocacy at the most senior levels of governance also enabled this responsiveness to new evidence and agility in adapting malaria-control strategies more generally. The UN’s Kofi Annan, the WHO’s Arata Kochi and Gro Harlem Brundtland, Ethiopia’s Tedros Adhanom Ghebreyesus, Kenya’s Charity Ngilu, African heads of state, and other senior policymakers’ championing of malaria in global health and development policy and financing (e.g., in the Global Fund, MDGs, and Abuja Declaration) helped accelerate ITN scaleup. By the start of the 2010s, more ownership over malaria-elimination efforts by endemic-country governments, in several experts’ view, further accelerated and sustained ITN scaleup as well. With ALMA’s creation in 2009, “African heads of state came together and decided to fully own the malaria response—that’s where the shift came in,” Mwenesi said; “the alliance has given African leaders more impetus to interrogate their countries’ malaria data more closely, understand it and use it for decisionmaking, pushing to see that malaria is eliminated where possible or at least reduced as a public health burden.”

Public scrutiny on USG foreign assistance and public pressure on US policymakers to increase public spending on global health also enabled greater investment in malaria-control efforts. Public hearings on USG malaria spending leading up to PMI’s formation in 2005, alongside negative media coverage of USAID’s malaria programming and USG foreign assistance spending more generally, helped put pressure on the USG to shift from predominantly social marketing and “technical assistance” to direct commodity purchasing, which was key for greater USG involvement in ITN scaleup. “That public advocacy component is huge,” Ziemer said on this topic; “How do you measure it? Pretty hard. But it’s needed.” More broadly in global health, Paul Farmer’s “clinical leadership and pioneering on the ground,

[Sachs's] leadership on policy, and [Annan's] political grace," in McArthur's view, were all essential pieces in triggering a broader paradigm shift in official development assistance for HIV/AIDS and the Global Fund, which became necessary for ITN scaleup to happen at the pace it did.

Although some institutional processes and attributes served as barriers to scaleup, there were also examples of institutional flexibility and willingness to experiment that likely supported rapid scaleup. Grabowsky, for example, said that in his experience, CDC epidemiologists "were in a career path that fostered innovation and were able to take risks in ways others may not have been able to."²⁶⁷ In addition, integration with or borrowing from existing infrastructure and tools enabled responsiveness and nimbleness (most notably in the integration of net delivery in immunization and other child survival campaigns). Grabowsky noted that with the Alliance for Malaria Prevention multisectoral partnership, established under his leadership in 2004, "we used tools commonplace in vaccines and further refined for measles campaigns, so had the tools, partners, and mindset all ready to go for bednets."²⁶⁸

Having clear mandates and clear lines of communication between various malaria organizations also supported ITN scaleup. Leading up to the mid-2000s, for example, there "was a lot of confusion" in the malaria community about the WHO's and RBM's respective mandates, Mnzava recalled. Indeed, the WHO "objected that RBM's technical Working Groups were encroaching on WHO's normative function (e.g. setting standards, issuing technical recommendations) and its role in providing technical assistance to member states around implementing those recommendations" (Pillinger 2020, 337). A host of other challenges within RBM and between RBM and the WHO's Global Malaria Programme "almost imploded" RBM in 2005, in Court's words. An inflection point occurred at RBM's eighth annual board meeting in Yaoundé in November 2005; following the meeting, RBM leadership engaged the Boston Consulting Group to help develop a series of reforms, which Kochi enacted via the WHO.²⁶⁹ These reforms made a clearer "separation" between the normative function of the WHO's Global Malaria Programme and RBM's role "to mobilize resources to implement the recommendations made by GMP," in Mnzava's words. This clarity of roles enhanced coordination, which benefited scaleup.

More generally, other sectoral shifts throughout the 2000s seem to have created favorable conditions for ITN scaleup by contributing to an enabling policy environment. The birth of the UHC movement and the decision by progressively more countries to abolish health user fees throughout the decade, for example, certainly seemed to animate the argument for free net distribution, which became the delivery model capable of achieving rapid global scale. Through the MDGs and other policy agendas introduced over the course of the decade, maternal and child health initiatives (including child survival programs and prenatal care) also became increasingly prioritized in global health policy.

Barriers to and Challenges in Scaleup before 2005

Numerous factors prevented rapid ITN scaleup before 2005 and continued to undermine rapid scaleup throughout the end of the decade. Leading up to the start of the 2000s, the legacy created by the MEP, ongoing effects of structural adjustment programs on domestic health financing and health systems, and neoliberal economic thinking in development policy all contributed to a sense of fatalism around controlling malaria in Africa. The time it took to make nets legible as a health commodity and vector-

control tool—both for funders and users—seems to have initially delayed rapid scaleup as well. Understanding barriers to use, user preferences, and the applicability of ITN efficacy and effectiveness trials across different contexts were all important questions to address before scaling ITNs across different countries and communities.

Nevertheless, throughout the 1990s and into the early 2000s, efforts were made to scale ITN coverage; financing and operational/logistical challenges, however, prevented rapid scaleup. Malaria-endemic countries seemed broadly supportive of ITN scaleup and numerous countries implemented smaller-scale (and some larger-scale) campaigns. Large multilateral and bilateral donors such as the World Bank and DFID made funding commitments to realize the targets set out in the 2000 Abuja Declaration, yet funding did not materialize commensurate with committed amounts. Crucially, countries with the highest malaria burden overlapped significantly with low-income countries and heavily indebted countries, which meant that domestic budgets were constrained. External financing in many of these countries was a significant source of health financing. Health ministers had made this point since the early 1990s, as in the WHO director-general's report on the 1992 Ministerial Conference on Malaria, which stated, "We draw attention to the fact that the problem is often greatest in the very countries or areas which can least afford to take action ... we call upon international development partners ... to increase their support to malaria control" (WHO 1992).

The fundamental question of "where is the money going to come from" for ITN scaleup was far and away the biggest barrier to rapid scaleup through the mid-2000s. With low domestic spending on health in many African countries through this period (\$4–\$5 per capita annually on average), external financing and/or private sector involvement was necessary to realize ITN scaleup at any pace, let alone rapid scaleup. With the Global Fund's creation in 2002 and PMI's in 2005—and the millions and subsequently billions of dollars mobilized for malaria through these organizations—the terms of this debate shifted. Nevertheless, and in part because the financing itself took time to scale, "heated" debates over ITN delivery models and net price / health user fees more broadly curtailed scaleup efforts.

In addition to available financing, ideological differences and politics shaped these debates. "Unfortunately, a lot of ideology got wrapped up in these things," in Yates's view, which resulted in "pretty bitter disputes about how [health products] should be distributed." This dynamic also resulted in institutional resistance to funding HIV/AIDS, TB, and malaria treatment in the 2000s. Reflective of this broader debate around health user fees, the debate around net price had two gravitational centers: on the one hand, nets were a lifesaving public good similar to vaccines and so they "should not be sold to poor populations that can't afford them," in Renshaw's words; and on the other hand, "of the little public money available, reserve free nets for pregnant women and small children; everyone else has to buy" nets, in Lengeler's words.

The pro-market segmentation argument can be further broken down into two subcomponents. First, Lengeler and other experts consulted for this case study speak to the "value for money" question, which essentially asks how to make whatever limited public resources that *are* available go as far as possible vis-à-vis health impact. "When you have very tight budgets, there is a legitimate discussion

between protecting a small high-risk population with free nets versus protecting more people and charging some of them,” in Lengeler’s view. A “value for money” framework can sometimes seem to run at odds with the WHO’s organizing principle of “health for all,” which prioritizes the primary goal of protecting health and mobilizing whatever resources are required to meet that primary goal.²⁷⁰ Indeed, this lens can be seen in the nature of the pushback to charging for nets. “Look at vaccines: in Ghana and most African countries, UNICEF delivered vaccines freely; why not equate nets to vaccines? If the goal is to reduce the malaria burden and protect people, it didn’t make any sense” to charge people for nets, in Binka’s view. The merits and critiques of either argument aside, malaria financing was severely constrained well into the 2000s; even with the creation of the Global Fund and PMI, funding for ITN scaleup was not assured.

The second subcomponent underlying the pro-market segmentation argument was what Grabowsky called an “academic prescriptiveness” and “allegiance to theory” over practice. Multiple experts consulted suggested that at various points along the road to scaleup, untested theories acted as barriers. This theme can be seen in: hesitancy among some development agencies and donors in the 1990s to get behind nets because of then-untested concerns around delayed deaths in high-transmission zones; the argument used for health user fees (i.e., people will value health products more if they pay for them); concerns around adverse consequences of integrating net distribution with immunization campaigns; concerns about net misuse; and using “willingness to pay” studies for nets, the results of which apparently did not hold up in practice. Though some of these positions stemmed from reasonable concerns and though some degree of cautiousness in rolling out new interventions is warranted, a recurrent characteristic of debates around ITN delivery seems to revolve around allegiance to untested theories. On health user fees and cost-sharing, for example, Dupas stated, “Before discarding a program on the premise that free stuff isn’t used, let’s think twice. The first paper on net pricing showed that you got way more access and coverage when nets were provided for free.”²⁷¹ This dynamic might be why, in a 2006 profile of Kochi, he was quoted as saying, “Their [the malaria community’s] science is very weak. The community is small and inward-looking and fighting each other.”²⁷²

On net misuse, there were some anecdotes of people using nets for purposes other than malaria prevention (for example, using nets for fishing), but the magnitude of the problem seems to have been overstated. In addition, research demonstrated that most people wanted nets and would use them correctly if they could access them. It was “just lazy thinking,” in Yates’s view, to argue against free nets on the premise that people might not use them as bednets or would otherwise “misuse” them en masse. On net access among target populations, Jallow stated, “Sometimes we like to overthink things and come up with nice fancy models. People who can afford [to buy nets] do get malaria, but they can afford to buy other vector control tools, so it’s the vulnerable population who can’t afford it who are actually more vulnerable to malaria.” Conceding missteps, miscalculations, or flawed assumptions, however, can be difficult, both for individuals and institutions. “Once these things get momentum, it can be very difficult for people to turn around and go, this is rubbish,” Yates said of the resistance to getting rid of health user fees.

Underlying all these various untested theories, however, was also a lack of data on malaria generally, which contributed to an inability to monitor what was happening in real time. Multiple experts interviewed for this case study noted this reality. “The landscape I noticed when I started working on this was that people thought that there was scaleup already happening,” Dupas said; perhaps organizations “already had a program, but the design of the program was not optimal” for scaleup. Ziemer similarly noted that “we had no data except local data to show how we were doing.” By 2008, in Erskine’s view, “having more data, being able to say what the malaria burden was, and being able to say we can do something about it” helped scaleup, underscoring that the lack of data initially undermined scaleup.

A lack of coordination around evidence generation also seemed to play a part in stalling efforts to scale ITNs. In the 1990s when efficacy and effectiveness studies were underway, multiple experts pointed to an apparent disconnect between research and implementation. “Scaleup was also really hindered by a lack of coordination between implementing organizations across time and space,” in Moore-Sheeley’s view; “efforts to implement ITNs certainly didn’t respond to problems revealed in past research.” Multiple experts also critiqued the WHO for delaying formal policy guidance on ITNs, despite available evidence supporting them. “Findings from research feed into policy, but you need to have an appropriate and functional structure or mechanism of taking up the results from research to policy,” in Mnzava’s view; “the lack of a functional structure within the WHO that would have convened to discuss the evidence and come up with the recommendations then, for me, was the fundamental problem.”²⁷³

Institutional operational challenges were not limited to the WHO; operational challenges within the Global Fund and production-capacity constraints among manufacturers also curtailed scaleup. Through the mid-aughts, only two LLIN manufacturers had WHOPES approval; the regulatory environment (in which the WHO, through WHOPES, played an important role) seems to have slowed the pace at which new manufacturers entered the market. Difficulties with the Global Fund’s procurement processes also seem to have curtailed scaleup through the mid-2000s; however, once these issues were resolved and as the Global Fund and PMI increasingly supported mass campaigns, these volume assurances contributed to increases in production capacity by signaling the existence of a market for LLINs to manufacturers.

Contextualizing the Mechanistic in the Humanistic and Broader Questions Raised by This Case Study

In many ways, this case study is a case study of power, politics, and personalities, and of the influence of those factors in decisionmaking, agenda-setting, and available financing in global health.

With respect to power, neglect and inaction were the dominant themes through the early 2000s. Malaria was and continues to be considered a disease of poverty, often grouped with other neglected tropical diseases that receive disproportionately less coordinated global action and financing relative to the health burden. Malaria also disproportionately affects the most marginalized and vulnerable members of society, such as young children, people living in poverty, mobile and displaced populations, pregnant people, and rural populations. In global financing and policymaking, malaria was acutely

neglected between 1980 and 2000; malaria programs and malaria research and development are also chronically underfunded. “All issues need money to drive the science, but funding was not available” for malaria, Binka explained. Going into the new millennium, there was an apparent lack of accountability for donors’ underspending on malaria as well; Vasant Narasimhan (now CEO of Novartis, then a medical student) and Amir Attaran (a Canadian professor who worked with Sachs on the WHO Commission on Macroeconomics and Health) wrote in 2003,

Donors who complain now about reaching an impasse because of limited absorptive capacity have themselves to blame for this, because it is hard to see how capacity in 2003 is any worse than it was in 1998, when the RBM Partners—i.e. *the donors themselves*—decided on the goal of halving malaria deaths by 2010, with full awareness of the capacity limitations in Africa. ... If some aid donors continue to underspend in coming years and cause RBM to fail in meeting its goal by 2010, millions of lives will be lost unnecessarily. Should that occur, the only “capacity” that must be questioned is that of the donor agencies to act in accordance with past promises. Politicians will then be correct to demand extreme—even punishing—scrutiny of the donor agencies involved, including to hold some leaders personally accountable, no differently than in other fatal disasters (e.g. an airplane crash). (Narasimhan and Attaran 2003)

The role of power in the ITN scaleup story is also palpable in debates around what constitutes an appropriate, optimal, or worthy tool, strategy, or investment. Because many domestic health budgets were constrained, the “power of donor money in a grossly underfunded health system,” per Yates, meant that donor preferences in many contexts dictated health policy and health financing choices. Malaria was also broadly out of sight, out of mind for North American and European policymakers, until the HIV/AIDS pandemic seems to have helped force a shift in how the US and UK in particular approached global health challenges, including malaria. Although malaria has been eliminated in North America and Europe, “this overhang that malaria just existed in Africa and could never be eliminated was embedded in a lot of development thinking” going into the 2000s, according to Simon.²⁷⁴

There are always competing demands in health financing and health research and development; this case study raises the question of who gets to decide what is worth investing in and which demands prevail (which are fundamentally questions of whose lives are worth saving). These decisions are almost always political in nature and are shaped by the imaginations of—or what is deemed possible by—the people in positions of power.²⁷⁵ The historical context of colonialism and the enduring impacts of colonialism on global politics, economics, and disease ecologies undoubtedly factored into the policy and financing preferences of people in positions of power at development agencies headquartered in rich countries.²⁷⁶ Going into the 2000s, leading health aid donors such as DFID and USAID, alongside numerous academics, supported health user fees and cost-sharing in part on the basis of the assumption that it was not possible to drum up the financial resources needed to fund HIV/AIDS, TB, or malaria services in the poorest parts of the world (many of which overlapped with countries previously colonized).

