“Rethinking Integrated Service Delivery for Malaria,”
by Evelyn Ansah and Corrina Moucheraud

Note: This preprint is part of the “Rethinking Malaria in the Context of COVID-19” series. All of the manuscripts produced in this effort will be submitted for peer-review and published as a compendium. This preprint is being made available to enable a broader discussion around key challenges and solutions.

The “Rethinking Malaria in the Context of COVID–19” global engagement was constituted as a consultative process to ‘take stock’ and push beyond conventional thinking to question fundamental assumptions and approaches, with a focus on bold new ideas to achieve real-world progress. The process managed by three governance bodies comprising a Steering Committee, Working Group Co-Chairs and contributing authors, and an External Advisory Committee. For a listing of the "Rethinking Malaria" Working Group Co-Chairs and contributing authors and External Advisory Committee members, see Text A1.

Funding: "Rethinking Malaria in the Context of COVID–19" received grants from the Bill & Melinda Gates Foundation and JC Flowers Foundation and additional support from Harvard’s Defeating Malaria: From the Genes to the Globe Initiative and Takemi Program in International Health at the Harvard T.H. Chan School of Public Health. The funders had no role in determining the scope of topics, information gathering from and key informants, decision to publish, or preparation of the manuscript.

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Abstract

Despite worldwide efforts and much progress toward malaria control, declines in malaria morbidity and mortality have hit a plateau. In particular, while many nations achieved significant malaria suppression or even elimination, success has been uneven, with other nations making little headway—or even losing ground in this battle. These alarming trends threaten to derail attainment of global targets for malaria control. Among the challenges impeding success in malaria reduction, many strategies center malaria as a set of technical problems in commodity development and delivery. Yet, this narrow perspective overlooks the importance of strong health systems and robust healthcare delivery. This paper argues that strategies that move the needle on health services and behaviors offer a significant opportunity to achieve malaria control through a comprehensive approach that integrates malaria with broader health services efforts. Indeed, malaria may serve as the thread that weaves integrated service delivery into a path forward for universal health coverage. Using key themes identified by the Rethinking Malaria effort through engagement with key stakeholders, we provide recommendations for pursuing integrated service delivery that can advance malaria control via strengthening health systems, increasing visibility and use of high-quality data at all levels, ensuring equity, promoting research and innovation for new tools, expanding knowledge on effective implementation strategies for interventions, making the case for investing in malaria among stakeholders, and engaging impacted communities and nations.

Introduction

Malaria is preventable and treatable—yet the disease continues to cause significant morbidity and mortality worldwide [1].

Substantial scale-up of malaria interventions globally contributed to a 30% decline in malaria incidence between 2001 and 2013, and a 47% decline in malaria mortality, averting an estimated 4.3 million deaths over this period [1]. Many institutions, groups and networks working at global, regional and other levels have over the years contributed immensely and in diverse ways to the fight against malaria and to our joint achievements to date and deserve acknowledgement and commendation.

Following this era of progress and hope, the World Health Assembly adopted the Global Technical Strategy for Malaria 2016–2030 in May 2015. The strategy provides a comprehensive framework to guide countries in their efforts to accelerate progress toward eliminating malaria [2]. World Health Organization member states that adopted the strategy endorsed a bold vision of a malaria-free world, with an ambitious target of reducing global malaria incidence and mortality by 90% by 2030.

However, over the first five years of Strategy implementation, progress against malaria mortality and morbidity has slowed, stalled, or reversed in many moderate- and high-transmission countries [1]. Globally, malaria case incidence only declined by an estimated 2% in 2015–2019, as compared to a 27% decline in 2000–2015. While the malaria mortality rate (i.e., deaths per 100,000 population) declined from 25 to 12 between 2000 and 2015, the decline between 2015 and 2019 was marginal, reducing from 12 to 10 over this period [1].

Further, progress has been heterogeneous across countries and regions (Figure 1). While some countries have made considerable progress, others, particularly in sub-Saharan Africa, have not significantly reduced their malaria burden. Disparate burden in bordering areas can lead to re-introduction of the disease into countries that have come close to eliminating malaria, further hindering progress.
These indications demonstrate that malaria needs constant attention—policies must work toward elimination (“getting to zero”) and be continuously refined to enable countries to stay at zero. Without ongoing plans and efforts, any significant gains in malaria control may be lost.

**The COVID-19 pandemic: Presenting additional challenges and new opportunities**

The ongoing COVID-19 pandemic has further threatened the bold ambition of the *Global Technical Strategy for Malaria*. The health systems of many countries that were already struggling to grapple with malaria, other infectious diseases, and the growing threat of non-communicable diseases were further stressed by COVID-19. Human and other resources originally focused on malaria were diverted to deal with the urgent global public health emergency. A recent modelling analysis by the WHO predicted a $>20\%$ rise in malaria morbidity and $>100\%$ mortality in sub-Saharan Africa during the COVID-19 pandemic as a result of 75% reduction in routine malaria control measures including ITN distribution and effective malaria treatment [3].

Yet the COVID-19 pandemic also presents an opportunity to reflect and carefully consider how to proceed. The pandemic has re-invigorated the infectious disease agenda. COVID-19 has underscored the importance of enhancing global collaboration and effective partnerships among all sectors and stakeholders, not only in facing the immense challenges posed by the pandemic but also to build back better. Such multi-stakeholder collaboration is thus critical for tackling the challenges of COVID-19, and for building more sustainable, resilient and inclusive societies [4]. The pandemic emphasized the importance of engaging communities as partners in managing health challenges both existing and new. This global crisis also underscored the need for rapid response, ensuring availability and use of timely data for decision-making, and protecting the workforce at the forefront of service delivery.

