A literature review of economic and financial factors influencing population access to core malaria interventions: preventive therapies, rapid diagnostic tests and antimalarial treatment.

Dr Lesong Conteh
School of Public Health
Faculty of Medicine
Imperial College London
London, United Kingdom

Dr Catherine Grant
Institute of Development Studies
Brighton, United Kingdom

Dr Edith Patouillard
Global Malaria Programme
World Health Organization
Geneva, Switzerland

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Summary

This section attempts to summarise the evidence reviewed in this report. For additional details and nuances in the evidence summarised here, we invite readers to refer directly to Section 3 Results.

After 15 years of success in global malaria control, progress in reducing morbidity and mortality has stalled and the likelihood of reaching the GTS milestone of a 40% reduction in malaria case incidence and mortality rate by 2020 is small. In 2016, there were 5 million more cases than in 2015 or an estimated 216 million cases and a stagnated number of deaths at 445,000 deaths [1]. In that same year, 15 countries – all but one in sub-Saharan Africa – carried 80% of the global malaria burden [1]. A better understanding of the factors contributing to this situation is required if adequate strategies are to be developed for ensuring progress towards the GTS 2020 milestone. In the context of the WHO Technical Consultation on universal access to core malaria interventions in high burden countries 12-15th February 2018, the available evidence on the demand and supply-side constraints of core malaria control interventions was reviewed as well as on the impact (or absence of) of the strategies recently implemented to address these constraints.

The focus of this report is on the demand and supply side constraints of economic and financial nature affecting population access to malaria control interventions, including preventive therapies, rapid diagnostic tests and antimalarial treatment. Preventive therapies included intermittent preventive treatment in pregnant women (IPTp) and seasonal chemoprevention in children (SMC). Case management focussed on rapid diagnostic tests and antimalarial medicines used in the treatment of uncomplicated or severe malaria. A conceptual framework of economic and financial constraints on the supply and demand of malaria control interventions was developed drawing on Vassall and colleagues [2]. Demand side constraints included factors related to household resources, poverty or socioeconomic status; ability to pay; household general values and preferences for providers, services or products. Supply side constraints related to factors at central, district and facility levels and health financing at both national and international levels. The framework also considered strategies for addressing economic or financial constraints on the supply and demand of the above-mentioned core malaria interventions. Evidence of the non-financial constraints and strategies were outside the scope of this review. Whilst this review identifies relevant qualitative and quantitative research that refers specifically to economic and financial factors influencing (or not) access to specified malaria interventions, it is not a meta-analysis and does not quantify the economic and financial determinants of demand and supply. It is not an exhaustive review of all factors associated with the demand or supply of the specific core malaria interventions that are focused on in this report, but more a narrative review that has sought to identify literature referring to economic and financial determinants and access. Reporting the costs and cost-effectiveness of strategies for addressing supply and demand constraints are outside the remit of this review. Finally, the reviewed studies are often set in a single location or country and any extrapolations of the evidence they report to other contexts should be considered carefully. Pubmed and Econlit databases were searched using key words related to the conceptual framework. A snowball approach was used to identify additional relevant articles from the lists of references of articles retrieved during the initial searches. The focus was on articles published on malaria endemic countries in English between 2010 and 2017. Additional documents were identified from key experts or institutions working in the field of malaria.

A total of 510 studies were identified, of which 150 (29%) were relevant to our review on preventive therapies, RDT and ACT. Out of these 150 studies, 51 (34%) were relevant to Theme 1 of the conceptual framework, 62 (41%) to Theme 2 and 29 (21%) to Theme 3. Across the three themes, the focus of the identified studies was on malaria endemic countries of the WHO African region and notably on the top 10 malaria endemic countries in 2016. Outside Africa, studies concerned the WHO

South East Asia region. No relevant studies were identified in the WHO America and Eastern Mediterranean regions.

Theme 1: Demand-side constraints

A vast number of studies retrieved during the literature search reported on the different socioeconomic characteristics associated with *use of* preventive and curative services for malaria. Fewer studies reported *how* these differences influenced access. The body of evidence on financial and economic factors influencing access to curative services was found to be larger than for preventive therapies. Decisions to seek care or not in cases of suspected malaria, the timeliness of care seeking and the types of providers visited were reported to be affected by financial and economic factors. Not seeking care and delaying treatment outside home were found to be influenced by the direct costs of commodities, services and travel to the point of care combined with populations' limited ability to pay and socioeconomic status. Evidence on how remoteness from health care providers constrained demand for services was mixed, though with a sense that proximity to services mitigates travel costs and may contribute to seeking treatment outside home. Factors influencing treatment seeking decisions for children were found to differ from that of adults. Household gender and economic dynamics – through women engaging in economic activities or men capacity to provide financial resources or facilitating transport, were mentioned as facilitating treatment seeking. Having health insurance was reported by one study as positively associated with demand for treatment. The choice of provider was strongly associated with population socioeconomic status, age and geographic location. When treatment was accessed, lower socioeconomic groups were often reported as spending higher proportions of their income on accessing malaria treatment. Evidence indicated that spending towards malaria treatment existed even in situations where services were meant to be provided free of charge. Out-of-pocket payments were often mentioned as the main payment type whilst health insurance was reported by a single study relating to malaria, although with mixed outcomes. Evidence relevant to IPTp demand related to very similar issues, including direct costs, travel and waiting time, and formal / informal user fees. However, supply-side constraints were also reported as key inhibitors to IPTp access as noted under Theme 2. Finally the review did not identify any study providing evidence on how financial or economic factors may influence SMC demand.

Theme 2: Supply-side constraints

The limited resources available to public health facilities, notably in the context of user fee reduction or abolition policies were reported as a supply-side issue preventing the good functioning of facilities and potentially adherence of health workers to fee exemption or removal. At the community level, evidence concentrated on the extent that integrated community case management contributed to improved access to timely and appropriate treatment for fever amongst hard to reach children. Securing access to these services was reported to require investment in training and supervision of providers and treating malaria as part of management of febrile illnesses rather than as a standalone disease. One potential barrier to sustainability related to the issue of financial motivation for the community health workers. Much has been debated about financial versus non-financial incentives but findings seem inconclusive, although there may be a growing consensus that financial compensation could lead to more sustainable delivery modes. The private commercial sector literature related to the important role of the private sector in malaria treatment and on how to improve equitable access to RDTs and ACTs, notably through commodity price subsidies. The reviewed evidence on the impact of subsidies and other strategies working with private commercial providers is reviewed under Theme 3. As for IPTp, insufficient budgetary allocations were reported as one financial barrier to effective implementation across Africa, alongside several non-financial ones not reviewed in this report. The review did not identify evidence on how economic or financial factors may influence SMC supply. Finally, both domestic and international financing issues combined with

challenges in cost-effectiveness considerations were identified as constraints on an efficient supply of core malaria control interventions.