Paul Farmer and Jim Kim, among many others, challenged this assumption, however, and helped shift the then-dominant paradigm in global health, which was basically that “it is too expensive to treat poor people.”²⁷⁷ It is worth repeating Simon’s assessment of the funding landscape for malaria before

PMI: “Fighting malaria was going to cost a lot of money, and people didn’t have the imagination to think we could go get that money.” Development economist Justin Sandefur makes a similar point in his analysis of the broader foreign aid budget in this era: “In retrospect, it seems clear that economists were far too quick to accept the total foreign aid budget envelope as a fixed constraint. When in practice, as PEPFAR proved, the total size of the foreign aid budget was very much up for debate.”²⁷⁸ A direct causal line between the work of advocates such as Farmer and Kim and ITN scaleup was not deeply investigated in this case study; considering the role of donor financing in ITN scaleup in the 2000s and other causal effects attributed to advocacy in this case study, however, it is plausible that rapid scaleup would not have happened without such earlier advocacy.

In the case of ITNs specifically, the “allegiance to theory” over practice also seems to have stemmed from these power dynamics. ITNs are not a perfect vector-control or malaria-prevention tool, and certainly scaling up ITNs involved addressing complex challenges and open questions related to procurement/logistics, user preferences, and disease ecology. As numerous experts consulted for this case study stated, though, these were not abstractions happening in a vacuum; thousands were dying daily. In Mnzava’s words,

If you consider malaria as an emergency and a tool has been identified, why don’t you come up with recommendations, then use this tool in the interim until the lengthy process of WHO coming up with recommendations is concluded—because we are dealing with lives of people, lives of infants, young children, pregnant women, displaced populations. You cannot wait, you cannot delay this. That has been my argument all along. Yes, do those [RCTs], they take [a] long [time], they’re very expensive; but in the interim, when a new tool has demonstrated significant kill of mosquitos and has been demonstrated to be safe, I think for me I’d take it up as a temporary measure until the lengthy process has been concluded.

To reiterate, evidence that ITNs could save lives existed as early as 1991, and it certainly existed by 2000, by which point development leaders broadly understood ITNs as a lifesaving tool; the primary question for scaleup at that point was how countries would pay for nets and ongoing delivery programs (which seemed to also influence the WHO’s delay in formulating policy guidance). This question created a dilemma, or tension, between what Lengeler and coauthors summarized as “quick wins versus long-term sustainability” in their 2007 paper on advantages and disadvantages of public and private sector approaches to scaleup (Lengeler et al. 2007). More specifically, the paper discusses how to balance “the need to have rapid gains in coverage in all endemic countries, while at the same time, setting up systems that will ensure long-term availability” (Lengeler et al. 2007). By 2003, there was evidence that poverty and net price were the main barriers to net use, yet absent the funding to purchase and deliver nets at scale, the logic was to rely on the private sector for long-term sustainability. Four years on and with significantly more malaria funding available, this tension had yet to be resolved.

This dynamic begs the question: Sustainability for whom, and in what context? Grabowsky mentioned the global model for immunization as a counterpoint: it achieves high coverage yet is mostly externally funded, with some elements such as vaccine development completely externally funded, making it “sustainable” at the global level but not necessarily at the country level. Do countries necessarily need to be self-sufficient for all health financing? What do countries owe each other in

shouldering the financial responsibility for the global health burden, particularly when the exploitative practices of some countries led (and still lead) to the inability of other countries to adequately finance their health systems? The “health for all” framework contests the notion that available resources for a given health problem are fixed, though increasing available financing can take time and is not guaranteed. How should countries finance their health systems in the meantime?

The answers to these questions are, of course, complex, nuanced, and context-dependent, yet they are also dependent upon the politics involved in decisionmaking around these questions. Through interviews and desk-based research completed for this case study, it is evident that there was significant resistance within development agencies to abolishing health user fees and providing health services/products for free in malaria-endemic countries. The resistance seems to have occurred partly because reputations and careers were on the line, and there was minimal accountability for the consequences of these policy mistakes. “To a great number of people, this was very, very threatening,” in the view of Yates, who cited 2005 research²⁷⁹ and his subsequent 2009 analysis that linked user fees directly to preventable deaths in children under 5, which estimated that “more than 3 million child deaths could have been averted over the past 20 years had fees not been charged” (Yates 2009, 2,079).²⁸⁰ “The global health community is in denial in how important this topic was and how badly we got it wrong,” Yates said; “collectively we’ve got a lot to be responsible for.”

This broader context of ideological entrenchment around health user fees and resistance to providing health care in impoverished communities curtailed the pace at which ITN scaleup could occur because this ideology informed the debate around ITN delivery models and whether nets should be free. An argument against free distribution was that people would misuse or not use nets; “the idea that people only value things if they pay for it is nonsense, yet everyone bought into it,” per Yates. Again, this dynamic was influenced by who held power in global health decisionmaking in the 2000s. As Jallow noted, European countries do not operate by this logic, yet “the same people would come to Africa and look at people who could not afford it and say, ‘oh no, no, if we charge them, then they will appreciate it more.’ Maybe for some other sectors, but you’re talking about health.” Though over the course of the aughts things trended in the direction of abolishing user fees and using mass free distribution campaigns to deliver ITNs, these debates were still active as of 2007, when the WHO formally recommended universal coverage and Dupas and Cohen published their findings comparing ITN coverage with and without cost-sharing. These considerations help contextualize the debates around net price and why the debates were so heated. In Jallow’s words:

The biggest achievement in terms of scaleup of bednets is making sure they’re provided free of charge. Let’s face facts. You’re talking about a public health concern. You’re talking about millions of people who get malaria every year. I don’t think there is any single family in malaria-endemic Africa who hasn’t lost a family member to malaria, including me talking to you.

Behind politics and power, of course, are people and personalities. “There is something to be said about global health personalities and the influence they have on the direction of funders and public opinion,” in Moore-Sheeley’s words. Sachs, for example, came up frequently in interviews and the literature as an outspoken, at times adversarial proponent of free nets; the precise level of credit he

deserves in the ITN scaleup story is unclear, but in any case, he had access to people in positions of power and advocated for free nets years before leading donors got on board. Kochi similarly was considered a “big personality” who was at times criticized for his approach (i.e., being “unrealistic” or “undiplomatic”). Who gets to have the professional latitude to go against the grain, or to have a “big personality,” in global health? Why must discussions be diplomatic when millions of lives are at stake? Whose ideas are respected, in whose imagination are we living?

Because ITNs, alongside other malaria interventions, were so effective in reducing the malaria burden, many organizations are quick to take credit for the global ITN scaleup. Indeed, most organizations mentioned in this case study promote their involvement in reducing that burden in their marketing materials, and many also promote their role in ITN scaleup specifically. Importantly, though, there was consensus among experts consulted that coordinated partnership across manufacturing, financing, policy, program implementation, and research was essential in ITN scaleup. Opinions also diverged on how much credit to assign to different actors (e.g., implementers, researchers, funders), again underscoring the causal role of partnership and collective action in scaleup efforts.²⁸¹ In McArthur’s view, “It’s hard to say precisely which puzzle pieces were most decisive,” as there is “not one single individual who deserves all the credit.”

Indeed, no single actor or agency can claim full credit, and some may have actually impeded scaleup efforts at earlier points. The US government, RBM, and the WHO all played vital roles in scaleup, but they also initially contributed to delays in faster scaleup, for various reasons discussed in this study (agencies such as USAID, for example, “had to be pulled in,” in Court’s words). PSI, as another example, arguably inhibited scaleup by resisting the removal of cost-sharing requirements for health products, yet it also became one of the main procurement agents for Global Fund malaria grants early on and through those grants, helped deliver millions of nets.

Who pays the price for missteps, mistakes, and miscalculations? Take, for example, the Global Fund’s initial challenges with health product procurement, about which Grabowsky stated, “The initial inefficiencies in the Global Fund’s financing model that led to massive inefficiencies in procurement, and their reluctance to move away from it, led to many unprevented deaths from malaria.” The funding made available through the Global Fund unquestionably played an integral role in causing rapid ITN scaleup. How do these earlier failures change our understanding of the Global Fund’s contributions to malaria control? Perhaps these are unanswerable questions, but they are worth asking nevertheless.

Drawbacks of Rapid ITN Scaleup and Implications for the Future of Malaria Control

The story of how ITN scaleup happened over the course of the aughts has implications for ongoing global malaria-control efforts. Though beyond the scope of this inquiry, this topic frequently emerged during expert interviews; the following discussion presents a brief synopsis of some of the central themes raised.

First and foremost, sustained investment in malaria control remains a challenge, and the future of malaria funding is, as ever, not guaranteed. Many experts consulted noted that at no point, including up to today,²⁸² has malaria ever been fully funded (i.e., funded to deliver “everything we want to everyone

who needs it,” in McGuire’s words). To maintain the gains made in malaria control since 2000, however, sustained and increased investment is needed. “If you look over USG commitment to PMI and PEPFAR, it has been constant or increased; if that hadn’t happened, we would’ve seen backsliding of malaria and HIV figures around the world,” Ziemer stated. Indeed, as one example, Mohamed Saleh Jiddawi, Zanzibar Ministry of Health and Social Welfare principal secretary, stated at the 2006 White House Summit on Malaria: “What we need now is to set up sustainable mosquito control activities, monitoring, and rapid response teams so as not to allow malaria to resurge as it happened in the ’60s and the ’80s.”²⁸³

Because of this perennial financing challenge, numerous experts consulted also thought that perhaps social marketing and segmented market approaches make sense as ITN delivery models *now*. Erskine, for example, thought that “social marketing has such a place now because we’ve built so much of a net culture,” but in the early days of trying to scale ITNs, social marketing was an idea “before its time.” Particularly also in the context of next-generation nets (e.g., piperonyl-butoxide and dual-active-ingredient nets), multiple experts noted that some people, especially wealthier people in urban areas, are willing to pay for customized nets (e.g., of different sizes, shapes, and colors and with different features, such as cell phone pockets, zippers, and reinforced bottoms). Feachem noted that

the biggest drivers on the demand side are not the prevention of malaria, but rather a good night’s sleep, a lack of nuisance mosquito biting and buzzing. In many cases the reason for wanting it, buying it, looking after it, using it, replacing it when it gets damaged won’t be primarily about malaria, it will be about other things in daily life that are important.

Indeed, a recurrent critique of mass free distribution was that “consumer preferences fell to the wayside” in favor of a “one-size-fits all approach,” McGuire said. Rockwood expressed a similar opinion: toward the late 2000s, “the focus was on just getting the lowest-priced commodity; countries at that time were no longer able to specify what they wanted, so it was always the lowest-cost net, which wasn’t necessarily what countries or communities wanted.” McGuire further added that through this approach, donors could then say “we achieved X percent coverage, although ownership doesn’t always translate into use, and maybe a lot of nets are going to people who might not need a subsidy and would be willing to buy a net that met their needs and personal preferences.” Multiple experts shared the view that looking forward, more nuance is needed in delivery strategy. Feachem presented the dilemma this way:

How do we see bednets in five years’ time, in ten years’ time? Is this a never-ending repetition of what we’re doing at the moment? Do we segue into a more private demand met by private supply model? If so, how do we do that? And if we eliminated malaria, do we keep on with the bednets? Do they live on beyond malaria? When we launch a polio program, we’ve got to explain, when polio is eradicated, do we continue to vaccinate or do we not continue to vaccinate, and why? People need to know that; it affects the cost-benefit of the whole program quite a bit. Most of the savings in smallpox come from the fact that we don’t have to vaccinate against smallpox anymore. So, we need to be able to say, if we eliminate malaria: bednets yes or bednets no? Supplied how? Private supply? Private demand? We need a story and a consensus among experts. Today, we are not close to having either.

Feachem's comment touches on a broader critique raised of bednets, which is that malaria is impossible to control without vector control, but nets are not a silver bullet in vector control, and eliminating or eradicating malaria requires considering the entire local disease ecology of malaria. "Most malaria tools have been imperfect," including antimalarials and the current malaria vaccine, Binka explained. "Impregnated bednets were sort of systematically oversold," in Feachem's view. "The impression was given that bednets would solve the malaria problem, particularly in the publicity and evangelism around bednets," Feachem explained, but "that evangelism distorted the fact that bednets are a tool amongst other tools and part of a wider program. With the other interventions in place, bednets are a big part of the solution. But on their own, much less." Evidence of this systematic overselling can be seen in a 2008 *Wall Street Journal* article covering new malaria funding commitments: "Officials involved in the efforts emphasized that bed nets—which have received a lot of promotion in the US as an easy fix for malaria—are just part of the battery of tools needed."²⁸⁴ Other tools, such as ACTs and rapid tests, also constituted critical components of the expanding malaria toolkit. Health commodities such as bednets, moreover, did not drive malaria elimination in North America and Europe; a suite of broader public health interventions did.²⁸⁵

Resistance remains another perennial challenge, raising again questions of optimal scaleup strategies for (next-generation) nets. Microbes evolve naturally, but Rabinovich thought that the slow rollout of ITNs and the initially sparse coverage of ITNs—which used the same insecticide used in IRS—was a "great way to develop resistance" in the long run.²⁸⁶ The question of net price is again coming up as nets using new insecticides come online, as newer technologies tend to cost more per unit initially, "putting more pressure on budgets," McGuire said.²⁸⁷ It is also unclear whether nets last as long as intended, which has implications for countries' and donors' planning functions. The Global Fund approves grants, for example, in three-year increments; if nets do not last that full three-year period, that creates challenges. "Provide the right technology and be prepared to refine this technology with the feedback that you get from the field," Mnzava advised. It is "time to advocate for industry to refine their technology so when donors and programs pay for a particular product at a particular price, it really lasts that long and provides the protection that they have claimed," he added.