**Re-thinking malaria through integrated service delivery**

Decades of scientific innovation have generated effective technologies that can be deployed to fight malaria, from prevention to diagnosis to treatment [5]. This armamentarium may predispose some to approach malaria control as a set of technical problems: how can more and better tools be acquired, and how should these tools reach the maximum number of people including the “unreached?” Although tools
are a major challenge, focusing on this alone may be a limited—and limiting—perspective [6,7]. Tools are critical to the control of infectious diseases, but tools alone cannot solve the whole problem. The COVID-19 pandemic also illustrated important lessons about the limitations of public health strategies that rely on individual behavior change [8]. It similarly may be reductionist to conceptualize the fight against malaria as being merely about product delivery, although the temptation to do so may be exacerbated by some global donors’ tendency to monitor and reward based on commodities [9–11] as it is easier and more immediate to count program outputs (e.g., product distribution, uptake, or coverage) than behavior (e.g., usage or adherence) or health outcomes.

But there are dangers to taking such a technical, commodity-driven approach. It may decontextualize malaria control efforts and deemphasize the role of services and systems. When commodities are central to a malaria strategy, it is too easy to focus on the managerial aspects of product delivery—and consequently minimize accompanying service- and behavior-oriented issues. Divorcing malaria products from the systems and services that administer them, as well as their corresponding policies and programs, overlooks important areas that need to be strengthened. Additionally, malaria exists in the context of countless additional health, resource, and political priorities on national, regional, and global levels. Overemphasis on malaria-specific technology development by malaria-focused funders and implementers may therefore limit the malaria community’s engagement in broader dialogues, such as about health system strengthening, climate change, and social determinants of health.

These concerns underscore long-persisting tensions between maintaining a concentrated focus and participating in broader public health activities and dialogues. Are we at a tipping point? This question takes on particular salience and urgency in the context of global movement toward Universal Health Coverage (UHC), and as COVID-19 forces a reckoning with how pandemics and other global forces may affect disease-specific programs and their progress. Although focused programming may be efficient, it does not build robust and resilient health systems capable of providing comprehensive care or weathering unexpected crises [12]. There is an urgent need to consider how malaria efforts could and should be integrated with other services.

The objective of this paper is to examine reasons for, barriers to, and steps needed to move toward integrated service delivery for malaria. Particularly in the context of UHC, there are many unresolved questions about how to expand affordable, high-quality, and cost-effective malaria services while maintaining a focus on reducing the malaria burden and working toward eventual elimination. While there is no one “path” to UHC, integration of services can be a first step. Should malaria prevention, diagnosis and case management services be offered alone, or are there opportunities to synergize with other types of services? If services are bundled together and offered as a package—whether intentional pairing of specific service lines, or full integration i.e., UHC—what will this require? How should the malaria community prepare itself for this transition? Can the malaria community be a leader in service integration and blaze a trail toward UHC that other services can benefit from? Integrating malaria intervention and evaluation efforts with other priorities, especially general health system strengthening, has proven to be necessary and impactful [13].

This re-think requires consideration of two perspectives: why it is important for malaria to be integrated into health services, and why it is beneficial for other services and the system if malaria is integrated. Both sides present a win-win situation, as we argue in this white paper.
We argue that malaria can be the “thread” that leads the way in integrating services and moving toward UHC (Figure 2). The building blocks of integrated service delivery for malaria can be leveraged for other health needs. In practical terms, malaria services, especially treatment, are often integrated at the point of care in both the public and private sectors [14]. Mothers do not bring their febrile babies to malaria-specific nurses, and drug shops do not sell only antimalarial medications. Although many malaria services are thus already delivered in an integrated model, many high-burden countries are missing a more deliberate, systematic approach to integrating the upstream “inputs”—including financing, training, mentorship and supervision, and monitoring and evaluation—to facilitate effective delivery of multiple services downstream [15,16].

Many disease-specific communities are grappling with what it will take, and what it will mean, to move toward UHC. We encourage the malaria community to leverage its broadly applicable knowledge and its unique position in the health system to seize the opportunity to take a leadership role in these activities. For example, many countries’ COVID-19 pandemic responses were led by their malaria experts, as they possessed the relevant experience and skills in surveillance and diagnostics. (Incidentally, shifting malaria staff to another disease area for nearly two years may have unintended consequences on malaria control efforts—an area worthy of rigorous study.) If the malaria community improves data systems and surveillance activities, strengthens supply chains and other health systems infrastructure, builds health worker expertise, and innovates new service delivery paradigms, these “railroad tracks” also could be used by other health programs—resulting in improved health outcomes for all. This has already manifested to a certain extent in integrated community case management programs, but much more remains to be done.

This is not a new idea: integration has been discussed for decades, including in the malaria community. Numerous technical strategic documents and country strategies have emphasized integration. Despite these years of dialogue, integration for malaria control has not yet gained traction at the policy and implementation levels [17]. Why is this the case and how can the malaria community move past this to make meaningful progress? It is time for the global community of malaria policymakers, planners, implementers, researchers, clinicians, and partners to think deeply and humbly about why there has been so little progress on integration, and to interpret any feelings of déjà vu with introspection rather than
egoism. It is a sign of failure to endorse the same ideas for decades without making meaningful progress. Just as the global community lent weary and skeptical ears to repeated warnings of an inevitable pandemic, and was consequently under-prepared, repeated recommendations about integration in the context of malaria are not resulting in the necessary action. This must change. In the context of UHC and pandemics, it is even more necessary to seriously and specifically address integration of malaria services.