Theme 3: Strategies to address demand- and supply-side constraints

The review did not identify any robust impact evaluations of demand – side financial strategies. Much more has been written on the impact of supply-side strategies, although experimental or quasi experimental studies were rare. Key strategies identified during the review included: the removal/interruption of user fees at public health facilities; ACT and RDT price subsidies, in the public and/or private sector and at manufacturer or retail outlet level; pay for performance in the form of financial incentives to health workers and/or facilities upon attainment of pre-defined service delivery targets; and, other strategies working with private commercial providers, including RDT introduction, training and supervision. Evidence of their impact or suggested impact is reviewed in details under Section 3 of the report.

1. Introduction

The Global Technical Strategy for malaria 2016-2030 includes malaria control and elimination targets for 2030 and interim milestones for 2020 and 2025. The nearest GTS milestone includes a reduction in malaria case incidence and mortality rates of at least 40% by 2020 compared to 2015 levels, the elimination of malaria in at least 10 countries and the prevention of re-establishment of the disease in countries that are malaria-free.

After 15 years of success in global malaria control, progress in reducing morbidity and mortality has stalled and the likelihood of reaching the 2020 milestones is small. In 2016, there were an estimated 216 million cases of malaria or 5 million more than in 2015 and around 445,000 deaths [1]. The African Region continues to bear an estimated 90% of all malaria cases and deaths worldwide. Fifteen countries – all but one in sub-Saharan Africa – carry 80% of the global malaria burden [1].

Universal access to WHO-recommended interventions is necessary to reach the GTS milestones, especially in counties with the highest malaria burden. A better understanding of these gaps and how they relate to malaria burden especially in high burden countries, the factors contributing to these gaps, populations affected and types of strategies that may be used to reduce these gaps are required to ensure progress towards UHC and the GTS 2020 milestone.

This report summarises the available evidence on the factors contributing to gaps in access to malaria control interventions, with a particular focus on economic and financial constraints on the supply and demand of core malaria interventions in high burden countries. Evidence pertaining to the non-financial factors and interventions is reviewed in separate reports. The next section describes the methods used to review the economic literature and is followed by a section presenting and discussing the results.

2. Methods

Scope of the review

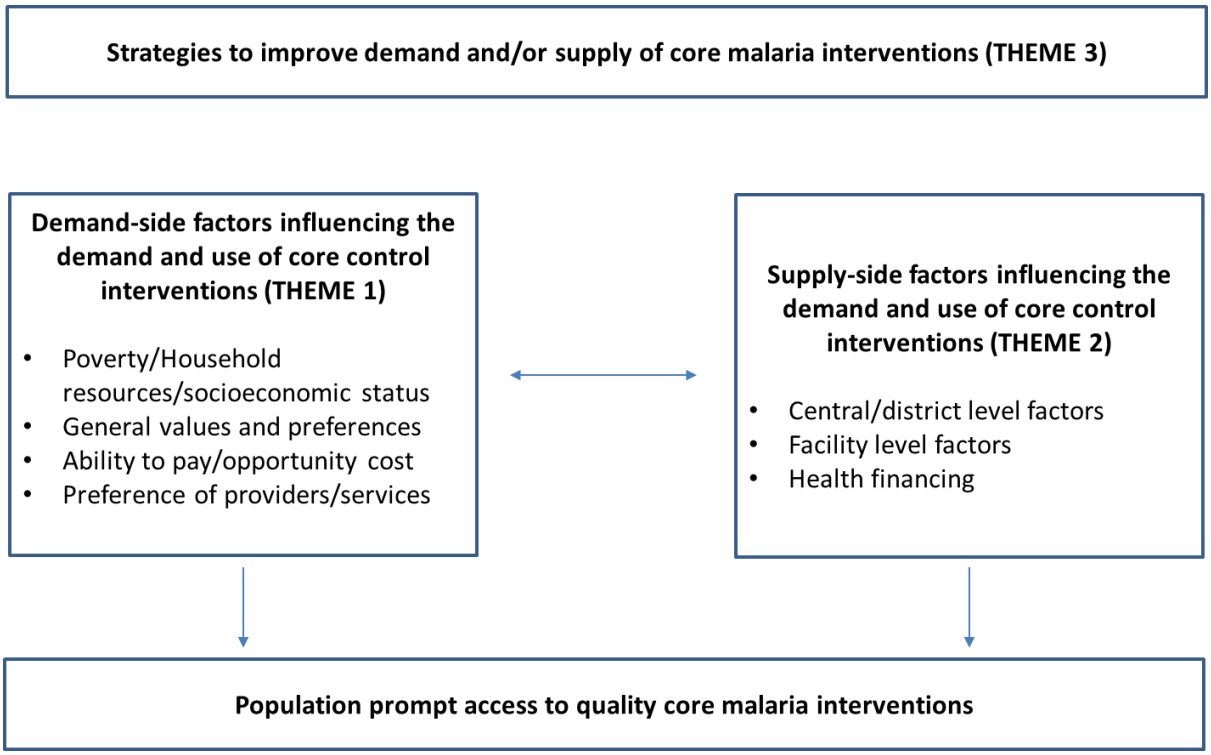
The aim of this review is to identify the key economic and financial factors reported in the literature to influence population access to malaria control interventions. It is not concerned with the absolute costs and cost effectiveness ratios associated with interventions, but rather the range of economic determinants that influence their availability. In this report, core malaria interventions include preventive therapies, rapid diagnostic tests and antimalarial treatment. Preventive therapies include here intermittent preventive treatment in pregnant women (IPTp) and seasonal chemoprevention in children (SMC). Case management focuses on rapid diagnostic tests and antimalarial medicines used in the treatment of uncomplicated or severe malaria.

Conceptual framework

The review draws on a simplified conceptual framework of factors influencing the supply and demand of an intervention [2]. An intervention is defined as a technology and activities to support its optimal use [2]. In this report, the framework was adapted to focus on economic and financial factors hypothesised to influence the performance of the core malaria interventions under study (Figure 1).