Multiple experts consulted also critiqued what they perceived as a skewed balance toward health commodities at the expense of ongoing investment in malaria research and development. Given persistent challenges with resistance, for example, research into new and better tools to combat malaria is vital. It is a "key oversight" to not include research funding as part of the Global Fund or PMI (neither of which supports research), in Binka's view. "In all these efforts—malaria, HIV, whichever bug—put money into research. Buy commodities, yes, but even a five-percent contribution into research is much better than zero percent," Binka explained. This disconnect, or "very sharp divide," between research and implementation can be traced to the exclusion of research in the MEP campaign, according to O'Meara.

Lastly, though this case study centers primarily on ITN distribution as the metric for global ITN scaleup, the number of nets distributed does not equate to net coverage and net use, nor does it necessarily directly translate to reductions in malaria cases and deaths. These are different questions.

Not discussed at length but certainly of relevance are also the gendered dimensions of ITN uptake; women in many parts of the world are not necessarily in control of household finances, nor are they necessarily prioritized within the household for health interventions, even if they are disproportionately at greater risk of severe outcomes. Owning a net also does not necessarily mean the owners are sleeping under it every night, or that the net's insecticide is still active/effective. Nevertheless, net access remains the main barrier to net coverage and use.²⁸⁸

Conclusion

The global scaleup of insecticide-treated bednets in the 2000s, together with scaled access to artemisinin-based combination therapies and other malaria-control tools, contributed to a remarkable reduction in global malaria cases and deaths between 2005 and 2015. Although now heralded as a “global health success,” the story of ITN scaleup is not an unqualified success story. It is also a story of politics, power, and inaction. The path to scaleup was complex, and aspects of scaleup that may now seem straightforward, inevitable, or obvious in hindsight were not necessarily so then. Logistical, technical, and financial challenges and questions all needed to be addressed before ITNs could be scaled globally as well.

By the start of the aughts, the evidence was clear: nets could save lives. Through the MDGs and Abuja Declaration, policymakers committed to acting on malaria and delivering nets to vulnerable populations. Yet through the mid-2000s, malaria was severely underfunded (and it is still underfunded today). In the absence of adequate domestic or donor financing, rapid scaleup was impossible. With early investments from the Red Cross and Canadian government and the subsequent mobilization of financing achieved through the creation of the Global Fund and PMI, however, rapid scale became possible. This mobilization was not inevitable. Champions of malaria and advocates for universal health services helped blaze the trail. Strategic framing and messaging, collective action among disparate actors toward a common goal, partnerships, robust evidence, technological innovation, accountability through public pressure on policymakers, and institutional responsiveness were all vital ingredients for scaling up ITNs globally.

Although this case study ends at the start of the 2010s, that does not mean it was smooth sailing from then on. ITN coverage remained below 60 percent through 2015, while demand forecasting, funding, net pricing, and production capacity all presented ongoing challenges to scaling efforts. As noted elsewhere, it is also important to remember that effective malaria control requires a multipronged, context-driven approach. Malaria is localized, and local disease ecologies influence transmission. ITNs are but one component of a complex disease-management process. As discussed throughout this case study, moreover, malaria-control efforts benefited from the awareness that countries—and individual citizens—do not have singular health needs or challenges. None of these diseases happen in a vacuum; people living in malaria-endemic areas may have chronic illnesses or be at risk of other neglected tropical diseases, for example.

This case study also highlights something that often gets obfuscated in global health and development, namely the role of politics and power in resource mobilization. Some may (and did) argue

that there was an urgent, obvious need to do more on malaria; the reality, however, is that the moral argument alone has almost never been sufficient to mobilize resources and undertake collective action to address a health challenge. Certainly it was insufficient for malaria for many years, and it remains insufficient for a litany of other diseases and conditions. This case study, then, aims to elucidate some of the factors that do enable collective action and resource mobilization.

The net price debate, moreover, invokes a recurrent tension between practicality (i.e., making do with available, limited resources) and idealism (i.e., how things should be, in an ideal world). Things are the way they are because of choices people make. Systemic, structural, institutional barriers to addressing health challenges may create a sense of inertia, but the odds are never as fixed as they seem. The ITN scaleup story shows that change *is* possible and requires *both* practicality and idealism. The hubris of eradication efforts in the 20th century showed the necessity of humility and evidence/research, while malaria-control efforts after the MEP showed the necessity of not accepting dire circumstances as acceptable or inevitable.

This case study shows that to address neglected health areas—along with any social concern that requires disrupting the status quo to address—people need to come together to push for greater imagination of what is considered possible to achieve. It is not either/or, however; it is as in the “Stockdale Paradox”: having “unwavering faith that you can and will prevail in the end, regardless of the difficulties, and at the same time, hav[ing] the discipline to confront the most brutal facts of your current reality, whatever they might be.”²⁸⁹ The level of financing for malaria in 2010 would have been unimaginable in 2000. It is necessary to work within the bounds of reality, but also to challenge the assumptions that establish those bounds.

Cordelia S. Kenney is an independently affiliated global health policy researcher. Kenney's research broadly focuses on understanding how change happens and how context shapes policy/program implementation, field-building, and other activities/processes in the health sector.

Notes

- ¹ “Malaria,” World Health Organization, last updated March 29, 2023, <https://www.who.int/news-room/fact-sheets/detail/malaria>.
- ² In the context of epidemiology, “elimination” refers to achieving zero incidence of a disease in a particular region, whereas “eradication” refers to achieving zero incidence worldwide. Only one human disease has been eradicated: smallpox.
- ³ Max Roser and Hannah Ritchie, “Malaria,” *Our World in Data*, 2022, <https://ourworldindata.org/malaria>. Global estimates of malaria deaths between 1990 and 2015 vary considerably depending on the accounting method and source. Broad trends, however, indicate that deaths rose until 2004, peaked, and then started decreasing (and have been rising again since the start of the COVID-19 pandemic).
- ⁴ “Net Mapping Project,” Alliance for Malaria Prevention, accessed September 1, 2022, <https://netmappingproject.allianceformalariaprevention.com/>.
- ⁵ “Celebrating the Distribution of 2 Billion Life-Saving Mosquito Nets,” United to Beat Malaria, January 2020, <https://beatmalaria.org/blog/celebrating-the-distribution-of-2-billion-life-saving-mosquito-nets/>.
- ⁶ John McArthur, virtual interview by the author, March 23, 2023.

- ⁷ For brevity, citations of the author’s interviews with experts are provided once and include the names of the interviewees and the dates of the interviews. Thereafter, if a reference or source is not specified when attributing evidence or quoting an expert, that material is from an expert interview.
- ⁸ Though this case study focuses on ITNs, that focus should not be interpreted as a value statement on all existing and potential malaria-prevention and -control tools and approaches.
- ⁹ See, for example, the most recent meta-analysis of ITN effectiveness in preventing child mortality: Joseph Pryce, Marty Richardson, and Christian Lengeler, “Insecticide-treated nets for preventing malaria,” *Cochrane Database of Systematic Reviews*, 2018, Issue 11, Art. No. CD000363. See also GiveWell’s resource library on LLIN effectiveness: “Mass Distribution of Long-Lasting Insecticide-Treated Nets (LLINs),” GiveWell, last updated July 2021, <https://www.givewell.org/international/technical/programs/insecticide-treated-nets>.
- ¹⁰ Stopping analysis in 2010, however, should not be interpreted as an indication that all barriers to scaleup had been completely resolved or that scaleup was guaranteed after that point. Numerous barriers identified in this case study, such as constraints in funding, in ITN production capacity, and in efficient procurement, continued to present ongoing challenges.
- ¹¹ Social marketing for health products and health user fees are not synonymous. For the purpose of this case study, however, they are treated as more or less conceptually equivalent in terms of the central outcome they both produce: charging people for health products.
- ¹² Vestergaard was founded in Denmark but has been based in Switzerland for many years.
- ¹³ Efficacy trials for health interventions assess interventions’ safety and efficacy in controlled and/or clinical settings whereas effectiveness trials assess outcomes in “real-world” settings.
- ¹⁴ Mariatou Tala Jallow, virtual interview by the author, December 20, 2022.
- ¹⁵ “Malaria,” World Health Organization. *P. falciparum* is associated with much higher levels of mortality and morbidity than *P. vivax*.
- ¹⁶ “Malaria,” World Health Organization.
- ¹⁷ For example, multiple locally transmitted cases of malaria were reported in the US in 2023, the first time in 20 years. See Keren Landman, “3 people have acquired malaria in the US. They’re the first in 20 years,” *Vox*, June 23, 2023, <https://www.vox.com/science/2023/6/23/23771154/malaria-transmission-florida-texas-mosquitoes-risk-prevention-anopheles>.
- ¹⁸ For a history of the emergence of malaria as a life-threatening disease and of malaria-control efforts, see Sonia Shah, *The Fever: How Malaria Has Ruled Humankind for 500,000 Years* (New York: Picador, 2010). See also Randall M. Packard, *The Making of a Tropical Disease: A Short History of Malaria* (Baltimore: Johns Hopkins University Press, 2007). On malaria-control efforts in Africa specifically, see Snow and coauthors (2012).
- ¹⁹ “Vector Control,” World Health Organization, accessed May 15, 2023, <https://www.who.int/teams/control-of-neglected-tropical-diseases/interventions/strategies/vector-control>.
- ²⁰ Chloroquine is a synthetic substitute for quinine, an antimalarial compound derived from cinchona tree bark. It was the main drug used to treat malaria from about the 1950s through the early 2000s and is still used for malaria prevention and treatment in some contexts.
- ²¹ Artemisinin is another tree-derived antimalarial compound. Sweet wormwood (*Artemisia annua*) extract has been used in traditional Chinese medicine for over two millennia; its application in treating malaria was discovered by Tu Youyou in 1972. See “Tu Youyou,” *The Nobel Prize*, accessed May 15, 2023, <https://www.nobelprize.org/womenwhochangedscience/stories/tu-youyou>.
- ²² Chapter six of Packard’s *The Making of a Tropical Disease*, “Malaria Dreams,” features an extensive discussion of what led to the launch of the MEP and factors that influenced the longer-term sustainability of malaria eradication across different countries’ contexts.
- ²³ Packard reaches a similar conclusion in *The Making of a Tropical Disease*.
- ²⁴ Wendy Prudhomme O’Meara, virtual interview by the author, September 20, 2022.
- ²⁵ Kirsten Moore-Sheeley, virtual interview by the author, September 21, 2022.

- ²⁶ Former World Bank malaria program staff member, virtual interview by the author with malaria program staff member, Martin Edlund, and Alan Court, March 30, 2023.
- ²⁷ This case study references Moore-Sheeley's 2017 dissertation; see also Moore-Sheeley's forthcoming book, *Nothing But Nets: A Biography of Global Health Science and Its Objects* (Baltimore: Johns Hopkins University Press, 2023).
- ²⁸ Only \$5.7 billion was spent on DAH in 1990. See Suerie Moon and Oluwatosin Omole, *Development Assistance for Health: Critiques and Proposals for Change* (London: Chatham House, April 2013).
- ²⁹ The lasting effects of colonialism in Africa also constrained what was possible in terms of domestically funded malaria control. Most African countries became independent around the mid-20th century (the 1950s and 1960s) and became low- or middle-income as a result of colonization. See Walter Rodney, *How Europe Underdeveloped Africa* (London: Verso, 2018).
- ³⁰ Max Roser and Hannah Ritchie, "HIV/AIDS," *Our World in Data*, last revised November 2019, <https://ourworldindata.org/hiv-aids>.
- ³¹ For more on the history of clinical trials for nets in the 1980s, see Moore-Sheeley (2017).
- ³² For example, see Jo D. Lines, Christopher F. Curtis, Joseph Myamba, and Ritha Njau, "Tests of repellent or insecticide impregnated curtains, bed nets and anklets against malaria vectors in Tanzania," *World Health Organization, WHO/ VBC/85.920* (1985); P. Ranque, T. Y. Toure, G. Soula, et al., "Use of mosquito nets impregnated with deltamethrin in mosquito control," *International Congress on Tropical Medicine and Malaria*; Calgary (1984); R. W. Snow, K. M. Rowan, and B. M. Greenwood, "A trial of insecticide treated bed nets in the prevention of malaria in Gambian children," *Transactions of the Royal Society of Tropical Medicine and Hygiene* 81 (1987): 563–67; and R. W. Snow, S. W. Lindsay, R. J. Hayes, and B. M. Greenwood, "Permethrin-treated bed nets (mosquito nets) prevent malaria in Gambian children," *Transactions of the Royal Society of Tropical Medicine and Hygiene* 82 (1988): 838–42.
- ³³ Former Global Fund Technical Review Panel member, virtual interview by the author, October 13, 2022.
- ³⁴ For more on this 1992 program, see M. K. Cham, U. D'Alessandro, J. Todd, S. Bennett, G. Fegan, B. A. Cham, and B. M. Greenwood, "Implementing a nationwide insecticide-impregnated bednet programme in The Gambia," *Health Policy and Planning*, 11, no. 3 (September 1996): 292–8.
- ³⁵ The WHO, UNICEF, the UN Development Programme, and the World Bank cosponsor TDR; it is run out of the WHO.
- ³⁶ For trial results, see U. D'Alessandro, B. O. Olaleye, W. McGuire, P. Langerock, S. Bennett, M. K. Aikins, M. C. Thomson, et al., "Mortality and morbidity from malaria in Gambian children after introduction of an impregnated bednet programme," *The Lancet*, 345 (1995): 479–83; F. N. Binka, A. Kubaje, M. Adjuik, L. A. Williams, C. Lengeler, G. H. Maude, G. E. Armah, et al., "Impact of permethrin impregnated bednets on child mortality in Kassena-Nankana district, Ghana: a randomized controlled trial," *Tropical Medicine and International Health*, 1 (1996): 147–54; C. G. Nevill, E. S. Some, V. O. Mung'ala, W. Mutemi, L. New, K. Marsh, C. Lengeler, and R. W. Snow, "Insecticide-treated bednets reduce mortality and severe morbidity from malaria among children on the Kenyan coast," *Tropical Medicine and International Health* 1, no. 2 (1996): 1,139–146; and A. Habluetzel, D. A. Diallo, F. Esposito, L. Lamizana, F. Pagnoni, C. Lengeler, C. Traoré, and S. N. Cousens, "Do insecticide-treated curtains reduce all-cause child mortality in Burkina Faso?," *Tropical Medicine and International Health* 2, no. 9 (1997): 855–62.
- ³⁷ "Megatrials show impregnated mosquito nets could save 500,000 African children a year – at very low cost," *TDR News* 50 (June 1996): 1–2.
- ³⁸ Des Chavasse, virtual interview by the author, September 20, 2022.
- ³⁹ Christian Lengeler, virtual interview by the author, October 11, 2022.
- ⁴⁰ Fred Binka, virtual interview by the author, October 4, 2022. For a discussion of the literature on this topic, see Moore-Sheeley (2017).
- ⁴¹ See, for example, Fred Binka, et al., "Mortality in a seven-and-a-half-year follow-up of a trial with insecticide-treated mosquito nets in Ghana," *Transactions of the Royal Society of Tropical Medicine and Hygiene* 96, no. 6

(2002): 597–99, and D. A. Diallo, et al., “Child mortality in a West African population protected with insecticide-treated curtains for a period of up to 6 years,” *Bulletin of the World Health Organization* 82, no. 2 (2004): 85–91.