One possible reason why progress on integration has been slow is that all communities are different. There is no one conversation or “solution” that will fully resolve this for all geographies and all populations. We therefore encourage a context-driven approach to integration. Different countries may need different approaches to integrate malaria services, depending on factors such as disease burden, seasonality, health system financing, organization, and socio-cultural considerations. It should be emphasized that integration is not a magic bullet to improve health outcomes for all. Evidence on integration from other diseases is mixed. For example, the global community has been exploring options for integrating non-communicable disease management with HIV treatment services. Although this is highly appealing, pilot efforts in numerous countries have encountered implementation challenges, and many programs have failed to achieve meaningful clinical benefits [18–20]. Integrating malaria prevention and control efforts with other services must be considered and approached with caution, bearing the context in mind.

We wish to explicitly acknowledge that expecting to “solve” the issue of integration through a global approach and broad discussions that are not tailored to specific needs of different countries—nor the diverse communities within these—itself perpetuates the colonialist legacies of malaria control efforts [21]. Top-down decision-making that occurs outside the most-affected communities is not the answer. Diversity of voices, and diversity of solutions, are needed. But burdening the most-affected countries and communities with designing policies and programs to overcome the myriad wrongs perpetuated by the Global North—actions that set the course of malaria burden and malaria control to where it is today—would be an injustice. This is the time for local leadership and local communities to devise a path forward and out of the cycle of discussion and debate about integration. However, the global malaria community cannot abdicate its duty by placing the responsibility for this work on high-burden countries. Governments, donors, academics and stakeholders from high-income countries must support and amplify these local conversations, and provide the tools and resources needed in this global effort to re-think malaria. Their role should be as allies, partners and accompaniers.

Rethinking Malaria in the Context of COVID-19: Six key themes

Rethinking Malaria in the Context of COVID-19 was undertaken as a multi-month global engagement process, engaging stakeholders across sectors and disciplines to reflect on malaria progress and where improvement is needed. These stakeholders included people from the public sector, private sector, multilateral and bilateral agencies, donors, academic institutions, think-tanks, and non-governmental implementing organizations. Service integration was identified from the outset as a key area, and we embarked on a global dialogue and informal interviews to gather perspectives on this topic, including experiences, challenges, and areas for opportunity. These discussions gathered ideas from people of diverse geographic locations, contexts, and backgrounds, both from within and outside the malaria community (Figure 3). The initiative provided a forum to capture the voices of those living with the disease and those at the frontline of service delivery. The ultimate aim is to provide a “living” forum where learned experiences and practices are shared for learning and for change—a place to have a global conversation.
Figure 3. The Rethinking Malaria in the Context of COVID-19 global engagement included key informant interviews, group, and one-on-one sessions to review initial findings with External Advisory Committee members across workstreams (over 200 individuals: 39% female and 61% male).

Notes from the discussions were converted into a matrix to draw out key themes; six key themes were identified as bridging comments across respondents. These themes highlight high-level findings about how to integrate malaria services for improving health outcomes, particularly in high-burden countries. This working paper presents a summary of findings and recommendations within each theme. As a next step, it will be critical to translate these results and recommendations to diverse audiences by crafting unique messages for different constituencies depending on their needs and positions [22].

The six themes emphasize the importance of the malaria community’s contribution to building health systems that are strong, resilient, and sustainable for integrated service delivery. This includes the urgency to better understand and to reframe malaria as an equity issue, in order to inform its successful and impactful integration in a package of health services and ultimately toward effective UHC. Additionally, we emphasize the importance of timely and high-quality data for making decisions about service delivery and demand for those services. We highlight how those who generate health information must feel urgency and ownership for the data and be equipped to hold those who lead them accountable accordingly. To ensure that all stakeholders engage in discussions about malaria control and service integration, the case must resonate with them, and we recommend ways to achieve this. Lastly, we highlight the need for better understanding of the “how” of implementing interventions and service integration for malaria control; and underscore the need for more research and development into improved technologies and strategies, particularly research that is conducted by and for the most-affected communities.

Key theme #1: It is important for the malaria community to contribute toward building strong, resilient, and sustainable health systems.

A strong and resilient health system is a critical foundation for integrated service delivery that is sustainable. The malaria community must see health system strengthening as core to its mission. While it is true that some vertical services -- such as long-lasting insecticidal nets (LLIN) campaigns -- may be
delivered efficiently without health systems, strong, resilient, responsive, and sustainable systems for health are necessary to ensure that people have access to effective and efficient services for malaria and other health needs. Strong primary health care (PHC) systems and UHC are critical to make progress against malaria and other diseases and to ensure that countries can better respond to varied health challenges, including global health security threats like pandemics [23]. Strong health systems help avoid loss of gains and reversal of progress in the face of crises. In addition, as the number of malaria cases decreases, the health system needs to be even stronger and more responsive to identify and manage these cases in the “last mile” of the journey toward “zero malaria.”

Despite its importance, there is an insufficient emphasis on true health system strengthening within malaria efforts. An analysis of funding requests carried out by the Technical Review Panel of the Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria (GFATM) that included investments in Resilient and Sustainable Systems for Health (RSSH) submitted in the 2017–2019 allocation period found that most proposed RSSH investments would provide support to -- rather than strengthen -- the health system [24]. An evaluation commissioned by the Technical Evaluation Reference Group of the GFATM that examined funding requests from 11 countries over the same period also showed that only 27% of RSSH investments from the main allocation funding request were used for health systems strengthening [25]; most of the funding meant for health systems strengthening was directed towards activities that supported rather than strengthened the health system.