On the demand side, demand and adequate use of interventions may be influenced by household resources, ability to pay, general values and preferences (Theme 1). On the supply side, the availability and quality of interventions may be influenced by economic and financial factors playing at central, district and facility levels and more broadly through health financing policies and arrangements (Theme 2). The conceptual framework also considers the strategies that may be implemented to improve the performance of interventions by addressing supply and/or demand side constraints (Theme 3). Non-financial factors such as socio-cultural and gender dynamics; knowledge and information barriers; and health facility deterrents [3] [4] are outside the scope of this review and not included in this report.

Figure 1 Simplified conceptual framework



Search strategy

PubMed and EconLit dababases were used using key terms described in Appendix A and focusing on references written in English and published since 2010. Abstracts were read and when relevant to the review topic full texts were collected and read for relevance. In case of doubt on the relevance of the study, the reference was read by another researcher to confirm inclusion or exclusion. Evidence from reports of institutions working on malaria was also reviewed when reports were available to the researchers.

3. Results

Overview

A total of 510 studies were identified, of which 150 (29%) were relevant to our review on preventive therapies, RDT and ACT. Out of these 150 studies, 51 (34%) were relevant to Theme 1 of the conceptual framework, 62 (41%) to Theme 2 and 29 (21%) to Theme 3. Across the three themes, the focus of the identified studies was on malaria endemic countries of the WHO African region and notably on the top 10 malaria endemic countries in 2016. Outside Africa, studies concerned the WHO South East Asia region. No relevant studies were identified in the WHO America and Eastern Mediterranean regions. The geographical spread of the reviewed studies is presented in Appendix B.

Theme 1: Economic and financial constraints on the demand / uptake of interventions

Case management

A vast number of studies retrieved during the literature search reported on the different socioeconomic characteristics associated with *use of* preventive and curative services for malaria. However, fewer studies reported *how* these differences influenced access. The body of evidence on financial and economic factors influencing access to curative services was found to be larger than for preventive therapies.

Financial and economic factors were reported to affect (i) decisions to seek care or not in cases of suspected malaria, (ii) the timeliness of care seeking and (iii) the types of providers visited. In this section, results are presented under each of these steps that form the pathway to care.

The decision to seek care or not in cases of suspected malaria was often influenced by the direct cost of seeking care, in terms of the affordability of the services available. Self-medication was reported as a preferred / first option in a number of studies [5] [6] particularly among the poorest households. In Nigeria, the decision not to seek care was due to services reported to be too expensive relative to respondents' ability to pay [7]. In a district of Cameroon in 2006 (pre-ACT roll out) rapid diagnostic testing and prepackaged ACT for non-severe malaria in under-fives were reported to be perceived by mothers as too expensive and would be accepted if offered at a lower and affordable price [8].

In terms of financial barriers to seeking treatment for severe malaria, high direct and indirect costs were often cited as leading to medical impoverishment [9-12]. Henessee et al found that in Malawi, although malaria treatment is supposed to be free in public health facilities, households still incurred high direct and indirect costs for malaria illness episodes that result in hospital admission [9]. In a separate study set in hospitals of Kinshasa, Democratic Republic of Congo, the costs of treatment of children affected by severe malaria was reported to be expensive and highly variable both in private and state hospitals. Factors explaining the variability of costs were the neurological form of malaria, indirect recourse to hospital, socioeconomic level, type of prescribing person, child's status upon leaving the hospital, and child's transfusion status [13].

Household financial dynamics were reported to be a key influential factor in decision making. The ability of mothers to engage in an occupation that increased household resources facilitated access to health care [14]. In addition, the involvement of men, most often the father figure, was reported to improve access to care, through their capacity to mobilise funds and facilitate transport to facilities

[15]. In India, a study explored how rural older adults in India faced increasing out-of-pocket health expenditure on malaria, contributing to inequitable access to essential health services [16].

Willingness to pay studies of malaria diagnostics and treatment highlighted the importance of the cost of RDT and ACT in influencing treatment seeking decisions. In Cameroon, RDT and prepackaged ACT for simple malaria in children under 5 years would be accepted if it was offered at an affordable price from the perspective of the study respondents[8]. In Uganda, drug shop customers expressed a WTP for an RDT and a course of ACT considerably lower than prevailing and end-user prices for these commodities[17]. In contrast, in Nigeria, rural residents reported to be less willing to pay for RDT than urban residents, with both rural and urban dwellers reporting to be happy to pay more than the current price for RDTs [18]. Finally, in Uganda, exit interviews with drug shop customers in Mukono District were conducted to elicit the WTP for an RDT and a course of ACT with and without RDT confirmation. Results showed that having a higher socio-economic status, no fever/malaria in the household in the past 2 weeks and whether a malaria diagnosis had been obtained from a qualified health worker prior to visiting the drug shop were factors strongly associated with a higher WTP for these commodities [19]. In addition, the results suggested that the WTP for an RDT and a course of ACT among drug shop customers was considerably lower than prevailing and estimated end-user prices for these commodities [19].

The financial costs of travelling to health care providers and the opportunity costs of spending time travelling were also commonly reported in the reviewed studies as key financial and economic issues influencing care seeking decisions. In Senegal, self-medication for malaria was reported as a common practice among all households living in the urban town of Dakar, but more specifically by the poorest respondents. The proximity of health care in the neighborhood of residence was found to increase the use of health services among the poor [20]. Whilst proximity of health care services in the neighborhood was not reported to be the most important factor of access in Dakar, it was a major enabler for overcoming financial constraints [5]. However, when the risk of malaria transmission was perceived to be very high, the cost or opportunity cost of seeking care was reported to have no influence on treatment seeking decision [20]. In a district in Equatorial Guinea, there was no statistically significant association between distance to facility and delay in seeking treatment amongst children [6]. Another study in the Kenyan Highlands suggested no significant association between travel time and delay in seeking care [21]. Finally, in three districts of Ghana covering each the three country ecological zones (coast, forest and savannah), a study found health insurance and travel time to the health facility to be significant determinants of demand for malaria treatment[22].