- ⁴² This article demonstrated “real-world” implementation effectiveness, an important milestone beyond establishing efficacy in RCTs. See also G. Fink, et al., “Mosquito Net Use in Early Childhood and Survival to Adulthood in Tanzania,” *New England Journal of Medicine* 386 (2022): 428–36. This latter article demonstrated long-term survival benefits of ITNs in the same cohort as Schellenberg and coauthors’ 2001 article.
- ⁴³ “RBM Partnership Working Group on Insecticide Treated Netting Materials (ITNs),” presentation given at the inaugural meeting of the RBM Partnership Working Group on Insecticide Treated Netting Materials, Geneva, September 8–9, 2003.
- ⁴⁴ RBM has since rebranded as the RBM Partnership to End Malaria. For the purposes of this case study, it is referred to as RBM throughout.
- ⁴⁵ Conference agenda available from <https://web.archive.org/web/20060220005718/http://www.malaria.org/bnets/>.
- ⁴⁶ Halima Mwenesi, virtual interview by the author, October 26, 2022.
- ⁴⁷ Richard Feachem, virtual interview by the author, December 21, 2022.
- ⁴⁸ Abraham Mnzava, virtual interview by the author, November 17, 2022.
- ⁴⁹ This concern was most relevant before the advent of LLINs, which weaved the insecticide directly into the net fiber.
- ⁵⁰ Marcy Erskine, virtual interview by the author, October 25, 2022.
- ⁵¹ Claims of net misuse continued throughout the 2000s and 2010s; although people occasionally use nets for purposes other than malaria prevention, most people (~90 percent) use them as intended when they have access to them. See Chris Helfrich, “Reflecting on The New York Times Article,” United to Beat Malaria, June 8, 2017, <https://beatmalaria.org/blog/reflecting-on-the-new-york-times-article/>.
- ⁵² This paper was published in a peer-reviewed academic journal in 2010: Jessica Cohen and Pascaline Dupas, “Free Distribution or Cost-Sharing? Evidence from a Randomized Malaria Prevention Experiment,” *Quarterly Journal of Economics* 125, issue 1 (February 2010): 1–45, <https://doi.org/10.1162/qjec.2010.125.1.1>. The publication process in economics journals is notoriously long; consequently, it is common for scholars in the field to publicize their findings through working paper series during the peer-review process.
- ⁵³ Pascaline Dupas, virtual interview by the author, September 19, 2022.
- ⁵⁴ Note that WHO estimates for global malaria deaths during this period are much lower.
- ⁵⁵ Mnzava further noted that the 1992 Ministerial Conference on Malaria, hosted by the WHO, “only mentions vector control in passing” and omits any mention of entomological surveillance, “which is the basis for guiding the implementation of vector control.” See WHO (1992).
- ⁵⁶ These are rough figures; in the context of present-day insecticide resistance, greater coverage would most likely be required to achieve this effect.
- ⁵⁷ See, for example, Christopher F. Curtis and Abraham E. P. Mnzava, “Comparison of house spraying and insecticide-treated nets for malaria control,” *Bulletin of the World Health Organization* 78 (2000): 1,389–400, <https://www.scielosp.org/article/bwho/2000.v78n12/1389-1400/#ModalArticles>. See also Indira Nath, “Christopher Curtis (1939–2008),” *Nature*, June 18, 2008, <https://www.nature.com/articles/4531002a>.
- ⁵⁸ UN secretary-general Kofi Annan, for example, included the “proportion of children under 5 sleeping under insecticide-treated bednets” as an indicator for UN Millennium Development Goal 6 in 2000 to “combat HIV/AIDS, malaria and other diseases.” Target 6.C of Goal 6 was to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases; Indicator 6.7 was the proportion of children under 5 sleeping under insecticide-treated bednets. The other two malaria-related indicators were 6.6 (incidence and death rates associated with malaria) and 6.8 (the proportion of children under 5 with fever who are treated with appropriate antimalarial drugs). See “Millennium Development Goals Indicators,” United Nations, last modified March 22, 2023, <https://millenniumindicators.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm>.

- ⁵⁹ John Simon, virtual interview by the author, October 25, 2022.
- ⁶⁰ The Alliance for Malaria Prevention, for example, was formed in 2004 to provide technical support for ITN delivery. The alliance is a sub-workstream of RBM's Country/Regional Support Partner Committee. "Who We Are," Alliance for Malaria Prevention, accessed July 20, 2023, <https://allianceformalariaprevention.com/about/who-we-are/>.
- ⁶¹ "Essential Programme on Immunization," World Health Organization, accessed May 20, 2023, <https://www.who.int/teams/immunization-vaccines-and-biologicals/essential-programme-on-immunization>.
- ⁶² Tony Kopetchny, "Aid Effectiveness: A Debate Between Steve Radelet and William Easterly," Center for Global Development, November 27, 2006, <https://www.cgdev.org/blog/aid-effectiveness-debate-between-steve-radelet-and-william-easterly>.
- ⁶³ In the first chapter, Easterly also says of Sachs, "His intellectual solutions are less convincing."
- ⁶⁴ Kopetchny, "Aid Effectiveness." See also: Michael Clemens and Todd Moss, "What's Wrong with the Millennium Development Goals?" Center for Global Development, September 12, 2005, <https://www.cgdev.org/publication/whats-wrong-millennium-development-goals>.
- ⁶⁵ Children under 5 were among the primary target population (along with pregnant people) for ITN coverage, because mortality rates were highest among this cohort.
- ⁶⁶ Alliance for Malaria's Net Mapping Project.
- ⁶⁷ ITNs, specifically LLINs, are expected to last about three years, meaning mass distribution campaigns should not, in theory, be required annually. Consequently, global distribution numbers have ebbed and flowed since the early 2010s.
- ⁶⁸ Our World in Data, "Malaria."
- ⁶⁹ In 1996, WHO regional director for Africa Ebrahim Samba and World Bank director for health, nutrition and population Richard Feachem proposed approaches to addressing malaria; among them was "an African malaria initiative" to incentivize "well-focused malaria research investments leading to new products and tools which could be rapidly tested and applied in major ongoing control programmes." This idea contributed to the Multilateral Initiative on Malaria. From Richard Feachem, "Roll Back Malaria: an historical footnote," *Malaria Journal* 17 (2018): 433. For more on the Multilateral Initiative on Malaria, see Miller (2010).
- ⁷⁰ World Health Organization, *The Abuja Declaration and the Plan of Action: An Extract from the African Summit on Roll Back Malaria*, WHO/CDS/RBM/2000.17 (April 25, 2000).
- ⁷¹ UN General Assembly, 57/294, 2001–2010: Decade to Roll Back Malaria in Developing Countries, Particularly in Africa, A/RES/57/294 (December 2002), <https://digitallibrary.un.org/record/482284?ln=en>.
- ⁷² "Roll Back Malaria: Report by the Director-General," World Health Organization, April 1999, https://apps.who.int/gb/ebwaha/pdf_files/WHA52/ew6.pdf.
- ⁷³ "Dr Gro Harlem Brundtland, Director-General Elect, The World Health Organization: Speech to the Fifty-first World Health Assembly," World Health Organization, May 13, 1998, <https://apps.who.int/iris/bitstream/handle/10665/79896/eadv6.pdf>.
- ⁷⁴ "The Abuja Declaration on Roll Back Malaria in Africa," African Union, April 2000, https://au.int/sites/default/files/pages/32894-file-2000_abuja_declaration.pdf.
- ⁷⁵ Des Chavasse, email correspondence with the author, October 6, 2022.
- ⁷⁶ Lancet Editorial Board, "Reversing the Failures of Roll Back Malaria," *The Lancet*, April 23, 2005, [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(05\)66391-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(05)66391-X/fulltext). See also New York Times Editorial Board, "How Not to Roll Back Malaria," *New York Times*, October 16, 2005, <https://www.nytimes.com/2005/10/16/opinion/how-not-to-roll-back-malaria.html>.
- ⁷⁷ Daphna Berman, "An Accidental Health Economist Talks Education, Bill Gates, and Why Impact Evaluation Isn't Enough," World Bank Blogs, May 15, 2018, <https://blogs.worldbank.org/education/accidental-health-economist-talks-education-bill-gates-and-why-impact-evaluation-isn-t-enough>.

- ⁷⁸ Malcolm G. Farley, "How Can We Sustain the Child Survival Revolution?," UNICEF, February 16, 2017, <https://www.unicefusa.org/stories/how-can-we-sustain-child-survival-revolution>.
- ⁷⁹ David McGuire, virtual interview by the author, September 22, 2022.
- ⁸⁰ McArthur further noted that the estimated minimum per capita spending required to meet basic health services for all (about \$35 per capita) was an order of magnitude greater than what most African countries spent on health at the start of the 2000s (about \$4–5 per capita). This disparity contributed to the sense among some academics and policymakers that achieving health services for all was too "radical" to be feasible, according to McArthur. McArthur, along with Lengeler, also credited the 2000–01 Commission on Health and Macroeconomics process with "kick-starting" (as Lengeler put it) the Global Fund design. Other evidence supports this view; the commission's precise role in the formation of the Global Fund, however, has not been thoroughly investigated.
- ⁸¹ Roser and Ritchie, "HIV/AIDS." See also *Report on the Global HIV/AIDS Epidemic* (Geneva: UNAIDS, 2002).
- ⁸² Josh Michaud, Kellie Moss, and Jennifer Kates, "The U.S. Government and Global Health Security," Kaiser Family Foundation, May 2021, <https://www.kff.org/global-health-policy/issue-brief/the-u-s-government-and-global-health-security/>.
- ⁸³ See "Millennium Development Goals Indicators."
- ⁸⁴ The path to including malaria in the MDGs and including ITN use as an indicator for MDG 6 was not investigated in depth for this case study; further research into how exactly this happened would likely yield additional fruitful insights.
- ⁸⁵ Going into the early 2000s, and against a backdrop of low development spending, numerous economists and US policymakers advocated against providing AIDS treatment to poor people. See Paul Farmer, "An Anthropology of Structural Violence," *Current Anthropology* 45, no. 3 (2004): 305–25. Put more damningly, in the early 2000s, "the conventional wisdom within health economics was that sending AIDS drugs to Africa was a waste of money." From Justin Sandefur, "How Economists Got Africa's AIDS Epidemic Wrong," Center for Global Development, May 31 2023, <https://www.cgdev.org/blog/how-economists-got-africas-aids-epidemic-wrong>. See also Amanda Taub, "When Politics Saves Lives: a Good-News Story," *New York Times*, June 7, 2023, <https://web.archive.org/web/20230607180059/https://www.nytimes.com/2023/06/07/world/africa/interpreter-hiv-aids-drugs-bush.html>.
- ⁸⁶ "Paul Farmer: 'Accompaniment' As Policy," *Harvard Magazine*, May 25, 2011, <https://www.harvardmagazine.com/2011/05/paul-farmer-accompaniment-as-policy>.
- ⁸⁷ Individual Members of the Faculty of Harvard University, "Consensus statement on antiretroviral treatment for AIDS in poor countries," March 2001, <https://www.iasusa.org/wp-content/uploads/2001/06/9-2-14.pdf>. See also John Cohen, "A Call for Drugs," *Science*, April 6, 2001, <https://www.science.org/content/article/call-drugs>.
- ⁸⁸ Throughout the aughts, however, some development economists continued to argue against providing HIV/AIDS treatment in Africa on the basis of cost. See, for example, Emily Oster, "Treating HIV Doesn't Pay," *Forbes*, July 25 2005, <https://www.forbes.com/forbes/2005/0725/044.html?sh=7bb0873b68a4>.
- ⁸⁹ "Time to put malaria control on the global agenda," *Nature* 386, 6625 (1997): 535–36, <https://www.nature.com/articles/386535a0>.
- ⁹⁰ Melanie Renshaw, virtual interview by the author, September 28, 2022.
- ⁹¹ "The U.S. & The Global Fund to Fight AIDS, Tuberculosis and Malaria," Kaiser Family Foundation, September 9, 2022, <https://www.kff.org/global-health-policy/fact-sheet/the-u-s-the-global-fund-to-fight-aids-tuberculosis-and-malaria/>.
- ⁹² "Monterrey Conference," United Nations Department of Economic and Social Affairs: Financing, accessed June 15, 2023, <https://www.un.org/esa/ffd/overview/monterrey-conference.html>.
- ⁹³ McArthur also credited *The Lancet*, under Richard Horton's leadership, with helping to "galvanize" efforts around the MDGs, starting with the 2003 series on child survival led by Robert Black; see Sarah Venis, "Child Survival," *The Lancet* 361 (June 2003): 9376. *The Lancet*, in McArthur's view, "created a bullseye for debates" around the MDGs and helped show what "was possible through known interventions."