We conceptualize the health system as also including other sectors critical to its functioning including agriculture, the environment, housing, roads, water, sanitation, and education among others. Without roads, people cannot access health services such as diagnosis and treatment of malaria. Poor sanitation directly results in increased malaria burden [26]. Well-planned urbanization will help reduce malaria transmission through destruction of mosquito breeding sites and improved housing [27]. To achieve the shared objective of optimum health for the population, the malaria community must work closely with all stakeholders to strengthen health systems. Countries that have eliminated malaria have worked with other ministries, departments, and agencies in the country [28]. National Malaria Control Programmes must leverage local networks and strengthen collaboration by identifying common areas of interest and shared objectives. There is also a need to strengthen regional integration and harmonization of efforts of National Malaria Control Programmes in order to address cross-border malaria transmission. These collaborations need to be maintained and continually strengthened, beyond when the immediate public health needs are met.

The malaria community must expand beyond the “malaria box” and cede some control to other stakeholders. Potential partners—such as the faith/religious community, academia, the military and the private sector—could make critical contributions to malaria elimination efforts as they did for COVID-19, and this could be a game-changer for malaria too [29–31]. There are also other potential partners within the broader health space who could be engaged, such as the Coalition of Partnerships for UHC and Global Health. The malaria community will need to “speak the language” familiar to others to engage these partners in potentially meaningful action (see Key Theme 4). The mindset of malaria program implementers must change from seeing clients as “belonging” to a specific program to building a holistic and resilient health system in which people with any disease (existing disease, including malaria, or novel diseases such as COVID-19) can obtain care.

The effort to strengthen health systems should also include community health systems as a key conduit to reach the unreached. It is important to work closely with and listen to community members to ensure co-creation and ownership of effective strategies to improve malaria outcomes. Malaria control and elimination interventions (e.g., indoor residual spraying, larviciding) may be delivered more effectively if
delivered by people from and living in the target communities—this would improve ownership, monitoring, and evaluation. Additionally, COVID-19 illuminated how pivoting to offer services closer to communities can help reduce density at overcrowded health facilities and increase access and acceptability during emergencies. For example, ITN distribution was less-heavily disrupted during peaks of the COVID-19 pandemic because much service delivery involved community members [32]. This further reinforces the importance of building and fostering strong implementation of malaria control—and other public health—interventions at the community level.

*Key theme #2: Reframe malaria as an equity issue.*

The burden of malaria is not equally borne by all members of society [33]. The malaria community must prioritize research on inequities to inform development of strategies to mitigate these inequities. This is particularly important because not all countries, communities or individuals are starting at the same place—history, culture, politics, economics, social communities and other contextual factors all work hand-in-hand in ways that affect equity. These groups will continue to be neglected by traditional malaria services and will continue to see disproportionate burden until we fully understand who is most vulnerable to malaria and why in different contexts, including the intersectionality of risk across demographic, geographic, and other factors. An improved understanding of equity also would highlight where service integration, within and beyond the health sector, could present the largest opportunity to improve population health outcomes.

A better understanding of intersectionality and malaria risk should be used to strengthen policies, programs, and clinical care and identify key opportunities for integration. Not everyone is equally vulnerable to malaria. For instance, it is well-established that inequities in geographical and financial access to health services are important drivers of inequities in health outcomes [34–36] [37,38]. Social determinants, such as socioeconomic status, intersect with these factors to affect risk of infection. People who live in higher-quality housing with air conditioning experience fewer malaria episodes than people who live in homes without screened windows [39]. Wealthier people even in malaria-endemic areas, have better access to health care and malaria treatment [40]. But formal study of inequity of malaria burden and management has been relatively under-emphasized in the malaria community.

This requires research on the social determinants of malaria burden (incidence, morbidity, and mortality) and behaviors (access and adherence to prevention and treatment). Funders and scientific agencies like the National Institutes of Health (NIH) should finance this research; journals and editors should solicit articles on these topics (and widen the pool of potential reviewers to give adequate and fair assessments to these papers); and the malaria community should be open to the expertise of social and behavioral scientists. Compared to other health topics, the malaria community has been inattentive to this subject. A PubMed search of scientific papers about inequities in HIV, tuberculosis, and malaria demonstrates this discrepancy (Figure 4). Since 1987, there have been 1120 articles published about HIV and inequities or social determinants, 297 articles published on tuberculosis and inequities or social determinants, and only 155 articles about malaria and inequities or social determinants. This illustrates the clear opportunity that exists for the malaria community to welcome new and essential perspectives from other disciplines such as the social sciences, in understanding heterogeneity of risk.
We also encourage thoughtful deliberation within the malaria community of what “equity” means. How will we know when equity has been achieved? And are we seeking equity in access to technologies and commodities, or to services; or are we seeking equity in outcomes such as incidence or mortality? Trade-offs and potential efficiency losses – operating within countries (across groups, or across subnational regions) and across countries (at regional and global levels) – may complicate these decisions, so they should be carefully considered.

Governments of high-burden countries should consider mechanisms to reduce inequities, such as National Health Insurance schemes with arrangements that cater for the poor and vulnerable [41,42]. Strengthening community health systems including the services delivered at community clinics and drug retail shops and linking them seamlessly with the formal health sector using strategies such as telemedicine, medical specialist outreach, strengthened referral services will address to a large extent, geographical barriers to healthcare while integrating community and public sector health care delivery. (See Key Theme 1 for more information on health system strengthening, including at the community level.)