Timeliness of care seeking for suspected malaria was commonly reported to be affected by financial and economic factors [23]. Populations in lower socioeconomic categories were often reported as more likely to delay treatment for malaria fever than those of higher socio-economic status (SES) categories [6, 24, 25] . An analysis of the Ugandan 2009 MIS found that caregivers living in rural areas were less likely to seek care promptly than those living in urban settings [24] . An urban or rural location and the financial impact it has on accessing malaria interventions across SES groups was frequently cited [26]. In Malawi, high direct and indirect costs were often cited as inhibiting timely treatment seeking for severe malaria [9]. In Nigeria, a study observing socio-economic and geographic differences in health seeking and expenditures suggests that more effort is needed to identify constraints which impede the equitable distribution and access of public health services for the general population especially for poor people and rural dwellers[7]. In Bangladesh, poor adults were found to more likely attribute delays in decision-making to a lack of financial resources and the prospect of catastrophic household expenditure [27]. However, for children no significant difference in delays of treatment seeking was found between poor and non-poor households [27].

The choice of provider was reported to be associated with socioeconomic and geographic differences. In Nigeria, rural residents and poorer SES populations were reported to seek care at lower level or informal providers [7, 28]. Treatment of adult malaria among higher SES groups used more of public and private hospitals, while lower SES groups used more of traditional healers [28]. Children of lower SES were found to use more pharmacy shops compared to higher SES children who used more health care centres or private hospitals [28]. In Malawi, a study found that the probability of selecting private hospitals and public health centers increased with the ability to pay medical bills[29]. Again in Malawi, health facility utilization and household costs of attending a health facility were compared between individuals living near the district hospital and those in hard-to-reach villages [30]. Those living in hard-to-reach areas were less likely to attend a health facility for a childhood febrile event and experienced greater associated household costs[30]. Commercial retail facilities were also reported as a preferred / first option in a number of studies particularly among the poorest households [6, 21]. Using household survey data from 5 sub-Saharan countries (Gambia, Ghana, Kenya, Nigeria and Uganda) an estimated 92% of individuals with a febrile episode sought care outside the home, 96% received medicines, 67% were treated with antimalarials, and 16% received ACT, with the choice of provider reported to be influenced by perceptions about medicines availability and affordability [31]. Results confirmed the high prevalence of presumptive antimalarial treatment for acute fever, especially in public healthcare facilities where poor people sought care. They showed that perceptions about access to medicines shaped behaviour by directing patients and caregivers to sources of care where they believe medicines were accessible [31]. In Ghana, individual characteristics, such as age, education and wealth status were found to be significant determinants of health care provider choice for specific types of health facilities [22]. Insured individuals were found to be significantly more likely to choose a formal health care provider than an informal one when compared with uninsured individuals [22].

When accessing treatment, inequities were reported. Whilst higher SES groups and urban population spent higher amounts on health care, lower socio-economic groups generally spent a higher proportion of their income on malaria treatment [7, 32]. This might be expected in terms of access to adult (non-pregnant) services where a fee is official policy. There is evidence to suggest, however, that costs exist even for services that are meant to be provided free and such costs either prohibit or delay treatment seeking [14, 33, 34]. A study conducted in the poorest areas of four malaria endemic districts in Kenya estimated around 40% of individuals who visted a shop to buy malaria drugs or 42% who visited a formal health facility reported not having enough money to pay for treatment. Coping stratgies including borrowing money and getting treatment on credit were necessary in order to access care [35]. In Nigeria, a study investigated how different population groups paid for health services and coped with payments [26]. Out of pocket payments were the main method of payment and health insurance was rarely used. A greater proportion of people in the urban area compared with the rural dwellers borrowed money to pay for care. Evidence indicated that those in lower SES were often reported as more likely to suffer catastrophic expenditure [13, 27]. In Ghana, the Government introduced the National Health Insurance Scheme (NHIS) in 2003 to mitigate out of pocket payments for health services in general. A cross-sectional study conducted between 2009 and 2011 in Nakana districts of Northern Ghana reported finding some evidence of NHIS protective effect against direct costs for individuals who had experienced fever or malaria, with some insured patients still experiencing out of pocket spending [36].

Quality of health care was reported to be affected by supply and demand side characteristics of the market for malaria treatment. In Nigeria, all SES groups were reported to use poor quality malaria treatment services with quality levels declining as SES decreased[28]. In Ghana, Fenny and colleagues found no significant differences in the quality of uncomplicated malaria treatment given to the insured and uninsured patients [37].

In Mozambique, the market was found to be far from competitive with market failures including limited ACT availability, low quality of case management, patient lack of information and high costs of access[38].

In 2011, in six districts of Uganda Eastern Region, focus group discussions were conducted with 84 community members in the context of a behaviour change campaign to encourage and sustain the demand for RDTs in drug shops. Discussions explored incentives and barriers to seeking diagnosis for malaria, how people reacted to test results and why, and what could be done to increase the willingness to pay for RDTs [39]. Results showed that participants were very familiar with malaria diagnostic testing and understood its importance. However, very few individuals were familiar with RDTs. When faced with limited financial resources, participants preferred to spend their money on medication and sought testing only when presumptive treatment proved ineffective [39]. Finally, participants did not mention other potential costs of taking unnecessary or ineffective medications, such as money wasted on excess drugs or delays in resolution of symptoms. The study authors concluded that in order to boost demand, private sector RDTs would have to be made convenient and affordable to potential patients and that targeted behaviour change campaigns should strive to increase the perceived value of diagnosis [39].

Intermittent preventive treatment in pregnant women

As with seeking facility based treatment for malaria, accessibility to antenatal care (ANC) services, during which IPTp should be delivered, was found to be hampered by direct and indirect costs, travel distances, official user-fees, household decision-making, gender relations and waiting time [34, 40, 41]. In rural Mali, a study looked at factors contributing to low uptake of intermittent preventive treatment of malaria in pregnancy with sulfadoxine-pyrimethamine (IPTp-SP). The study conducted secondary data analysis on Mali's 2012–2013 DHS to determine the proportion of women who failed to take IPTp-SP due to ineligibility or non-attendance at ANC clinics, and carried out qualitative interviews, focus groups and ANC observations in six rural sites in Sikasso and Koulikoro regions to identify reasons for missed opportunities. Increasing ANC attendance was identified as the first priority for increasing IPTp-SP coverage, by reducing notably cost and access barriers, ensuring that providers follow up-to-date guidelines, and improving patient counselling[42].

When exploring the market for IPTp in Uganda, Rassi et al suggested that the demand-side for IPTp was not the main concern, rather it was supply side constraints inhibiting access to IPTp [43]. This perspective was supported by an earlier study undertaken in Nigeria by Onoka et al. who found that demand-side factors such as attendance to antenatal care, appropriate timing of attendance, and perceptions about side effects were not significant constraining factors to increased IPTi coverage[44]. However, in Mali, Klein et al suggest both actual and perceived costs are currently barriers to IPTp uptake[45]. Given the confusion around cost of services in the two study regions, more detailed national-level studies of both perceived and actual costs could help inform policy and programme decisions promoting IPTp in Mali[45]. Unbundling free and fee-based services, making clear that IPTp is free, and ensuring that it is provided at no cost could help increase uptake [45]. The authors suggest free community-based distribution might be another route to increased uptake and adherence[45].