- ⁹⁴ Jim Yong Kim also worked closely with Paul Farmer and was among the group that helped launch Partners in Health.
- ⁹⁵ Draft speech quoted in Donald G. McNeil Jr., “An Iron Fist Joins the Malaria Wars,” *New York Times*, June 27, 2006, <https://www.nytimes.com/2006/06/27/health/27prof.html>.
- ⁹⁶ According to McArthur, this fed into commitments made in 2005 at the 31st G8 summit at Gleneagles and the UN World Summit. Among other commitments, participating countries resolved “to urgently identify and implement country-led initiatives with adequate international support ... We will take such action as the distribution of malaria bed nets, including free distribution, where appropriate.” See UN General Assembly, 60/1, 2005 World Summit Outcome, A/RES/60/1, https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_60_1.pdf.
- ⁹⁷ Experts interviewed unanimously agreed that funding was the number-one constraint.
- ⁹⁸ Or, “in popular terms, the Hollywood film, *The Titanic*, had a production budget twice as much as the worldwide total of international aid for malaria control” in 2000. From Narasimhan and Attaran (2003).
- ⁹⁹ Between 1993 and 2004, funding for malaria research and development nearly doubled, up to \$323 million in 2004, yet this amount still fell far short relative to the disease burden. See *Malaria Research & Development: An Assessment of Global Investment* (Malaria R&D Alliance, 2005).
- ¹⁰⁰ “Financing Global Health,” University of Washington Institute for Health Metrics and Evaluation, accessed November 1, 2023, <http://vizhub.healthdata.org/fgh/>.
- ¹⁰¹ “Financing Global Health,” Institute for Health Metrics and Evaluation.
- ¹⁰² “The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR),” Kaiser Family Foundation, July 26, 2023, <https://www.kff.org/global-health-policy/fact-sheet/the-u-s-presidents-emergency-plan-for-aids-relief-pepfar/>. Additional research into the lobbying efforts surrounding the preparation and passage of this act would likely yield further insights.
- ¹⁰³ For a discussion of PEPFAR’s role in bringing down the prices of antiretrovirals over time, see Sandefur, “How Economists Got Africa’s AIDS Epidemic Wrong.”
- ¹⁰⁴ For a history of the term “neglected tropical diseases” and the accompanying movement to address them, see David H. Molyneux, Anarfi Asamoah-Bah, Alan Fenwick, Lorenzo Savioli, and Peter Hotez, “The history of the neglected tropical disease movement,” *Transactions of The Royal Society of Tropical Medicine and Hygiene* 115, no. 2 (February 2021): 169–75, <https://doi.org/10.1093/trstmh/tra015>.
- ¹⁰⁵ “Address by Kofi Annan to the African Summit on HIV/AIDS, Tuberculosis and Other Infectious Diseases,” United Nations, April 26, 2001, <https://www.un.org/sg/en/content/sg/speeches/2001-04-26/address-kofi-annan-african-summit-hivaids-tuberculosis-and-other>. Sachs has also been credited with proposing the idea for a “global fund” in 2000 (see Amir Attaran and Jeffrey Sachs, “Defining and refining international donor support for combating the AIDS pandemic,” *The Lancet* 357, 9249 [January 2001]), when he discussed the failures of existing financing at the International AIDS Conference in Durban (“Interview with Jeffrey Sachs,” PBS, accessed May 15, 2023, <https://www.pbs.org/wgbh/pages/frontline/aids/interviews/sachs.html>). Who exactly deserves credit for first proposing the idea of a global fund is unclear, and neither Annan nor Sachs may have been the first to propose an innovative global health financing mechanism such as the Global Fund (this thread of analysis, however, was not pursued in depth for this case study).
- ¹⁰⁶ “History of the Global Fund,” The Global Fund, accessed May 5, 2023, <https://www.theglobalfund.org/en/about-the-global-fund/history-of-the-global-fund/>.
- ¹⁰⁷ Notably, the WHO, USAID, and others resisted the idea of providing treatment in low-income countries. See “Interview: Kofi Annan,” Frontline, accessed May 5, 2023, <https://www.pbs.org/wgbh/pages/frontline/aids/interviews/annan.html>.
- ¹⁰⁸ Feachem described this as a “fertile area” for further analysis: “How were the various parties aligned or not aligned, who was pulling in which direction, how was malaria added on, what was the business model early in the life of the Global Fund and how did that change with time—I think those are all largely untold stories.”
- ¹⁰⁹ Jessica Rockwood, virtual interview by the author, October 13, 2022.

- ¹¹⁰ Regina Rabinovich, virtual interview by the author, December 20, 2022.
- ¹¹¹ Awa Marie Coll-Seck, virtual interview by the author, November 8, 2022.
- ¹¹² Mark Grabowsky, virtual interview by the author, November 9, 2022.
- ¹¹³ Per email correspondence with Renshaw, October 8, 2022. See also “Roll Back Malaria partners set ambitious financial targets for 19 African countries fighting malaria,” Global Fund, April 23, 2007, <https://www.theglobalfund.org/en/news/2007/2007-04-23-roll-back-malaria-partners-set-ambitious-financial-targets-for-19-african-countries-fighting-malaria>.
- ¹¹⁴ This function within the RBM Partnership is currently called the Country/Regional Support Partner Committee.
- ¹¹⁵ “Roll Back Malaria partners set ambitious financial targets for 19 African countries fighting malaria,” Global Fund.
- ¹¹⁶ When it formed, the Global Fund instituted the TRP to support the application review process. For more information, see “Technical Review Panel,” Global Fund, accessed September 5, 2023, <https://www.theglobalfund.org/en/technical-review-panel/>.
- ¹¹⁷ Martin Edlund, virtual interview by the author with Edlund, Alan Court, and a former World Bank malaria program staff member, March 30, 2023.
- ¹¹⁸ “Malaria Strategy,” presentation given at the Global Fund 16th Board Meeting, Kunming, November 12–13, 2007.
- ¹¹⁹ “Board of the Global Fund approves US\$ 1.1 billion in new grants,” Global Fund, November 12, 2007, <https://www.theglobalfund.org/en/news/2007/2007-11-12-board-of-the-global-fund-approves-usd-1-1-billion-in-new-grants/>. See also *Annual Report 2006* (Geneva: Global Fund, 2007).
- ¹²⁰ “Roll Back Malaria partners set ambitious financial targets for 19 African countries fighting malaria,” Global Fund.
- ¹²¹ “Soon, nearly every family with children in Africa could have a bed net to protect against malaria,” Global Fund, November 27, 2007, <https://www.theglobalfund.org/en/news/2007/2007-11-27-soon-nearly-every-family-with-children-in-africa-could-have-a-bed-net-to-protect-against-malaria/>.
- ¹²² “Roll Back Malaria partners set ambitious financial targets for 19 African countries fighting malaria,” Global Fund. PMI and the World Bank provided most of the rest.
- ¹²³ Of the remaining share of global malaria funding (from donors), PMI contributed 15 percent, the World Bank 8 percent, and other donors 7 percent (Johansson et al. 2010).
- ¹²⁴ “In February 2002 the MoH responded to the first call of the Global Fund to Fight AIDS, TB and Malaria (GFATM) for funding applications to secure five million nets and net treatments to provide free of charge to children under the age of 5 y and pregnant women. This application was unsuccessful.” In Noor et al. (2007, 1,342).
- ¹²⁵ For a discussion of this reality and how all development agencies face similar issues, see Nandini Oomman, “What Can We Learn from the Global Fund’s ‘Massive Fraud’?” Center for Global Development, January 25, 2011, <https://www.cgdev.org/blog/what-can-we-learn-global-fund%E2%80%99s-%E2%80%9Cmassive-fraud%E2%80%9D>.
- ¹²⁶ The Global Fund credits the Red Cross’s advocacy in its decision to approve the Niger grant: “The Red Cross worked with other partners in Niger to secure Global Fund funding for a massive distribution of” nets. The Canadian International Development Agency and Canadian, American, and Norwegian Red Cross Societies also provided financial support for this campaign.
- ¹²⁷ “Global Fund-supported programs deliver AIDS treatment for 3 million people,” Global Fund, December 1, 2010, <https://www.theglobalfund.org/en/news/2010/2010-12-01-global-fund-supported-programs-deliver-aids-treatment-for-3-million-people/>.
- ¹²⁸ Awa Marie Coll-Seck and Raymond G. Chambers, “Achieving Universal Coverage to End Malaria Deaths: A Discussion with the Global Fund Board,” RBM Partnership, April 29, 2008, https://www.theglobalfund.org/media/3689/bm17_otherrbm_presentation_en.pdf.

- ¹²⁹ “The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR),” Kaiser Family Foundation. PEPFAR has since become “the largest commitment by any nation to address a single disease in the world,” having committed more than \$110 billion for HIV/AIDS between 2003 and 2023.
- ¹³⁰ Historically, USG investments in malaria after the end of the Malaria Eradication Programme were largely “motivated by the military” and “focused on vaccines or drugs that could protect overseas soldiers” deployed in malaria-endemic regions, according to Moore-Sheeley. For more of this history, see Lynn W. Kitchen, David W. Vaughn, and Donald R. Skillman, “Role of US Military Research Programs in the Development of US Food and Drug Administration–Approved Antimalarial Drugs,” *Clinical Infectious Diseases* 43, Issue 1 (July 2006): 67–71.
- ¹³¹ Alan Court, virtual interview by the author with Court, Edlund, and a former malaria program staff member, March 30, 2023.
- ¹³² See also John W. McArthur, “Own the Goals: What the Millennium Development Goals Have Accomplished,” Brookings Institution, February 21, 2013, <https://www.brookings.edu/articles/own-the-goals-what-the-millennium-development-goals-have-accomplished/>.
- ¹³³ The Academy for Educational Development, through which NetMark operated, produced a case study on NetMark in 2005: *NetMark: A Case Study In Sustainable Malaria Prevention Through Partnership with Business* (Washington, DC: Academy for Educational Development, 2005).
- ¹³⁴ See also RBM, WHO, and UNICEF (2005).
- ¹³⁵ See also *External Project Evaluation of The NetMark Plus Malaria Social Marketing Program: Final Report 2008* (Washington, DC: The Mitchell Group, 2008). That evaluation states, “Disregarding for the moment the ultra-poor who appear unable to even pay 2 birr, the evaluation found that the moderately poor may be able to pay 10–20 birr and the less poor 30–60 birr for an ITN. However, the full price of an in-country LLIN ranges from 75 to 100 birr” (24). And, “There may not be enough wealthy people at risk of malaria in Ethiopia to keep private-sector nets afloat, especially when it is not possible to enforce a clear rural-urban segmentation in the program.”
- ¹³⁶ See also Hong Cheng, Philip Kotler, and Nancy R. Lee, eds., *Social Marketing for Public Health: Global Trends and Success Stories* (Burlington, MA: Jones and Bartlett Publishers, 2009). A case study on NetMark in Nigeria reported that management and administration and advertising/promotions/distribution made up about 52 percent of the 2001–2008 program budget, while vouchers / free ITNs made up about 26 percent.
- ¹³⁷ Donald G. McNeil Jr., “A Program to Fight Malaria in Africa Draws Questions,” *New York Times*, June 11, 2005, <http://web.archive.org/web/20210217195226/https://www.nytimes.com/2005/06/11/science/a-program-to-fight-malaria-in-africa-draws-questions.html>. See also Roger Bate and Benjamin Schwab, “The Blind Hydra: USAID Policy Fails to Control Malaria” (working paper 108, American Enterprise Institute, May 2005), https://www.aei.org/wp-content/uploads/2011/10/20050525_usaidpaper.pdf.
- ¹³⁸ “Global Malaria Control: U.S. and Multinational Investments and Implementation Challenges,” US Government Accountability Office, November 2005, <https://www.gao.gov/assets/gao-06-147r.pdf>.
- ¹³⁹ Neglected Diseases in East Asia: Are Public Health Programs Working?, 108th Cong. (2004), <https://www.govinfo.gov/app/details/CHRG-108shrg21964/summary>.
- ¹⁴⁰ McNeil Jr., “A Program to Fight Malaria in Africa Draws Questions.”
- ¹⁴¹ Nearly a quarter million people across India, Indonesia, Sri Lanka, Thailand, and 10 other countries perished in the 2004 Indian Ocean earthquake and tsunami. In addition to lives lost, the disaster caused severe destruction and economic damage in the region.
- ¹⁴² “Secretary-General Kofi Annan and UN’s Emergency Relief Coordinator Jan Egeland at press conference on Asian Tsunami disaster,” United Nations, December 30, 2004, <https://www.un.org/sg/en/content/sg/press-encounter/2004-12-30/secretary-general-kofi-annan-and-uns-emergency-relief>. Secretary of State Colin Powell appeared on Good Morning America shortly after the tsunami and (falsely) claimed that “the United States has given more aid in the last four years than any other nation or combination of nations in the world” in response to criticism of the USG’s initial response. “Interview on ABC’s Good Morning America With Christopher Cuomo,” US Department of State, December 28, 2004, <https://2001-2009.state.gov/secretary/former/powell/remarks/40071.htm>.
- ¹⁴³ New York Times Editorial Board, “Are We Stingy? Yes,” *New York Times*, December 30, 2004, <https://www.nytimes.com/2004/12/30/opinion/are-we-stingy-yes.html>.