Addressing the social determinants of health will require multi-level and intersectional strategies – and, with an improved and more nuanced understanding of how social forces impact malaria burden, policymakers can begin to adjust and expand their approaches accordingly. This information will be critical for developing and deploying a truly multi-sectoral malaria response for integrated service delivery. If research highlights a disproportionate burden among adolescent out-of-school girls or among migrant workers who live in temporary low-quality housing, for example, then the corresponding stakeholders and government ministries can be involved in relevant policymaking. Although analyses have modeled the potential impact of multisectoral action on malaria burden [43], this has not resulted in sustained involvement of broad stakeholders in the malaria response. There may be little incentive for those beyond the Ministry of Health to engage in malaria control discussions until their involvement in the underlying risk factors—and consequently their essential role in the response—is made clear. Additionally, by engaging more stakeholders, this may also widen the fiscal space and introduce new perspectives for formulating and implementing strategies for integrated service delivery for malaria control [44]. (See more on engaging diverse stakeholders in Key Theme 4.)
Greater attention to heterogeneous risk and social determinants of burden also presents an opportunity to engage social movements, civil society, and civic activism in affected countries. One major area of opportunity is the powerful women’s movement. By acknowledging the essential role of women and girls in the fight against malaria—as caregivers and decision-makers in their households, and as leaders in governments and societies—the malaria community could leverage a significant source of social and political strength. This applies to every aspect of malaria control—women can lead advocacy efforts for increased local investments in malaria (see Key Theme 5), but they must be properly equipped with information (see Key Theme 3) and financially empowered to do so. Existing limitations, such as gender inequality and economic disparities in many high-burden countries, may have hindered such efforts to date [45], so donors and other stakeholders must be more intentional in designing mechanisms and incentives to harness this opportunity. Young people are also increasingly active in advocacy and policy efforts, as we see in the case of climate change. Youth should be engaged and supported to organize sustainable advocacy efforts for malaria, including building on their existing climate change efforts. Collaborating with community movements such as “Zero malaria starts with me” and the youth-focused “Draw the line against malaria” may help synergize with community partnerships in the fight against malaria.

Key theme #3: Make data on malaria visible, accessible, and actionable at all levels.

Integrated service delivery requires high-quality data—which in turn needs health information systems that collate timely and complete data. For high-burden countries, the Global Malaria Programme proposes moving away from “one-size-fits-all” interventions to tailored implementation depending on the local epidemiological context, geography, disease burden and human behaviour. To do this effectively, high-quality, rapidly disseminated data are necessary. Additionally, integrated service delivery is a “data-hungry” endeavor. For example, building and running a responsive supply chain for integrated services requires detailed, local data about the occurrence and co-occurrence of health conditions. If the data are not valid and reliable, resulting in misclassification of ailments, or do not provide timely information, resulting in missed seasonal or other fluctuations, supply chains will not be able to deliver appropriate commodities to the right places, for the right needs, at the right time. This will result in product wastage, stockouts and likely mismanagement of diseases, with consequences on health outcomes. Data systems therefore must be strengthened to enable integrated service delivery for malaria.

Existing data systems have important gaps: private sector information may not be included because of data alignment and coordination challenges; and data on malaria interventions, especially community-based diagnosis, treatment, and prevention, also may not be consistently incorporated. These omissions mean that incomplete data are being used for decision-making. Ministries of Health and National Malaria Control Programmes must develop mechanisms for linking of health information data from diverse sources and across levels of the health system. This is essential for service integration, as a full data picture is necessary to ensure seamless and holistic service delivery across contexts, sectors and service delivery outlets. Routine Health Information systems also need to be expanded to include all aspects of health information related to malaria control activities than are currently included. Some key malaria control tools—particularly those related to vector control like mass distribution of ITNs, IRS and seasonal malaria chemoprevention—are not routinely delivered by health providers through routine health care services in all countries. Thus, measuring the implementation, coverage and outcomes resulting from these important interventions is not part of routine health information; and we must look to build data and monitoring systems that include all information from efforts to reduce malaria burden.

The existing health information system data on malaria are also not visible to those who generate the data or who are represented in the data. Program implementers and frontline managers often collect
epidemiologic data on malaria, but do not analyze the data themselves or use the data to inform local decisions. At present, data on malaria are often generated at health facilities and ideally are included in the District Health Information System (DHIS) or sometimes in a stand-alone malaria information system, from where it may be forwarded to regional and national levels. Most frontline health workers therefore may not have full visibility of the data they contribute to, even at their level and are therefore unable to clearly appreciate where they have come from, where they are and where they are going in regard to their efforts in the control and elimination of malaria.

We need a shift in mindset: from one where data satisfies the needs of others at a higher level, to one where there is ownership and need for data at the level where the data are generated. Every stakeholder involved in the control of malaria, whether in service delivery, research, policy making has a role to play in gathering, analyzing and using information. Those who tend to only gather information must be equipped to analyze and use it at the level where it is gathered. Efficient and effective use of data for decision-making, planning, and implementation should be incentivized to catalyze this shift in mindset. There is also a need for investment in technological and other innovations that can make malaria data more succinct, available and accessible at all levels.

Data must be made available in a format that is understandable, user-friendly and accessible in a timely manner, particularly at the level where they are generated. Data on COVID-19 offer a lesson for the malaria community. Countries and sub-national settings have reported a few key indicators, updated rapidly, to allow comparison within and between countries. Similarly, the malaria community needs to invest in better data collection platforms and systems and in mechanisms to disseminate this information in a simple form that can be appreciated by diverse groups, from citizens to health workers to those at different levels of government. Reported data elements might include the number of confirmed malaria cases, number of malaria deaths, number of malaria-related hospital admissions, coverage of preventive methods (e.g., bed nets, intermittent preventive treatment among pregnant women), and cost per malaria episode. An example proposed malaria “dashboard,” modeled off the Ghanaian Ministry of Health’s COVID-19 dashboard, is shown in Figure 5.

Figure 5. Sample malaria dashboard based on COVID–19 dashboard data points.
then use these data to make informed assessments of their level of satisfaction with these decisions made. This cycle of data-driven accountability itself creates incentives for generating more and better-quality data. Approaches like performance-based financing and expanded use of community scorecards -- wherein communities and health providers agree on a set of indicators and regularly and collaboratively monitor them -- have been proposed as strategies to achieve local accountability [46–48]. However, effectively implementing these requires investments in increasing capacity for data-driven decision-making, and for data democratization that will allow people of all backgrounds to understand the malaria situation.