Seasonal chemoprevention in children

There was no data identified in the review on the role of wealth and SMC uptake. Although randomized controlled trials have shown SMC to be highly effective with high levels of coverage due to delivery in the community, evidence and experience of how economic and financial factors influenced demand/uptake of routine implementation of SMC was not identified during this review. Reasons for this gap in evidence may be due to the relatively recent introduction of SMC at scale and often vertical nature of its distributions.

Theme 2: Economic and financial constraints on the supply of core interventions

Case management

National drug purchasing, pricing and policies were often mentioned as financial barriers to ACT access [46-48]**.** Evidence on these aspects is reviewed in detail in a separate background paper**.**

The complexity of ACT distribution chains and challenges in understanding how the structure of markets at different levels of the chain affect ACT availability, and pricing at the point of care, were mentioned in the reviewed literature as factors affecting the access to timely and appropriate malaria treatment [49, 50].

Limited resources available to public health facilities, notably in the context of user fee reduction or abolition policies was reported as a supply constraint in Kenya, with user fee revenues accounting for almost all facility cash income and providing revenue for basic operating costs, support staff, non-drug supplies and travel allowances [51]. As a result, Opwara and colleagues report that no facilities adhered fully to the user fee policy across all of the tracers, with adherence ranging from 62.2% for an adult with tuberculosis to 4.2% for an adult with malaria. The authors point to the need for alternative funding strategies for peripheral health facilities given the move away from user fees, which are now seen as a major hindrance to universal health coverage [51]. In Tanzania, non-compliant behaviour by health workers included charging patients who were eligible for free services or referring patients to the private sector despite ACT stock , with such supply side factors reported to increase household expenditure per fever episode [52].

Community level care. At the community level, literature on access to malaria services often reflects on the role and responsibilities of community health workers (and whether financial or non-financial incentives are preferable), and to a lesser extent the role of the community themselves and their relationship to CHWs and health services. Evidence continues to grow on the extent that integrated community case management (iCCM) contributes to improved access to timely and appropriate treatment for fever amongst hard to reach children [33, 53, 54]. Securing access to CHW services is reported to require investment in training and supervision of providers [55] [56] [57] and treating malaria as part of management of febrile illnesses rather than as a standalone disease. Several studies highlighted that outlets face challenges in delivering their services, but that CHWs have proved to be effective agents in providing correct diagnosis and treatment of malaria and other common fevers, even in remote areas. One potential barrier to sustainability highlighted in the reviewed literature relates to the issue of financial motivation for the CHWs [58]. Much has been debated about financial versus non-financial incentives but findings are inconclusive, although there seems to be a growing consensus that financial compensation is likely to lead to more sustainable delivery modes. For instance, in a Ghanaian study community members reported to prefer paying the CHW a small consultation charge as financial motivation to ensure sustainability. CHWs were reported to prefer money than payment in kind [59]. Findings also suggest that while financial and in-kind incentives can be a useful tool to motivate voluntary or minimally-compensated community-based health workers, they must be carefully structured to align with local social, economic, and epidemiological realities over the long-term [60]. In the modelling case study of Ethiopia, Gaumer and colleagues found that it was not clear that scale-up via community health workers (CHWs) was to be preferred to a facility-based intervention. The delivery through CHWs was felt to allow for a broader coverage of using RDT and respiratory rate timers, but with limited effectiveness due to often limited skills of CHWs in treating and managing patients [61]. By contrast, a recent community-based programme in Akwa

Ibom State, Nigeria suggested that the inclusion of community-based programmes substantially increased effective access to malaria prevention, formal health care access in general, and antenatal care attendance in particular. Given the relatively modest financial commitments they require, community-directed programmes were reported as a likely cost-effective way to improve malaria control [62]. Finally, the reviewed literature highlighted the need to involve and reinforce the role of civil society in health system financing [63]. Communities and civil society organisations were seen as having a role to pool funds and improve the management of health resources to increase financial access to health care for poor people [63, 64].

Private commercial sector. Talisuna and colleagues indicate that national and global efforts to treat malaria have focused largely on provision of effective antimalarial treatment, mainly through public health services [65]. The private sector (although a key source of antimalarials in many countries) has been mostly ignored in the effort to find solutions to the issues of accessibility, availability, and affordability of effective drugs [65]. Their claim is supported by [66] who highlight the fact that out of pocket expenditures are still prevalent and private provider is the preferred choice, increasing public provision may not be the sole answer.

In Nigeria, a study explored whether test-based malaria treatment was potentially cost-beneficial for private pharmacy sellers [67]. Around half of the 235 respondents said they preferred RDT before malaria treatment. Participants with education and participants who understood the purpose of RDTs, as described in the study questionnaire, were willing to pay more for RDTs. However, a unit increase in malaria frequency (e.g. from 'never' to 'rarely') led to a decrease in the amount private pharmacy sellers said they were willing to pay for RDT [67].

Two papers spoke of the complex relationships needed to provide good quality affordable malaria services. One study reflected on how providers, often making treatment decisions on behalf of patients, operate within a network of relationships and are agents not only for their patients, but also other health sector actors, such as their employer, the Ministry of Health, and pharmaceutical suppliers [68]. This study suggested that provider preference for ACT was significantly associated with working at a for-profit facility, knowledge that patients preferred ACT, and working at facilities that obtain antimalarials from drug company representatives [68]. Preferences were similar among colleagues within a facility, and among providers working in the same locality [68]. Another study suggested that the Malaysian Malaria Control Programmes partnering with the commercial sector (specifically the private palm oil, rubber and acacia plantations in the state of Sabah) was an essential operational strategy to support malaria elimination in the region [69]. Best practices included consistent communication, developing government-staffed subsector offices for malaria control on-site, engaging commercial plantations to provide financial and human resources for malaria control activities, and the development of new worker screening programmes[69].

Subsidized drugs were argued to be one policy option to address inequities in affordability and prompt access to effective treatment, notably in the private commercial sector of Morogoro urban district in Tanzania [70]. In Cambodia, private commercial provider pricing and structural characteristics of the ACT market were reported to limit access to appropriate malaria treatment [71]. A manufacturer level ACT price subsidy combined with effective communications directed at consumers and supportive private sector regulation were potential policy recommendations to progress towards improved access to quality malaria treatment [71] .