- ¹⁴⁴ Awash Teklehaimanot of Columbia University, a malaria specialist and cochair of the UN Millennium Project Task Force working group on malaria, also helped draft the memo, according to McArthur.
- ¹⁴⁵ See, for example, Jeffrey Sachs, “Consequences of the Iraq War,” Project Syndicate, March 25, 2003, <https://www.project-syndicate.org/commentary/consequences-of-the-iraq-war-2003-03>.
- ¹⁴⁶ McNeil Jr., “An Iron Fist Joins the Malaria Wars.”
- ¹⁴⁷ Gerson passed away in November 2022. Both he and Bush applied a “compassionate conservative” lens to foreign aid. See John Dilulio, Jr., “Michael J. Gerson and the Duty of Philanthropy,” *HistPhil*, January 12, 2023, <https://histphil.org/2023/01/12/michael-j-gerson-and-the-duty-of-philanthropy/>. Multiple sources in the literature cite the “moral” rather than the economic argument as decisive in mobilizing the Bush administration to create PEPFAR. See also Sandefur, “How Economists Got Africa’s AIDS Epidemic Wrong,” and Taub, “When Politics Saves Lives.”
- ¹⁴⁸ Elizabeth Becker and David E. Sanger, “Bush Maintains Opposition to Doubling Aid for Africa,” *New York Times*, June 2, 2005, <https://www.nytimes.com/2005/06/02/politics/bush-maintains-opposition-to-doubling-aid-for-africa.html>.
- ¹⁴⁹ There is also evidence that both Bush and Blair may have used the 2005 summit as an opportunity to divert attention from the US and UK involvement in the Iraq War. Under Blair, for example, the UK quadrupled arms sales to Africa before the G8 meeting. See Kamal Ahmed, “British Arms Sales to Africa Soar,” *The Guardian*, February 3, 2002, <https://www.theguardian.com/politics/2002/feb/03/uk.world>. See also “Gleneagles, United Kingdom,” Global Policy Forum, accessed April 25, 2023, <https://archive.globalpolicy.org/component/content/article/209-bwi-wto/42866-gleneagles-united-kingdom.html>.
- ¹⁵⁰ In addition to advances in malaria prevention (nets) and antimalarial treatment (ACTs), advances were made in malaria diagnosis (rapid tests) and testing and prophylactic treatment during pregnancy.
- ¹⁵¹ Wendy Woods and Jay Winsten, “Resetting the Roll Back Malaria Campaign,” Boston Consulting Group, May 23, 2011, <https://www.bcg.com/publications/2011/resetting-roll-back-malaria-campaign>.
- ¹⁵² “U.S. Global Health Budget Tracker,” Kaiser Family Foundation, accessed April 25, 2023, <https://www.kff.org/interactive/u-s-global-health-budget-tracker/>.
- ¹⁵³ Several experts, including Ziemer, credited Laura Bush for her role in orchestrating the summit and for personally appealing to congresspeople for the formation of the Congressional Malaria Caucus after the summit. In Edlund’s view, Laura Bush, “her office, and her team, and that human side of it, also helped move” forward the USG’s role in ITN scaleup.
- ¹⁵⁴ Another source familiar with the summit speculated that it also helped get other agencies, such as the World Bank, more invested in malaria control; the World Bank eventually committed \$1.1 billion in 2008 to expand its Booster Program to support “rapid scale-up of malaria programs,” including ITN distribution campaigns. It is unclear, however, whether a direct line can be traced between these two events. See Dana Christiansen, “World Leaders Commit Record Billions to Tackle Malaria,” United Nations, September 25, 2008, <https://www.un.org/millenniumgoals/2008highlevel/pdf/pr/PERU.pdf>.
- ¹⁵⁵ In 2008 *Wall Street Journal* coverage of Malaria No More, journalist Robert Guth wrote that Chambers and Chernin “framed the malaria battle in the language of business and economics—describing the effects of the malaria not only in the human toll but also in terms of its impact on Africa’s GDP.” Robert A. Guth, “Big Guns Enter Malaria Fight,” *Wall Street Journal*, September 26, 2008, <https://www.wsj.com/articles/SB122239705351678029>. As previously discussed, describing the economic impact of malaria was important for generating political will and investment from aid agencies and governments.
- ¹⁵⁶ Multiple other experts consulted for this case study recalled Sachs showing this photo in presentations.
- ¹⁵⁷ At the time, Sachs was also special advisor to Ban Ki-moon. Additional interviews with Chan, Ban, and their staff would help shed further light on the decision to appoint a special envoy for malaria and its impact on ITN scaleup.
- ¹⁵⁸ Kellie Moss and Jennifer Kates, “The U.S. Congress and Global Health: A Primer,” Kaiser Family Foundation, November 11, 2021, <https://www.kff.org/global-health-policy/report/the-u-s-congress-and-global-health-a-primer/>. See also Tom Lantos and Henry J. Hyde United States Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act of 2008, Pub. Law No 110-293 (2008).

- ¹⁵⁹ In PMI's first four years, it procured almost 28 million ITNs, distributed more than 19 million ITNs, and sold or delivered through voucher programs another 8 million (PMI 2010, 12).
- ¹⁶⁰ CIDA and the Canadian Red Cross funded the first national integrated ITN campaigns in Zambia in 2003 and Togo in 2004, among other campaigns discussed in this case study. The Canadian government also funded the "Accelerated Child Survival and Development initiative in 11 countries in West and Central Africa in 2002," which included free or highly subsidized ITNs delivered to pregnant women and young children. See RBM, WHO, and UNICEF (2005). Between 2003 and mid-2007, CIDA distributed CAD\$43 million to partners including the Canadian Red Cross for ITN distribution in Africa. See "Departmental Performance Report," Canadian International Development Agency, 2007, <https://www.tbs-sct.canada.ca/dpr-rmr/2006-2007/inst/ida/ida-eng.pdf>.
- ¹⁶¹ Between 2002 and 2004, UNICEF procured 4 to 5 million ITNs annually (i.e., most ITNs procured during that period); by 2005, it had procured between 15 and 20 million. See UNICEF Supply Division (2020). In 2006, UNICEF procured 25 million nets, valued at \$116 million; 92 percent of these were LLINs. See "Supply Annual Report," UNICEF, June 2007, <https://www.unicef.org/supply/reports/supply-annual-report-2006>.
- ¹⁶² Celia W. Dugger, "World Bank Failed in Fight Against Malaria, Health Experts Say," *New York Times*, April 25, 2006, <https://www.nytimes.com/2006/04/25/world/africa/world-bank-failed-in-fight-against-malaria-health-experts-say.html>. See also "World Bank Failed in Malaria Control Efforts, Experts Say," KFF Health News, June 11, 2009, <https://khn.org/morning-breakout/dr00036836/>; and Amir Attaran, Karen Barnes, Roger Bate, et al., "The World Bank: false financial and statistical accounts and medical malpractice in malaria treatment," *The Lancet* 368 (April 2006): 9,531.
- ¹⁶³ Christiansen, "World Leaders Commit Record Billions to Tackle Malaria."
- ¹⁶⁴ Other donors provided the remaining 7 percent (Johansson et al. 2010).
- ¹⁶⁵ The Gates Foundation invested in private-public partnerships such as the Medicines for Malaria Venture and the Innovative Vector Control Consortium, in addition to PATH's Malaria Vaccine Initiative.
- ¹⁶⁶ O'Meara and Binka, for example, shared this view; Binka also thought that the foundation's investments in malaria research were beneficial at a time when most malaria funding was going toward commodities rather than new tools, as "malaria tools are and always have been imperfect."
- ¹⁶⁷ Arata Kochi, the WHO's malaria chief from 2006 to 2008, circulated a memorandum citing potentially "far-reaching, largely unintended consequences" of Gates funding to WHO director-general Margaret Chan and health agency department heads "with a note asking whether they were having similar struggles with the Gates Foundation"; from Donald G. McNeil Jr., "Gates Foundation's Influence Criticized," *New York Times*, February 16, 2008, <https://www.nytimes.com/2008/02/16/science/16malaria.html>. Although beyond the scope of this case study, further research on the Gates Foundation's influence in malaria control would likely yield additional insights. See also Julian Eckl, "The power of private foundations: Rockefeller and Gates in the struggle against malaria," *Global Science Policy* 14, no. 1 (April 204): 91–116, <http://dx.doi.org/10.1177/1468018113515978>.
- ¹⁶⁸ Before the formal creation of the Global Fund, Bill Gates committed \$100 million through the foundation, though he framed this commitment in terms of addressing HIV/AIDS. See Jacquelline Fuller, "Bill & Melinda Gates Foundation Announces \$100 Million Commitment to the Global Fund For AIDS and Health," Gates Foundation, June 2001, <https://www.gatesfoundation.org/ideas/media-center/press-releases/2001/06/global-fund-for-aids>.
- ¹⁶⁹ "Nothing But Nets," *Philanthropy News Digest*, May 13, 2008, <https://philanthropynewsdigest.org/features/on-the-web/nothing-but-nets>.
- ¹⁷⁰ One example: the Gates Foundation launched a \$35 million, nine-year partnership in 2005 in Zambia "to serve as a model for how other African nations can cut malaria deaths dramatically" by scaling up ITNs, IRS, and ACTs. The Global Fund, USAID/PMI, and UNICEF/WHO funded most of Zambia's scaleup efforts. See Elizabeth Chizema-Kawesha, John M. Miller, Richard W. Steketee, Victor M. Mukonka, Chilandu Mukuka, Abdurahman D. Mohamed, Simon K. Miti, and Carlos C. Campbell, "Scaling up malaria control in Zambia: progress and impact 2005-2008," *American Journal of Tropical Medicine and Hygiene* 83, no. 3 (September 2010): 480–88. See also "New Partnership Launched to Accelerate and Evaluate National Malaria Control Program in Africa," Bill & Melinda Gates Foundation, <https://www.gatesfoundation.org/ideas/media-center/press-releases/2005/05/new-partnership-evaluating-malaria-control>. As mentioned elsewhere in this case study,

partnership and coordination among actors enabled scaleup, in part because “no organization has the resources to scale interventions everywhere,” in Rabinovich’s words. Direct product procurement was also, of course, not the only important component of scaleup requiring resources; evidence generation and research, for example, also required funding.

¹⁷¹ “Malaria Forum: Prepared Remarks by Melinda French Gates, Co-Chair,” Gates Foundation, October 17, 2007, <https://www.gatesfoundation.org/ideas/speeches/2007/10/melinda-french-gates-malaria-forum>.

¹⁷² See, for example, Richard Feachem and Oliver Sabot, “A new global malaria eradication strategy,” *The Lancet* 371 (2008): 1,633–635.

¹⁷³ The UK-based foundation the Wellcome Trust also funded malaria research throughout the 1980s and 1990s.

¹⁷⁴ Saldanha and O’Sullivan, “UK pledges money for WHO malaria initiative.”

¹⁷⁵ At the 2008 MDG Malaria Summit, for example, the DFID committed £40 million, large by 2000 standards, but by 2008 this pledge was small relative to the Global Fund’s \$1.62 billion and the World Bank’s \$1.1 billion pledges. See Christiansen, “World Leaders Commit Record Billions to Tackle Malaria.”

¹⁷⁶ Will Woodward, “Tories pledge \$1bn a year to wipe out malaria,” *The Guardian*, January 15, 2007, <https://www.theguardian.com/politics/2007/jan/15/uk.conservatives>.

¹⁷⁷ “British Prime Minister Brown Pledges \$200 million for ITNs To Fight Malaria in Africa,” KFF Health News, accessed March 15, 2023, <https://khn.org/morning-breakout/dr00051442/>.

¹⁷⁸ “Brown in 100m war on malaria,” Malaria Consortium, April 2008, <https://www.malariaconsortium.org/news-centre/brown-in-100m-war-on-malaria.htm>.

¹⁷⁹ In this section, “user fees,” “cost-sharing,” and “social marketing” are used somewhat interchangeably; although these terms mean different things, they are treated as roughly conceptually equivalent here, as all result in people being charged for health products and services.

¹⁸⁰ Rob Yates, virtual interview by the author, September 20, 2022; Rowden (2013).

¹⁸¹ See also Moore-Sheeley (2017) for a more comprehensive examination of neoliberalism’s role in health policy choices during the eighties and nineties and its influence in malaria control. Moore-Sheeley also noted in conversation an increased focus on community-led interventions in the late 20th century, which “was partially a response to top-down [MEP and immunization] campaigns, which ran without the consent of communities.”

¹⁸² Economic policies adopted by Margaret Thatcher in the UK and Ronald Reagan in the US in the 1980s institutionalized this kind of theorizing. For a discussion of factors leading up to the World Bank, DFID, and USAID’s promotion of health user fees and the eventual decision to abolish them, see Rowden (2013). Grabowsky also noted that in the US context, the debate around giving free nets in mass campaigns as opposed to selling them through social marketing “came out of an era when [US president] Bill Clinton ended welfare as we know it,” alongside a long history where “personal responsibility dominated thinking.”

¹⁸³ Economists Nancy Birdsall and David de Ferranti, for example, were particularly influential in the 1980s and 1990s in promoting the idea of health user fees at the World Bank and bilateral aid agencies. See Rowden (2013).

¹⁸⁴ “Financing Global Health,” Institute for Health Metrics and Evaluation.

¹⁸⁵ Women and children “in many households are not always prioritized or in control of family finances,” Moore-Sheeley noted, meaning those most at risk of severe malaria may not be the ones sleeping under or buying a net if there is only one net per household (which is also part of why a minimum of two nets per household became the coverage target in many campaigns).

¹⁸⁶ According to McArthur, some senior economists at the time argued that countries had to choose between investing in health or education first, premised on a view that governments could not do both at once.

¹⁸⁷ Evidence of this can be seen, for example, in World Bank president Jim Kim’s 2013 speech on UHC citing Thailand’s policy shift as an illustrative example of why UHC was the way forward on health financing. See “Speech by World Bank Group President Jim Yong Kim at the Government of Japan-World Bank Conference on Universal Health Coverage,” World Bank Group, December 6, 2013, <https://www.worldbank.org/en/news/speech/2013/12/06/speech-world-bank-group-president-jim-yong-kim-government-japan-conference-universal-health-coverage>.