Leaders must also be skilled and empowered to use data for decision-making, and to course-correct based on data as the local situation changes. Capacity requirements for those in public health leadership positions should be broadened beyond core technical skills to also include data fluency as well as "soft skills" such as working with diverse stakeholders and managing their interests for the common good. Likewise, citizens need to be informed and empowered to hold their leaders accountable. National Malaria Control Programmes can take advantage of recent technological advancements to achieve timely dissemination of accurate data to a diversity of audiences. This can include moving beyond traditional media (e.g., television and radio spots) which may not be a frequent or trusted source of information, especially by youth. Nearly half of sub-Saharan Africans own a mobile phone [44], so this offers a powerful social and behavioral change tool [45]. Additionally, using a credible source to disseminate locally relevant and high-quality data may help combat misinformation, myths, and rumors.

High-quality malaria data systems will benefit other disease areas as well. Existing surveillance networks were instrumental during COVID-19 in many high-malaria burden countries; malaria data scientists have expertise in and systems for diagnosing, reporting, and tracking febrile cases, which presented clear opportunities during early phases of the COVID-19 pandemic. If malaria data systems report data in a reliable and timely manner, this could help detect new fever hotspots and catch disease outbreaks early. Similarly, COVID-19-related investments in surveillance and data system infrastructure could be leveraged for the malaria community if and when the “acute” stage of the pandemic recedes.

**Key theme #4: Make a case for investing in malaria that resonates with diverse stakeholders.**

The global malaria community must make a compelling case for malaria that frames it as an investment rather than an expense, and advocates for integrated services. Although stakeholders in the public health space may be motivated by health-related outcomes and objectives, this may not resonate with the broad coalition of policymakers, activists, politicians and individuals who should be engaged more actively in the malaria response (see Key Themes 2 and 3). This coalition includes both global and domestic stakeholders. With increased service integration and ultimately the move toward UHC, this coalition will diversify even further, and the investment case will need to adjust accordingly.

First, we urge rethinking of the malaria community’s conceptualization of “elimination.” For countries far from this goal, its ambitiousness risks discouraging policymakers and practitioners. For people living in high-burden countries where malaria is ever-present, there is disconnect between their lived everyday experience and this objective. Elimination of malaria must be seen as a continuum with communities, districts and countries at various points along the continuum. We propose that policymakers, from global agencies to national and subnational entities, reconsider the framing of malaria goals and identify nearer-term objectives. These should form the basis for malaria plans and policies, with associated realistic timeframes. Incremental gains on the path to elimination should also be acknowledged and celebrated. Realistically, there is no short-term path to malaria eradication for high-burden countries, so the language and commitments of donors and policymakers should instead move toward a long-term trajectory. This requires corresponding shifts in how malaria financing is conceptualized and offered; as countries
progress through incremental improvements, the mosaic of financing, policies, clinical guidelines, and programs also must evolve. Expectations about reasonable outcomes, timeframes, and costs should adjust as countries progress on this trajectory. While it is important to leave no one behind, we also must recognize that there will be varied progress across and within countries. Program implementers, policymakers, frontline managers, and affected communities must jointly own and celebrate successes along the way as they focus on “control,” while keeping in mind the longer-term objective of “elimination.”

Second, although malaria causes substantial disease burden, it may not be viewed as a high-priority issue even among those most affected. National governments must align their priorities—and their spending—with local needs and priorities. Identifying a compelling and meaningful goal is therefore essential. Other needs, such as necessities of living (housing, food, employment) and even other health issues may be more top-of-mind [49]. Improved data collection and reporting malaria statistics in a meaningful and “provocative” way (see Key Theme 3) may shift some people’s perspectives, but the malaria community should be receptive to the notion that other health indicators may carry more salience. Overall health and wellbeing—to which malaria contributes only one aspect—may be a more compelling frame for some. This may be particularly true in the context of UHC and PHC and the increasing emphasis on building resilient and comprehensive health systems that address health as a multidimensional construct. We must note that such broader goals may be less compelling for donors and international agencies that rely on vertical programs’ tightly prescribed measurement for monitoring and evaluation. This recommendation is thus tied closely to the key concepts of service integration and the need for fundamental rethinking of what malaria progress means in the context of a world moving toward UHC. We encourage introspection, exploration, and reassessment of whether broader health goals carry more meaning and relevance and should be prioritized.

Third, the malaria community must commit itself to developing and disseminating investment cases that speak to diverse audiences. Although there have been numerous analyses of the cost–benefit of investing in malaria [1], these may not reach the desks of influential stakeholders outside the public health community (e.g., policymakers in other ministries such as finance). If the Ministry of Health is not well-positioned for knowledge translation of modeled estimates of economic returns on malaria investment, then other groups—such as think-tanks, advocacy, and other civil society organizations—should be empowered to do so. This will require a candid reconsideration of who is motivated by what information and the most effective conduits for these messages. Local messengers equipped with the right information have the potential to unlock local resources and political will. It also may be necessary to expand our evidence base to build compelling investment cases: for example, conducting local or regional analyses that emphasize the benefits of in-country or in-region manufacturing of commodities, or of the context-specific particularities of program implementation. Additionally, in light of the aforementioned recommendation to reconsider endpoints (e.g., if “elimination” is de-emphasized, and if inter- and intra-national variations and incremental progress are prioritized), investment cases should be constructed to allow flexibility in outcomes that are most compelling and salient to different stakeholders and at different points in time. For example, this might include economic indicators such as productivity or jobs creation and sustainment, alongside health indicators. This would be a substantial undertaking, so donors and research funders should support such research and knowledge translation efforts. Reframing malaria as a compelling investment rather than an expenditure is a necessary step toward building national and local buy-in for malaria control efforts.