Overall, the reviewed literature relating to the role of the private sector and on how to improve access to RDTs and ACTs was found to be dominated by 3 perspectives. Firstly, the case for why it is important to include the private sector and not simply focus on public facilities if malaria is to be combated [70, 72-74]. These perspectives were mostly pre-AMFm and spoke in general terms, hypothesising about

solutions. Secondly, the baseline studies that were conducted to prove the need for a considered ACT subsidy and equitable scale up [75, 76]. And thirdly a more recent, albeit limited, body of literature that looks at empirical evidence on the success of subsidies and efforts to address inequities [77-79]. The evidence on subsidies, notably relating to the impact of the AMFm is reviewed under Theme 3 section.

Intermittent preventive treatment in pregnant women

The reviewed evidence indicates that IPTp coverage in sub-Saharan Africa is suboptimal [40, 80]. Insufficient budgetary allocations for adequate policy implementation were reported to slow down the roll-out of IPTp policies across Africa since its introduction [81]. Rassi and colleagues undertook a qualitative study in two regions of Uganda to assess supply-side barriers to uptake of intermittent preventive treatment for malaria in pregnancy [82]. The authors felt that given the positive views of antenatal care and IPTp, high antenatal care coverage and reported low refusal rates for IPTp, supply-side issues, and not those on the demand-side were likely to account for the majority of missed opportunities for the provision of IPTp when women attend antenatal care[43, 82]. Although, to increase uptake of IPTp on the demand side, health workers should be encouraged to reassure eligible women that IPTp is safe. Supply side improvements needed included the consistent provision of ANC, implementation of current WHO IPTp policy recommendations, supply of SP to the private sector, availability of clear guidelines, as well as improved training and supervision for health workers[82]. Finally, improving facility and district-level recording and reporting would further strengthen the country's ability to address uptake of IPTp[82]. Maheu-Giroux and Castro assessed factors affecting providers' delivery of IPTp in a five-country analysis of national service provision assessment surveys, Five major modifiable determinants of IPTp delivery were identified: 1) user-fees for ANC medicines; 2) facilities having IPTp guidelines; 3) facilities having implemented IPTp as part of their routine ANC services offering; 4) stock-outs of sulphadoxine-pyrimethamine; and, 5) providers having received IPTp training[83]. Using the population-attributable fraction, it was estimated that addressing these barriers jointly could lead to a 31% increase in delivery of this intervention during ANC consultations[83]. Of these four potentially modifiable determinants, training of providers for IPTp had the largest potential impact[83].

Seasonal chemoprevention in children

The review did not identify evidence about how economic or financial factors influence SMC supply.

Financing

Given that most malaria resurgences have been linked to weakening of control programmes, there is an urgent need to develop practical solutions to the financial and operational threats to effectively sustain successful malaria control programmes [84]. The greatest threats to current malaria control efforts have been seen as non-biological, but financial [85]. Domestic spending by endemic country governments on malaria specifically, and health more generally, are often seen with the potential to go a long way towards filling the estimated funding gap. However, the literature emphasized that external funding is also essential, and the global community need to work together to ensure adequate funding [85].

Kazaz and colleagues explored ways to increase the level of artemisinin production, reduce volatility of artemisinin prices, and improve overall access to malaria medicines for the population. They developed a model of the supply chain to investigate the impact of various interventions on artemisinin supply and price volatility [86]. They found that the best interventions are those targeted at improving the crop yield, government assistance to maintain agricultural artemisinin market prices

and carefully managed increase of the supply of semi-synthetic artemisinin [86]. Ardal and Rottingen argue for greater investments in the development of new drugs and vaccines against malaria as well as efficient management of this funding for optimal value for money. In their study, they look at the existing R&D efforts and assess the potential for an "open source business model"[87]. They point out the lack of transparency and collaboration in the R&D field which lead to inefficiencies and question the cost-benefits of a system of public and philanthropic funded patents for malaria medicines[87].

Finally, White and colleagues highlight the need to scrutinise economic evaluations of malaria interventions. The costs and cost effectiveness of malaria interventions usually estimate the costs of single interventions in the absence of other anti-malaria interventions and which can be misleading when planning budgets and priority setting [88].

Theme 3: Strategies and their impact on demand and supply-side constraints

Having identified the barriers to accessing the core interventions under study in the previous sections, in this final section we explore the strategies and empirical evidence available to date of their impact.

Demand-side financing strategies

The review did not identify literature providing evidence on the *impact* of demand-side interventions on population access to malaria preventive therapies or case management. Evidence pertaining to *associations* between population access and, for example, health insurance status is reported under Theme 1 as it is relevant to population characteristics and not an impact of introducing insurance.

Supply-side financing strategies

Much has been written on the impact of the removal of user fees [89]. In this section, we focus on the available evidence of *how the removal of user fees has impacted access to our selected malaria interventions*.

In Mali, a study reported that removal of user fees at public health facilities for the treatment of malaria in children under five and pregnant women since 2007 significantly increased the use of services and free care and had been much appreciated by users [90]. However, the evidence showed that despite the free medicines policy, healthcare was not entirely free as consultations and medicines other than anti-malarials had to be paid for (antipyretics and antibiotics). For instance, under the free healthcare system, the average cost of a prescription for treating an uncomplicated case of malaria was still reported to be prohibitive to many patients [90]. The informal practices of charging for treatment by health professionals to supplement their remuneration were reported to reduce the scope of the policy further still [90]. Watson et al examined the effects of the introduction and removal of user fees on outpatient attendances and malaria (among other conditions) in Neno District, Malawi where user fees were re-instated at three of 13 health centres in 2013 and subsequently removed at one of these in 2015 [91]. The presence of user fees changed total attendances by −68 % [95 % confidence interval: −89 %, −12 %] and new malaria diagnoses in children over 5 years by −56 % [−83 %, +14] [91]. The estimated change in new malaria diagnoses among under-fives were also negative but accompanied by wide confidence intervals [91]. The removal of user fees resulted in an increase in total outpatient attendances of 352 % [213 %, 554 %], largely returning the number of attendances to their pre-user fee level [91]. Similar increases were seen in the numbers of new malaria

diagnoses in the under-fives and over five of 230 % [106 %, 430 %] and 247 % [171 %, 343 %], respectively [91].