- ¹⁸⁸ “The impact of price on take-up and use of preventive health products,” J-PAL, last updated May 2018, <https://www.povertyactionlab.org/policy-insight/impact-price-take-and-use-preventive-health-products>.
- ¹⁸⁹ Alliance for Malaria’s Net Mapping Project.
- ¹⁹⁰ He further stated that he left the London School of Hygiene and Tropical Medicine “to join PSI purely to join an organization with the capacity to deliver nets at scale” after studying how to do so with DFID funding at the London School in the late 1990s. See also Reed, Chavasse, and Attawell (1999).
- ¹⁹¹ In PSI’s Kenya program, for example, “the world’s largest [ITN] social marketing programme,” fully subsidized (i.e., free) nets were not provided through the clinic distribution channel until 2007, following Abuja target increases. See “PSI/Kenya insecticide-treated net social marketing programme,” NSMC, accessed May 10, 2023, <https://www.thensmc.com/resources/showcase/psikenya-insecticide-treated-net-social-marketing-programme>. See also “Free Malaria Bednets,” Innovations for Poverty Action, accessed June 1, 2023, <https://poverty-action.org/free-malaria-bednets>.
- ¹⁹² “With the levels of public funding that was available” before 2002, PSI still achieved “fairly good coverage,” in Chavasse’s view, but recognized that that coverage was “not enough, we did need serious money, they [nets] did need to be free, did need to go through campaign-style, we know that now.” But, critically, “without that money” that was subsequently mobilized through the Global Fund and later PMI, the feasibility of mass free distribution campaigns was all “theoretical,” in Chavasse’s view.
- ¹⁹³ Chavasse also said that PSI “became experts in Global Fund rules, regulations, and processes, and trained staff and embedded them in ministries of health.” See the Global Fund’s [Price and Quality Reporting database](#) for a comprehensive record of agents and intermediaries for ITN purchases.
- ¹⁹⁴ Such an analysis might also answer the following open question: What percentage of malaria grants approved before 2006 was for social marketing (if any) and what percentage was for free net campaigns? See the Global Fund’s [Data Explorer](#) for records of previous grant amounts, implementing partners, locations, and components. Given the Global Fund’s “radically passive,” demand-driven model and evidence presented elsewhere that countries themselves generally did not advocate for social marketing or ask for social marketing in their malaria grant applications, it seems PSI implemented social marketing for ITNs more through DFID funding than through the Global Fund.
- ¹⁹⁵ See this case study’s “Changing Coverage Goal, Changing Delivery Strategy” section for more details regarding these initial campaigns. See also Judi Kanne, Luke Greeves, Jean Roy, Nick Farrell, and Mark Grabowsky, *Partnerships in Action: An Integrated Approach to Combining a Measles Campaign with a Bed Net, Vitamin A and Mebendazole Campaign in Zambia* (Washington, DC: American Red Cross, 2004); and Mark Grabowsky, Nick Farrell, William Hawley, John Chimumbwa, Stefan Hoyer, Adam Wolkon, and Joel Selanikio, “Integrating insecticide-treated bednets into a measles vaccination campaign achieves high, rapid and equitable coverage with direct and voucher-based methods,” *Tropical Medicine and International Health* 10, no. 11 (November 2005): 1,151–60.
- ¹⁹⁶ Dupas further explained that in the early 2000s, “still a large number of households didn’t go to health facilities or health clinics were too far, so the thinking was nets needed to be sold in shops and need incentives for shops to carry the nets.”
- ¹⁹⁷ Estimates of ITN coverage achieved across distribution models vary; however, in a 2007 study comparing coverage levels achieved by commercialized, highly subsidized, and free distribution models in Kenya, the latter achieved significantly more coverage: 67.3 percent, versus 23.5 percent (through highly subsidized nets) and 7.1 percent (through commercial sector distribution). See Noor et al. (2007).
- ¹⁹⁸ Dupas also noted that she and Cohen were graduate students at the time, and so “fully subsidizing nets on our own was more expensive than topping up what they [PSI] were already subsidizing, but they said no.” See Cohen and Dupas (2007).
- ¹⁹⁹ This is not to say, however, that countries did not apply for mass free distribution campaigns before this point; Noor and coauthors (2007), for instance, note that Kenya applied for a free distribution campaign for 5 million nets in the Global Fund’s first round in 2002, but was rejected. As suggested elsewhere, further research into the proportion of active ITN delivery programs using commercialization, subsidies, and/or free distribution—and where funding came from in each case—would yield additional insights.

- ²⁰⁰ Dupas and Grabowsky both referenced research that found commercialization activities were costlier than the additional cost of fully subsidizing nets, meaning giving away nets was easier to sustain than selling them. See also the earlier section of this report on USAID and NetMark.
- ²⁰¹ “WHO releases new guidance on insecticide-treated mosquito nets,” World Health Organization, August 15, 2007, <https://www.who.int/news/item/15-08-2007-who-releases-new-guidance-on-insecticide-treated-mosquito-nets>.
- ²⁰² There is evidence that Dupas and Cohen’s research did directly influence policy choices: Prime Minister Blair cited their research, “alongside Kremer and Miguel’s study on the effect of cost-sharing on deworming take-up, in calling for the abolition of user fees for health products and services in poor countries” in 2009. Dupas noted that “these agencies talk with each other a lot; I can imagine a DFID, World Bank, and Global Fund meeting where new evidence gets brought up.” See “Free Malaria Bednets,” Innovations for Poverty Action.
- ²⁰³ “Abuja Call for Accelerated Action Towards Universal Access to HIV and AIDS, Tuberculosis and Malaria Services in Africa,” African Union, 2006, https://au.int/sites/default/files/pages/32904-file-2006_abuja_call.pdf.
- ²⁰⁴ Communal re-treatment processes might involve taking nets to clinics or other community-based facilities responsible for hosting re-treatment sessions, dipping the nets in large vats of an insecticide, waiting for them to dry, and then taking them home. Sachets made it possible for people to re-treat nets themselves whenever they needed to rather than have to wait for communal re-treatment sessions. See Moore-Sheeley (2017).
- ²⁰⁵ See “Price and Quality Reporting,” Global Fund, accessed June 1, 2023, <https://www.theglobalfund.org/en/sourcing-management/price-quality-reporting/>. After 2006, the PQR also lists some ITN purchases.
- ²⁰⁶ Simon suggested that LLIN cost may also have played a role: “Without a long-lasting net, it would cost even more because then you would have to replace the nets more frequently, and then who would replace them?” In that way, LLINs may have seemed cheaper (and hence, more attractive) in the long run to donors relative to ITNs requiring retreatment.
- ²⁰⁷ See also Takaaki Ito and Takeshi Okuno, “Development of ‘Olyset net’ for malaria control,” Sumitomo Chemical, 2006, https://www.sumitomo-chem.co.jp/english/rd/report/files/docs/20060200_Ini.pdf.
- ²⁰⁸ “A Timeline of Our Evolution,” Vestergaard, accessed May 15, 2023, <https://vestergaard.com/history/>.
- ²⁰⁹ See also Fredros Okumu, “The fabric of life: what if mosquito nets were durable and widely available but insecticide-free?” *Malaria Journal* 19 (July 2020): 260.
- ²¹⁰ Chavasse said of Vestergaard, “to their credit, they reinvested in product development and did actually produce a great product” after this initial misstep.
- ²¹¹ “Sumitomo Chemical donates ‘Olyset’ Nets to Africa’s ‘Millennium Villages,’” Sumitomo Chemical, March 2006, https://www.sumitomo-chem.co.jp/english/news/files/docs/20060327_1.pdf. See also “UNICEF, WHO, and Acumen Fund announce introduction in Africa of new technology to fight malaria,” World Health Organization, September 26, 2003, <https://www.who.int/news/item/26-09-2003-unicef-who-and-acumen-fund-announce-introduction-in-africa-of-new-technology-to-fight-malaria>.
- ²¹² She added, “The problem is, the target product profile and how you want the insecticide to function and the safety profile to function are extremely different” when repurposing insecticides for human use.
- ²¹³ For example, according to Mwenesi, “Initially, all nets were conical, so thinking about how best to ensure nets are fit-for-purpose for the sleeping space, what size, what color—white nets were sometimes associated with funerals, so people won’t want to sleep under it. Research was also showing people needed slightly longer nets, nets you could hang from four points. All of this research was being done and uptake became better.” In the early 2000s, moreover, LLINs “were expensive, cumbersome to use [or hang up], bulky, not tailored to the consumer; they were almost a boutique tool rather than a mass tool,” in Grabowsky’s view.
- ²¹⁴ Additional research on trends in ITN procurement and purchasing over time could yield further insights.
- ²¹⁵ Taxes and tariffs on imported nets and insecticides were generally not identified as significant barriers to scaleup in the aughts (though they may have been bigger barriers before that). According to Binka, through RBM and the African Union, taxes on imported nets were removed early on. When asked, other experts interviewed similarly tended not to think taxes or tariffs played significant roles in ITN scaleup in the 2000s. Tanzania, which

prioritized social marketing and voucher schemes, made “very gradual” progress in ITN coverage but still “had to rely on imported nets,” according to Moore-Sheeley. Other experts also noted a lag in coverage rates in Tanzania relative to other countries.

²¹⁶ Efforts to scale ITN manufacturing in Africa, along with the relationship between global LLIN supply and demand, present another fertile area for further research. In Feachem’s view, there is a “rich story to be told in terms of the marketplace for nets, who was making them and where they were made, how supply was responding to this purchasing power that was on the table.” The growth in Africa-based net manufacturing is “an interesting thing that sort of *didn’t* happen.”

²¹⁷ “Meeting on Development, Production and Distribution of Long Lasting Insecticidal Nets (LLINs): Full Record of the Meeting,” RBM Working Group on Insecticide Treated Nets, September 2004, <https://endmalaria.org/sites/default/files/u224/RBM%20%20LLIN%20Business%20Meeting%20Joburg%20Sept%2004%20Full%20Report.pdf>.

²¹⁸ Jallow, among other experts consulted, also listed direct negotiation with manufacturers to bring down prices as a factor contributing to the lowering of LLIN unit costs.

²¹⁹ Between 2003 and 2004, for example, the number of countries that ordered LLINs through UNICEF more than doubled, from 14 to 30 countries. “Meeting on Development, Production and Distribution of Long Lasting Insecticidal Nets,” RBM Working Group on Insecticide Treated Nets.

²²⁰ “Canada boosts aid for Niger and the Sahel region,” ReliefWeb, August 5, 2005, <https://reliefweb.int/report/burkina-faso/canada-boosts-aid-niger-and-sahel-region>.

²²¹ See, for example, “Fifty-Eighth World Health Assembly: Resolutions and Decisions Annex,” World Health Organization, May 2005, https://apps.who.int/gb/ebwha/pdf_files/WHA58-REC1/english/A58_2005_REC1-en.pdf.

²²² The WHO’S 2007 policy change enabled the “shift in the number of new suppliers coming into the market simply because donors were now committed,” in Rockwood’s view.

²²³ From 2009 to 2010, Unitaid procured 20 million nets “to stop supply shortages and incentivize manufacturers to increase production capacity”; Unitaid’s support made up about one-fifth of all nets delivered in 2009. See *Transforming Markets, Saving Lives: Annual Report 2013* (Geneva: Unitaid and World Health Organization, 2013).

²²⁴ Rockwood noted that demand forecasting is still a challenge today.

²²⁵ WHOPES is now encompassed by the [WHO’s Prequalification](#).

²²⁶ McGuire also noted that WHOPES’s limited staff and countries’ internal regulatory processes were contributing factors to this slowness (i.e., some countries required additional trials inside their borders before approving products).

²²⁷ Grabowsky explained that while measles campaigns effectively eliminated measles, “susceptibility was always building up with new births,” which necessitated regular mass campaigns to keep up immunity. He then led research on adding other health interventions to measles campaigns (such as vitamin A supplements, deworming medicine, and condoms) to experiment with making measles campaigns “attractive to the public health community and consumers” in the absence of measles cases. That path then led him to “link immunization campaigns to malaria control” as “a marketing tool to get the public health community and parents to support” ongoing measles campaigns.

²²⁸ Funding and implementing partners included Ghana Red Cross, Ghana’s Ministry of Health, American Red Cross, Rotarians Against Malaria, the CDC, UNICEF, ExxonMobil, SatelLife, Inc., BASF Corporation, and the World Bank.

²²⁹ Examples of theories Grabowsky recalled encountering in opposition to integrated delivery: “people wouldn’t come next time if there weren’t bednets, or they wouldn’t use the nets because they got them for free, or they’ll sell the nets.” Subsequent research showed that these concerns did not happen in practice.

²³⁰ “Distribution of insecticide-treated bednets during an integrated nationwide immunization campaign – Togo, West Africa, December 2004,” *MMWR Morbidity and Mortal Weekly Report* 54 (2005): 994–96. RBM, WHO, and UNICEF’s *World Malaria Report 2005* also highlighted the scale achieved by these two campaigns: “National campaigns of ITN distribution in combination with measles immunization conducted in Zambia in 2003 and in

Togo in 2004 demonstrated an unprecedented successful approach of scaling up ITN coverage within only a few days.” The report also highlighted Malawi’s 2004 experience, noting that ITN “distribution rose from 750 000 in 2002 to more than 3 million by the end of 2004” via social marketing and subsidized net delivery through maternal and child health clinics (2005, 27, 29).

- ²³¹ The report continues: “Throughout Africa, vaccination campaigns have developed an extensive infrastructure which enables them to reach the great majority of targeted women and young children. As these are the same groups most at risk of malaria, health experts have recently begun to link the disease efforts by distributing a bed net or voucher to every caretaker that brings a young child to the vaccination stations” (2006, 55).
- ²³² Additional evidence from subsequent campaigns in Mozambique (2005) and Sierra Leone (2006) further demonstrated the feasibility of free distribution of ITNs integrated with other maternal and child health interventions in achieving coverage targets. The WHO and UNICEF also recommended integration in 2004; see “Malaria Control and Immunization: A Sound Partnership with Great Potential,” WHO/UNICEF WHO/HTM/RBM/2004.52. Rev1, 2004, https://apps.who.int/iris/bitstream/handle/10665/68585/WHO_HTM_RBM_2004.52_Rev.1.pdf?sequence=1.
- ²³³ “WHO releases new guidance on insecticide-treated mosquito nets,” World Health Organization.
- ²³⁴ “WHO releases new guidance on insecticide-treated mosquito nets,” World Health Organization.
- ²³⁵ The WHO’s original position paper is available from <https://files.givewell.org/files/DWDA%202009/Interventions/Nets/itnspospaperfinal.pdf>.
- ²³⁶ McNeil Jr., “An Iron Fist Joins the Malaria Wars.” Kochi was also quoted as describing social marketing as ineffective. On the treatment side, he compelled 18 drug companies to stop selling monotherapies (which promote resistance) within 90 days.
- ²³⁷ In Pillinger’s doctoral dissertation (2020, 342), she states, “An interviewee who worked closely with Kochi told me that Kochi basically couldn’t have cared less about his popularity and just wanted to get stuff done.”
- ²³⁸ “Ban Ki-moon announces new UN effort to end malaria deaths in Africa,” United Nations, April 25, 2008, <https://news.un.org/en/story/2008/04/257242>.
- ²³⁹ “Notice to Readers: Africa Malaria Day and Malaria Awareness Day,” US Centers for Disease Control and Prevention, April 25, 2007, <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5615a7.htm>.
- ²⁴⁰ “Achieving Universal Coverage to End Malaria Deaths: A Discussion with the Global Fund Board,” RBM Partnership.
- ²⁴¹ The GMAP was launched at an event cohosted by the Bill & Melinda Gates Foundation, Malaria No More, the UK government, and the UN Special Envoy for Malaria and endorsed at the UN Malaria Summit. See: “Global Roadmap To End Malaria Launched At UN Summit,” Malaria Consortium, September 25, 2008, https://www.malariaconsortium.org/news-centre/gmap_launch.htm.
- ²⁴² “Leaders at UN launch campaign to virtually eliminate malaria deaths by 2015,” United Nations, September 25, 2008, <https://news.un.org/en/story/2008/09/274952>.
- ²⁴³ “Tedros Adhanom Ghebreyesus, PhD: Recipient of the 2011 Jimmy and Rosalynn Carter Humanitarian Award,” National Foundation for Infectious Diseases, accessed July 20, 2023, <https://www.nfid.org/wp-content/uploads/2023/05/tedros.pdf>.
- ²⁴⁴ McArthur also shared the following anecdote “to give a flavor of discussions around how to actually make this happen”: shortly after British businessperson Richard Branson established his philanthropic organization, Virgin Unite, the idea was floated of “using a Virgin 747 airplane to deliver a jumbo jet full of bednets, but didn’t happen in the end.”
- ²⁴⁵ See “A Solution to Address Extreme Poverty: The Millennium Villages project,” Millennium Promise Alliance, accessed June 15, 2023, <https://www.millenniumpromise.org/millenniumvillages>. For a more in-depth accounting of the project, see Nina Munk, *The Idealist: Jeffrey Sachs and the Quest to End Poverty* (New York: Anchor Books. 2014).