Lastly, we highlight a recommendation that runs throughout this theme: the importance of elevating and amplifying local voices. The malaria response must not continue to be “driven” by donors and so-called experts from high-income countries. Local expertise, on everything from R&D to implementation to
measurement, must be moved into the forefront. The current investment case for malaria—what to do, why to do it, how to do it—is largely driven by global agencies and technical experts from high-income countries. This should change. Every health program should work toward priorities of those in the most-affected regions, not in response to the goals and mission of the donor agency. This will require international agencies, donors, and scientists to reposition themselves as active allies to researchers, policymakers, communities, and organizations in affected countries. There must be investment in, and commitment to, local and regional responses to malaria.

Key theme #5: Improve access to current information on best practices in implementation and integration of malaria interventions.

Too little is known about “how” to integrate services, and about effective implementation strategies for malaria interventions. We need to enhance the malaria “toolbox” by including this “how” of implementation, operational insights, and lessons from implementation in other disease programs and settings. While malaria program implementers are well-equipped with core technical skills, they lack implementation science skills, which are critically needed for improving the effectiveness of malaria interventions in a variety of settings.

Having an effective drug, diagnostic, vaccine, or prevention technology is necessary but not sufficient to achieve improved health outcomes. Critically, implementation science provides the theories, frameworks, and methods to help plan, design, deploy, adapt, and evaluate strategies to increase impact of proven- efficacious technologies and interventions. Implementation scholarship emphasizes measurement of implementation outcomes [e.g., acceptability (or feasibility), fidelity, costs, sustainability] alongside more traditional outcomes (e.g., effectiveness, equity) [50]. This orientation toward the “how” of implementation could be transformative for the malaria community. It would comprise an expanded research agenda for scholars (and a multidisciplinary, biobehavioral, intersectoral approach as encouraged by Key Theme 2); a more conscientious, systematic approach to implementation for Ministries of Health and partner organizations, with a corresponding broadened set of monitoring indicators; and new opportunities for knowledge generation and translation into updated policies, clinical guidelines, and programmatic technical guidance.

Yet research on implementation science design in the context of malaria is limited. A PubMed search for peer-reviewed publications on “malaria” and “implementation science” or “implementation research” from 1990 to 2020 shows that only in the past five years has there been some increase in such publications; further, during this recent period, there has been far less implementation research about malaria than in the HIV community, for example. Research in this area must be further encouraged, as it clearly aligns with the Global Malaria Programme’s shift from a “one-size-fits-all” approach to implementation to an approach that considers the specific context and its stakeholders and works with them to optimize implementation. It also aligns with the shift from viewing countries as being in distinct categories of “control,” “consolidation,” “pre-elimination,” and “elimination” — to being along a continuum towards elimination requiring iterative planning with anticipation of transition and evolving approaches at national and sub-national levels [51].

We need to contextualize implementation, understanding that real life differs from experimental situations. The malaria community has traditionally assumed that proven- efficacious tools should work equally well in all settings. Yet studies repeatedly demonstrate that efficacious interventions can lose traction as they are implemented in the health system, resulting in much lower effectiveness (Figure 6). This is seen clearly when highly efficacious vector control tools are distributed in one place and do not seem to work as well as they had worked elsewhere [52]. To increase the effectiveness of interventions
in the “real world,” implementers and other stakeholders need to identify implementation challenges and design strategies to address them.

**Figure 6.** Efficacious interventions lose traction as they “travel” through health systems (adapted from WHO/TDR Implementation Research Toolkit).

Implementers must be equipped to consider the social and behavioral science that drives implementation and not to expect interventions to work similarly and achieve the same results everywhere. Implementers must be knowledgeable in the foundational concepts of implementation science, which will enable them to identify where specific target beneficiaries of an intervention are on the diffusion–dissemination–implementation–adoption–sustainability continuum, at any point in time [53]. This will ensure flexibility and responsiveness to changing contexts as the malaria burden evolves and as novel disease and implementation challenges arise.

**Key theme #6: Facilitate research and innovation to develop new solutions in and by the most affected regions and countries.**

The importance of research and innovation in accelerating progress toward elimination of malaria cannot be overemphasized. New tools and strategies – developed through research and innovation -- are needed to catalyze progress; and are fundamentally linked to the aforementioned themes around integrated service delivery as they will have limited impact without improved service delivery and integration. There is thus a deep interconnectedness between R&D and service integration.

Local research institutes in high-burden settings must promote research and innovation, particularly around tools that will facilitate service integration. For example, several diseases present akin to malaria and can only be differentiated using diagnostic tools. The COVID-19 pandemic posed a diagnostic dilemma
at outpatient departments in malaria endemic areas, since patients presenting with fever might have malaria, COVID-19, both, or a different cause of fever altogether such as urinary tract infection or pneumonia. We therefore need a point-of-care test that can differentiate between malaria and other common causes of fever including those caused by viruses such as COVID-19. Such a tool would ensure accurate diagnoses while also serving as a multiplex point of entry for primary care.

The COVID-19 pandemic brought into sharp focus how high-priority issues with major political dedication and financial resources can massively accelerate R&D achievements. High-burden countries should lead advocacy efforts to keep malaria high on the global health agenda. R&D efforts should be a top priority for intergovernmental organizations such as the African Union and Asia-Pacific regional organizations. To achieve this, nations need to be more involved in funding themselves. Given gaps in infrastructure, technology platforms and lack of a critical mass of skilled scientists, there is a need to find sustainable solutions that embed local capacity development in any R&D strategy.