A similar interruption of user fees was analysed in Kaya district of Burkina Faso by Druetz et al and they too found that visits to health centres dropped immediately and significantly when free healthcare was interrupted [92], and increased again when free healthcare was reintroduced (+89, 95 % confidence interval [-11; 187]) [92]. In another study, Druetz and colleagues evaluated the effects of concurrent implementation of community case management of malaria (CCMm) and user fees abolition on treatment seeking practices for febrile children in Kaya district compared to Zorgho district where CCMm only was implemented. They found that user fees abolition was significantly associated with increased use of health centers and reduced absence of treatment seeking actions, and although not significantly with reduced use of self-medication[92]. Abolishing user fees was also associated with increase promptness of visits to health centres for febrile children, although only for households living less than 5 kms away from a health center [92]. For households living further than 5 kms, CCMm may still be a useful option [92]. Druetz and colleagues concluded the need to coordinate user fees abolition and CCMm implementation to maximise prompt access to treatment in rural areas [92].

In Tanzania, Mubyazi and colleagues found that strengthening of user-fee exemption practices and bringing services closer to the users, for example by promoting community-directed control of selected public health services, including IPTp, are urgently needed measures for increasing equity in health services in Tanzania [34]. Their study shows that despite national-level policies, actual IPTp costs varied widely between facilities and visits [34]. Pregnant women were found to pay for IPTp or receive it free at different visits and health centres were reported to often charge a lump sum for ANC visits that included both free and fee-based drugs and services. These practices were reported as making it difficult for women and families to distinguish between free services and those requiring payment. As a result, households were reported to forego free care that, because it is bundled with other fee-based services and medications, appears not to be free. Varying costs was found to also complicate household budgeting for health care, particularly as women often rely on their husbands for money[34]. Finally, while health facilities operating under the cost-recovery model strive to provide free IPTp, their own financial constraints often make this impossible[34].

ACT and RDT price subsidies. Many studies have discussed subsidies for malaria treatment, notably in the context of the Affordable Medicines Facility–malaria (AMFm) [76, 78, 93-101].

Established in 2010 by the Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund), the AMFm aimed to move towards universal coverage of ACT and displace artemisinin monotherapies by expanding access to affordable quality-assured ACTs through the public and private sectors and non-governmental organisations (NGOs). It incorporated three elements: (1) price reductions through negotiations with manufacturers of ACTs; (2) a buyer subsidy, via a co-payment at the manufacturer level; and (3) support of interventions to promote appropriate use of ACTs, including behaviour change communications, the training of private providers and the recommendation of a recommended retail price for quality-assured ACT medicines [98, 102]. The AMFm was implemented in seven African countries (eight pilots including Ghana, Kenya, Nigeria, Uganda and Tanzania mainland, Zanzibar, Niger and Madagascar). All Global Fund subsidised quality-assured ACT carried a green leaf logo as an indication of quality and affordable ACTs which was used to promote demand creation activities [102].

The AMFm independent evaluation found substantial increases in ACT availability and market share and price decreases in six of the eight pilots. The benchmark of a 20% point increase in availability was met in five of the eight pilots; the benchmark of a 10% increase in market share in four pilots (with further three with weak statistical significance); finally the benchmark of price reductions below three

times the price of most popular ACT in the country was met in five pilots[102]. Where the AMFm had an impact on affordability, the price of quality-assured ACTs decreased by US$1.28-$4.34, and absolute retail markups on these therapies decreased by US$0.31-$1.03 [103, 104]. These findings demonstrate that supranational subsidies can dramatically reduce retail prices of health commodities and that recommended retail prices communicated to a wide audience may be an effective mechanism for controlling the market power of private-sector antimalarial retailers and wholesalers. The evaluation also estimated that in all but two of the pilot programs, prices could fall further without suppliers losing money and expressed concerns about part of subsidy being captured within the ACT supply chain instead of being fully passed on to consumers [103]. In Maswa district in Shinyanga region and Kongwa district in Dodoma region in Tanzania, studies reported that the AMFm did not crowd out public sector treatment (by decreasing prices and increasing availability in retail outlets) nor neglected patients in remote areas and from low SES groups [105]. However, in Kisola district, Morogoro region in Tanzania, there were some concerns that the subsidy had not adequately reach children in needs to ACT [106]. In four regions of Ghana, quality-assured ACT were found to be accessible and affordable for most people seeking treatment form health facilities and licensed chemical sellers in rural areas [94]. In 2015, a systematic review of the literature examining the impact of subsidies on antimalarial drugs found subsidises to be successful in increasing ACT availability and reducing prices, with impact reported to be generally equitable between rural and urban areas and across income groups [99].

Following the 2010-2011 AMFm pilots, the subsidies and price negotiations continued as a private sector co-payment mechanism in six countries, including Ghana, Kenya, Madagascar, Nigeria, Tanzania and Uganda [102]. The ACTwatch Group and colleagues analysed the extent to which private sector improvements were maintained or intensified through 2015 in Kenya, Madagascar, Nigeria, Tanzania and Uganda. They found that the private sector co-payment mechanism implemented at national scale for 5 years was associated with positive and sustained improvements in the availability, price and market share of quality-assured ACT in Nigeria, Tanzania and Uganda, with more mixed results in Kenya, and few improvements in Madagascar [102]. For instance, in 2014-2015 availability of quality-assured ACT in the private sector improved in all countries except Madagascar [102]. The market share was maintained or improved post-AMFm in Nigeria, Tanzania and Uganda, but statistically significant declines were observed in Kenya and Madagascar [102]. It was highest in Kenya and Uganda (48.2 and 47.5%, respectively) followed by Tanzania (39.2%), Nigeria (35.0%), and Madagascar (7.0%)[102]. Private sector prices were maintained or further reduced in Tanzania, Nigeria and Uganda, but prices increased significantly in Kenya and Madagascar [102]. Quality assured ACT were reported to be two to three times more expensive than the most popular non-artemisinin therapy in all countries except Tanzania [102]. The ACTwatch Group and colleagues concluded that the subsidy mechanism as implemented was not sufficient on its own to achieve optimal ACT use. In order to maximise the impact of the subsidy, they draw attention to the role of effectively implemented supporting interventions to (i) create demand for ACT among providers and consumers and (ii) address continued availability and distribution of non-artemisinin therapies [102]. They also call for comprehensive market analyses to identify the barriers to high coverage of both confirmatory testing and appropriate treatment [102].