- ²⁴⁶ “Kenyan Minister Asserts MVP’s Impact on Nation-Wide Malaria Breakthrough,” Earth Institute, October 21, 2011, <https://news.climate.columbia.edu/2011/10/21/kenyan-minister-asserts-mvps-impact-on-nation-wide-malaria-breakthrough/>.
- ²⁴⁷ Davos Annual Meeting 2005 – The G8 and Africa,” World Economic Forum, August 30, 2007, https://www.youtube.com/watch?v=vF-Vg1owE5Y&list=PL66AD0BD73934A6F0&index=6&ab_channel=WorldEconomicForum. Panelists included Tony Blair (UK prime minister), Bono (musician, Debt, AIDS and Trade in Africa), Bill Clinton (former US president); Bill Gates (Bill & Melinda Gates Foundation, Microsoft Corporation), Thabo Mbeki (president of South Africa), and Olusegun Obasanjo (president of Nigeria).
- ²⁴⁸ Davos Annual Meeting 2005 – Funding the War on Poverty,” World Economic Forum, August 30, 2007, https://www.youtube.com/watch?v=R8CF4EoXjD0&ab_channel=WorldEconomicForum. Sachs also listed bednets among priority investments during the panel.
- ²⁴⁹ “Davos succumbs to star power,” DW, January 30, 2005, <https://www.dw.com/en/davos-succumbs-to-star-power/a-1473433>.
- ²⁵⁰ As noted elsewhere in this case study, Sachs also came to represent one camp in the “aid effectiveness” debates happening around this time (the “aid enthusiast” camp, or the camp arguing that more ODA was needed); development economist William Easterly represented the other main camp (the “aid critic” camp, or the camp arguing to make existing ODA better). Several experts interviewed cited this broader context as another contributing factor to why some people in the development sector rejected Sachs’s ideas at face value.
- ²⁵¹ As one example, Moore-Sheeley noted that Sachs described Tanzania’s social marketing scheme as a “complete failure,” whereas other pro-free campaign advocates tended to frame it as “slow, steady progress.”
- ²⁵² For a longer account of Chambers’s introduction to and subsequent work in malaria, see Alex Perry, *Lifeflood: How to Change the World One Dead Mosquito at a Time* (New York: PublicAffairs, 2011).
- ²⁵³ Chambers also framed his support of malaria control in terms of economic opportunity: “As a businessman, I firmly believe that no other cause offers the same potential return on investment as malaria.” See Christiansen, “World Leaders Commit Record Billions to Tackle Malaria.”
- ²⁵⁴ Looking at the networks in which Sachs was embedded as one illustrative example of the importance of relationships in ITN scaleup, multiple other experts shaped his understanding of, approach to, and interest in nets. McArthur noted Harvard entomologist Andrew Spielman and Columbia malariologist Awash Teklehaimanot as “influential in [Sachs’s] thinking on malaria” and Sachs’s wife Sonia Ehrlich Sachs, who was “always interpreting evidence from the medical field” as a practicing pediatrician, which Sachs discusses in his 2005 book, *The End of Poverty: Economic Possibilities for Our Time*.
- ²⁵⁵ Godal was also instrumental in the Global Alliance for Vaccines and Immunization’s formation in 2000. See “Malaria initiative gains momentum,” World Health Organization Bulletin, 1999, <https://apps.who.int/iris/bitstream/handle/10665/269130/PMC2615570.pdf?sequence=1&isAllowed=y>. See also Helga Fostad, “Tore Godal Turns 75,” Norad, February 16, 2015, <https://www.norad.no/en/front/about-norad/news/tore-godal-turns-75/>.
- ²⁵⁶ Speak Up Africa, through its focus on “zero malaria,” was also cited as providing valuable advocacy around malaria broadly. Omission of other malaria or health advocacy organizations should not be interpreted as an indication of their relative importance for malaria advocacy.
- ²⁵⁷ When launched, ALMA’s mandate was “to provide African leaders with a high-level forum to ensure efficient procurement, distribution and utilization of malaria control tools; facilitate the sharing of effective malaria control practices; and ensure that malaria remains high on the global policy agenda.” See Luis Gomes Sambo, Georges Ki-Zerbo, and Joses Muthuri Kirigia, “Malaria control in the African Region: perceptions and viewpoints on proceedings of the Africa Leaders Malaria Alliance (ALMA),” *BMC Proceedings*, 5, Suppl. 5 (June 2011), article no. S3. According to Malaria No More’s Edlund, Malaria No More “hosted ALMA legally” and “essentially became an incubator” by taking “all the administrative problems off the table.” He also stated that Chambers worked with Kikwete on ALMA’s formation. This claim was not further investigated, but additional research would shed additional light on the causal weight to assign to Chambers and Malaria No More in growing and sustaining ITN delivery efforts beyond 2010.

- ²⁵⁸ Given when in the timeline of ITN scaleup African leaders launched ALMA, the role of ALMA in ITN scaleup was not investigated in depth.
- ²⁵⁹ At the start of the decade, there was also growing public awareness in the US and in the UK and Europe more broadly about global poverty. For example, leading up to the 2005 G8 summit in Gleneagles, a series of “Live 8” benefit concerts took place across G8 countries and South Africa and were broadcast on major media networks, with the aim of compelling world leaders to “make poverty history.”
- ²⁶⁰ Rick Reilly, “Nothing But Nets,” *Sports Illustrated*, May 2006, <https://vault.si.com/vault/2006/05/01/nothing-but-nets>.
- ²⁶¹ Nothing But Nets (now United to Beat Malaria) also now has celebrity ambassadors such as American basketball player Stephen Curry, who made a pledge to donate three nets per three-point shot he makes during games.
- ²⁶² Viewers cast votes for performances and corporate sponsors donated to charities such as the Global Fund, Malaria No More, and Nothing But Nets. See Kimberly Nordyke, “‘Idol’ Recruits Superstars for Charity Special,” Reuters, March 9, 2007, <https://www.reuters.com/article/us-idol/idol-recruits-superstars-for-charity-special-idUSN0938676120070309>, and “American Idol’ Charity Looks to Establish Lasting Presence,” *Philanthropy News Digest*, April 8, 2008, <https://philanthropynewsdigest.org/news/american-idol-charity-looks-to-establish-lasting-presence>. Several experts thought that News Corporation’s executive, Peter Chernin, decided to host this event because of his relationship with Malaria No More through Chambers. The event “wouldn’t have happened without Chernin’s involvement,” in McArthur’s view.
- ²⁶³ In 2008 media coverage, journalist Robert Guth credited Malaria No More with “push[ing] the effort [for malaria control] into the public eye through” the 2006 White House Summit and Idol Gives Back. See Guth, “Big Guns Enter Malaria Fight.”
- ²⁶⁴ UK-based Against Malaria Foundation, for example, was founded in 2004.
- ²⁶⁵ Rabinovich also recalled the 2013 major motion picture *Mary and Martha* (featuring Hilary Swank) which featured a child contracting malaria through a broken bednet, and elementary- through college-age students starting or participating in fundraising campaigns for nets.
- ²⁶⁶ Feachem also thought that the “treatment and drug side of the story is as remarkable as bednets—two remarkable stories running in parallel.” A separate case study examining the causal factors behind scaleup of ACTs, intermittent preventive treatment in pregnancy, and diagnostics would provide a helpful complement to understanding the particularities of each component of malaria control scaled up in the 2000s.
- ²⁶⁷ He contrasted the CDC’s organizational structure with that of the World Bank, the WHO, and other multilateral institutions where key staff “might be on a two-year contract or in a highly bureaucratic environment that may not be as conducive to innovation.”
- ²⁶⁸ Grabowsky added that AMP enabled an “alternative authorizing environment; it allowed us to bypass many of the delaying institutional processes at different agencies, all of which have different mandates—the WHO does policy, UNICEF does delivery, World Bank does financing. By incorporating empowered personnel from these agencies into one entity, AMP could move quickly in a coordinated way.” He further noted that AMP “took the language and tools developed by the World Bank” for measuring “asset factor scores” and then “applied to bednets” to “quantifiably address concerns about equity, which we could then show to donors concerned about equity, for example, the Canadians.”
- ²⁶⁹ Pillinger (2020, 346) reports that “this highly dramatic [2005] meeting has attained somewhat legendary status within the malaria community” on account of what was described as “all out warfare between WHO and the [RBM] partnership.” See also Sara Boseley, “Arata Kochi: shaking up the malaria world,” *The Lancet* 367, 9527 (June 2006): 1973.
- ²⁷⁰ Some critics of the value-for-money frame argue that it pulls attention away from the reality that existing resources, in many global health areas, are insufficient to address the health needs of all affected populations. Value for money and health for all are not mutually exclusive; the nuances and complexities of this topic, however, are beyond the scope of this case study.
- ²⁷¹ Since Dupas’s first randomized price experiment on nets, over 12 other randomized studies support her initial finding that eliminating cost-sharing significantly improves health product uptake. “It helps when you can show the same finding across products and contexts,” Dupas said. For more, see “The impact of price on take-up and

use of preventive health products,” J-PAL, last updated May 2018, <https://www.povertyactionlab.org/policy-insight/impact-price-take-and-use-preventive-health-products>.

²⁷² McNeil Jr., “An Iron Fist Joins the Malaria Fight.”

²⁷³ Mnzava also recalled that “some of the researchers at the time wouldn’t share information with a body like the WHO without having published first—and publishing was a lengthy process. We have gone beyond that now, it’s not the case any longer, but during those times, people would not share their results before publication.”

²⁷⁴ Simon added that “the folks who said it would be tough weren’t wrong but with these new technologies, it went from something theoretically impossible to something that could be, if not completely eliminated, then dramatically improved.” The role of new technologies also underscores the role of research and development (and what research and development gets funded).

²⁷⁵ For a discussion on ideologies, power, framing, and different approaches to solving global health problems, see Yusra Ribhi Shawar, Rachel Neill, Michael Kunnuji, Malvikha Manoj, and Jeremy Shiffman, “Understanding resilience, self-reliance and increasing country voice: a clash of ideologies in global health,” *BMJ Global Health* 8 (2023): e010895.

²⁷⁶ For a discussion on the linkages between colonialism and malaria specifically, see Bump and Aniebo (2022).

²⁷⁷ Paul Farmer passed away in February 2022. For more on Farmer’s legacy in global health—particularly global health financing—see the 2017 documentary *Bending the Arc*.

²⁷⁸ Sandefur, “How Economists Got Africa’s AIDS Epidemic Wrong.”

²⁷⁹ That research was Chris James, Saul S. Morris, Regina Keith, and Anna Taylor, “Impact on child mortality of removing user fees: simulation model,” *BMJ* 331, 7519 (October 2005): 747–49.

²⁸⁰ Additional research published since 2009 has further documented the harmful effects of user fees on health outcomes. See also Rowden (2013).

²⁸¹ O’Meara, for example, shared the view that “who is most creditable for spurring greater investment in malaria depends on who you ask. You will get different answers depending on if they are on the research or implementation side.”

²⁸² In 2019, only about 54 percent of the global malaria funding target had been reached. Since the start of the COVID-19 pandemic, this figure has likely decreased. See “WHO calls for reinvigorated action to fight malaria,” World Health Organization, November 30, 2020, <https://www.who.int/news/item/30-11-2020-who-calls-for-reinvigorated-action-to-fight-malaria>.

²⁸³ “Remarks by Mohamed Saleh Jiddawi, M.D., Zanzibar Principal Secretary, Ministry of Health and Social Welfare,” White House Summit on Malaria, December 2006, <https://www.pmi.gov/remarks-by-mohamed-saleh-jiddawi-m-d-zanzibar-principal-secretary-ministry-of-health-and-social-welfare/>.

²⁸⁴ Guth, “Big Guns Enter Malaria Fight.”

²⁸⁵ “Swamp drainage, housing improvement, and other generalized aspects of public health and development defeated malaria in rich countries, but are not common aspects of donor programs now” (Bump and Aniebo 2022, 9).

²⁸⁶ “Harsh lessons must be learned from all the unacceptable dithering about another class of new LLINs, which complemented pyrethroids with the synergist piperonyl butoxide” (Killeen and Sougoufara 2023, 410).

²⁸⁷ McGuire also mentioned the challenge of managing environmental concerns: “Right now, nets are made of plastic; a lot of programs are struggling with how to manage nets in a responsible way. Nets often have to be individually packaged because they’re treated, depending on the laws in the countries of export and distribution. In Rwanda, for example, plastic bags are illegal—it creates challenges.”

²⁸⁸ For an in-depth analysis of net access and use in Africa between 2000 and 2020, see Amelia Bertozzi-Villa, Caitlin A. Bever, Hannah Koenker, et al., “Maps and metrics of insecticide-treated net access, use, and nets-per-capita in Africa from 2000-2020,” *Nature Communications* 12, no. 1 (June 2021): 3,589.

²⁸⁹ “The Stockdale Paradox,” *Jim Collins*, accessed June 1, 2023, <https://www.jimcollins.com/concepts/Stockdale-Concept.html>. See also James Smith, Ezekiel Boro, Edwin Jit Leung Kwong, and Megan Schmidt-Sane, “Resisting

unchecked pragmatism in global health,” *Lancet Global Health*, June 14, 2023, 11, 8: E1176–E1177, [https://doi.org/10.1016/S2214-109X\(23\)00208-5](https://doi.org/10.1016/S2214-109X(23)00208-5).

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500 L'Enfant Plaza SW
Washington, DC 20024

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