Additionally, the speed of COVID-19 vaccine development offers lessons for the malaria community: decision-makers must reverse the traditional, linear approach to innovation for malaria. But challenging the status quo requires unconventional approaches. For example, freedom of thought in R&D may be hindered by financiers’ prescription of how to spend funds; so entrepreneurs from affected countries should be encouraged and more involved in developing new tools for malaria. Young researchers must be encouraged and supported to “think outside the box” for innovation.

Research institutes in regions and countries that bear the greatest burden of malaria must take the lead in prioritizing projects that will provide solutions to their problems and should seek to overcome barriers, from the laboratory to the legislature, that limit progress. More local institutions in Africa and high-burden settings should engage in R&D and clinical trials. The solutions that are needed in the field must drive the agenda for research, development and innovation. Dynamics in R&D partnerships -- including across other diseases -- should be re-assessed to ensure that projects are prioritized not just on who holds the purse but on what is relevant for accelerating progress toward malaria elimination. Relaxation of import/export regulations can ease the acquisition and sharing of reagents and research products, which would facilitate priority access to developed products, including vaccines, diagnostics, drugs, and LLINs. There also is a need to establish R&D networks with strong regulatory linkages in the regions most affected by malaria that will facilitate swift prioritization of new interventions from early-stage laboratory and clinical evaluation to large-scale implementation.

We call for papers to provide direction for re-thinking malaria in key R&D areas, including vector control, new and more effective drugs, vaccine development, diagnostics, and data science.

Discussion
The objective of this working group within the Rethinking Malaria in the Context of COVID-19 global engagement was to consider what it would mean, and what it would take, to achieve integrated service delivery for malaria. Through many structured discussions with stakeholders—including, critically, voices from those “at the front lines” of the malaria response in highly-affected countries—we aimed to identify challenges and corresponding opportunities. We identified six key themes, and here we articulate specific recommendations aligned with each (Table 1).
Table 1. Challenges and corresponding opportunities to malaria service delivery integration for malaria.

<table>
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<tr>
<th>Key Themes</th>
<th>Specific Program &amp; Policy Action Recommendations</th>
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| Contribute towards building strong, resilient, and sustainable health systems | • Engage in multi-sectoral planning and policymaking  
• Build local networks and collaborations and “speak the language” familiar to other stakeholders in order to facilitate meaningful engagement and action  
• Work closely with communities to ensure co-creation and ownership of effective strategies                                                                                                            |
| Reframe malaria as an equity issue                                        | • Invest in research on the “social determinants” of malaria burden  
• Emphasize intersectionality of malaria risk through responsive, multi-sectoral approaches  
• Expand the malaria scientific community (e.g., journal editors, reviewers, scientific conferences) to include social and behavioral scientists  
• Engage social movements (i.e., youth and women) in malaria activities                                                                                                                                   |
| Make data on malaria visible, accessible, and actionable at all levels     | • Leverage recent technological advancements to link data on malaria burden and service coverage from across sources and levels of the health system  
• Design dashboards and data reporting formats that are meaningful to all people and actionable  
• Empower policy and program stakeholders from national, regional, and local levels to interpret and act upon data  
• Empower community members to hold their local leaders accountable for the malaria burden in their locality                                                                                             |
| Make a case for investing in malaria that resonates with diverse stakeholders | • Engage in global-local dialogues about what malaria program goals should be, with attention to other competing priorities and intra-national disparities  
• Match timeframes in funding and policies to what is reasonable for the goals stated  
• Foster research to conduct salient investment cases for malaria, with leadership of local scientists, input of local data, and selection of locally meaningful endpoints/outcomes  
• Invest in systems for knowledge translation, to empower advocates, community groups, and diverse coalitions of policymakers, with information necessary to recast malaria control as an investment not an expenditure |
| Increase research into best practices of implementation and integration for malaria | • Prioritize dissemination and implementation science research to identify strategies for increasing the uptake and impact of malaria prevention, diagnosis, and treatment technologies  
• Equip implementers with implementation science skills to enable them to have the “know how” for integration of malaria with other health programs and services                                                                 |
| Facilitate research and innovation toward the development of new           | • Local entrepreneurs from high-burden countries should be encouraged and involved in investing in developing new tools                                                                                                                                                 |
solutions in and by the regions and countries that are most affected for malaria, particularly those that promote and facilitate service integration

- High-burden countries should lead advocacy efforts to keep malaria high on the global health agenda.
- Research groups from affected countries should drive their own local R&D efforts

Central to the notion of “rethinking malaria” in the context of integrated service delivery is a reconsideration of where we are, and where we are headed. If the global community is pointed toward universal health coverage, malaria programs and policies must figure out where they fit. This will require transformations in all corners of the malaria community, as outlined above. The impact of integration is likely to be substantial -- but only if all the requisite building blocks are strong enough to support it.

Bearing this in mind, and throughout the key themes articulated above, there are several changes in mindset and terminology that may be necessary. We urge deep thought and urgent action about de-colonizing malaria programs and policies: these should be prioritized, designed, implemented, and evaluated by the communities most affected. We encourage a de-commoditization in the malaria response; effective products are necessary, but health services and systems are the “engine” that will get us to elimination. Emphasis must be placed on implementation, the development and dissemination of new tools, and the malaria community needs to engage more meaningfully in ongoing broader discussions e.g., around climate change and health systems strengthening.

Business as usual will not beat malaria—and particularly not during emergencies like COVID-19. We need more money, stronger systems, improved tools, and greater and broader buy-in. The malaria community has an opportunity to take a leadership role in strengthening health systems and moving towards integrated services and, ultimately, universal health coverage.

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