A recent Cochrane review assessed the effect of programmes that included ACT price subsidies for private retailers on ACT use, availability, price and market share. Out of the four trials included in the review, three assessed retail sector ACT subsidy with supportive interventions (retail outlet training, community awareness and mass media campaign) and one evaluated vouchers provided to households to purchase subsidized ACT. Price subsidies ranged from 80% to 95%. All studies were conducted in rural districts in East Africa - Kenya, Uganda and Tanzania [78]. Results show that the reviewed subsidy programmes (substantive price reductions combined with supportive interventions) improved use and availability of ACTs for children under five years of age with suspected malaria in the rural East Africa studies. The programmes also had a positive impact on ACT prices and market

share and reduced use of older antimalarials among febrile under-fives. However the studies did not evaluate whether patients had malaria confirmed with parasitological testing and did not assessed whether the impact reported in the studies had any effect on health outcomes [78]. As for vouchers, they were reported to lead to an increase in inappropriate use of ACT by people who did not actually have malaria [78].

Lussiana et al investigated the impact of introducing subsidized combination treatment with artemether-lumefantrine on sales of anti-malarial monotherapies in a sample of 34 private sector pharmacies in Huambo, Angola. The study found that subsidized ACTs rapidly attained a high relative market share[107]. However their introduction reduced, but did not eliminate, the demand for less effective monotherapies [107].

Hansen and colleagues examined if a subsidy on malaria rapid diagnostic tests (RDTs) should be incorporated. They developed a model consisting of an individual with malaria suspected fever seeking care at a drug shop where RDTs, ACTs and cheaper less effective anti-malarials are sold.
The model assumes that the individual has certain beliefs of the accuracy of the RDT result and the probability that the fever is malaria and predicts the diagnosis-treatment behaviour of the individual. RDT and ACT subsidies are introduced in the model to incentivize the choice of RDT before treatment and ACT purchase only if the test result is positive. The model estimates that a combined subsidy on both RDT and ACT is cost minimizing and improves diagnosis-treatment behaviour of individuals. For certain beliefs, such as low trust in RDT accuracy and strong belief that a fever is malaria, subsidization is however not sufficient to incentivize appropriate behaviour. Hansen and colleagues conclude that a combined subsidy on both RDT and ACT rather than a single subsidy is likely required to improve diagnosis-treatment behaviour among individuals seeking care for malaria in the private sector [108].

Pay for Performance. Pay for performance (P4P) has generated interest as a mechanism to improve health service delivery and accountability in resource-constrained health systems. However, there has been little experimental evidence to establish the effectiveness of P4P in developing countries.

In rural Kenya, Menya and colleagues tested a P4P strategy that emphasized parasitological diagnosis and appropriate treatment of suspected malaria, in particular reduction of unnecessary consumption of ACTs[109, 110]. They explored whether linking appropriate case management for malaria to financial incentives has the potential to improve patient care and reduce wastage of expensive antimalarials [109]. Their study aimed to demonstrate if facility rather than individual incentives are compelling enough to improve case management, and whether these incentives lead to offsetting cost-savings as a result of reduced drug consumption. Results suggested that facility-based incentives coupled with training may be more effective than training alone and could complement other quality improvement approaches [110].

Binyaruka and colleagues argued that despite widespread implementation across Africa, there is limited evidence of the effect of P4P in low income countries on the coverage of quality services and affordability, consistent with universal health coverage objectives. They examined the effect of a government P4P scheme on utilisation, quality, and user costs of health services in one region of Tanzania between 2012 and 2013 [111]. They estimated a significant positive effect on two out of eight indicators targeted by P4P. There was an 8.2% (95% CI: 3.6% to 12.8%) increase in coverage of institutional deliveries among women in the intervention area, and a 10.3% (95% CI: 4.4% to 16.1%) increase in the provision of anti-malarials during pregnancy. They highlight however the potential risks of such schemes in relation to non-targeted service use. Use of non-targeted services reduced at dispensaries by 57.5 visits per month among children under five (95% CI: -110.2 to -4.9) and by 90.8 visits per month for those aged over five (95% CI: -156.5 to -25.2). P4P was also associated with a 5.0% reduction in those paying out of pocket for deliveries (95% CI: -9.3% to -0.7%) but there was no

evidence of an effect on the average amount paid. The authors concluded that further consideration of the design of P4P schemes was required to enhance progress towards universal health coverage, and close monitoring of effects on non-targeted services and user costs should be encouraged.

Private Commercial Sector. A number of studies advocated better malaria management at community level through community health workers and drug sellers to improve prompt and effective treatment and reduce financial and non-financial costs [6] [34] [112] [113]. However, studies that go beyond advocating, and actually evaluate such approaches, were rare.

In Kenya, a study explored stakeholders' perceptions of the role of private medicine retailers (PMRs). PMRs were perceived to provide rapid cheap treatment for non-serious conditions and used as a deliberate and continuously evaluated choice between different treatment sources. Factors undermining the implementation of interventions working with PMRs included a lack of MoH resources to train and monitor large numbers of PMRs, the relative instability of outlets, medicines stocked and retail personnel, the large number of proprietary brands and financial challenges to retailers in stocking antimalarial medicines, and their customers in buying them [114]. Financial barriers underlie many described challenges, with important implications for policies on subsidies in this sector. In spite of barriers to implementation, increased exposure to programme activities promoted trust and improved relationships between PMRs and their clients and trainers, strengthening feasibility of such interventions. Public information was reported as key to strengthen PMR training programmes by engaging local communities and to facilitate performance monitoring of PMRs by their clients [114].

In Uganda, a study tested the feasibility of RDT distribution in drug shops[115]. A total of 92 drug shops in 58 villages were offered subsidized RDTs for sale after completing training. Despite some heterogeneity, shops demonstrated a desire to stock RDTs and used them to guide treatment recommendations. Most shops stored, administered and disposed of RDTs properly and charged mark-ups similar to those charged on common medicines. Results from this study suggest that distributing RDTs through the retail sector is feasible and can reduce inappropriate treatment for suspected malaria.

More recently, Visser and colleagues conducted a review on the introduction of RDTs for malaria at PMRs and identified study outcomes and success factors to inform scale up decisions [116]. A total of 12 studies were identified. Most of these were small-scale pilots of RDT introduction in drug shops or pharmacies in sub-Saharan Africa, and none assessed large-scale implementation in PMRs. The authors found that RDT uptake varied widely across the studies and settings from 8%-100% [116]. Provision of artemisinin-based combination therapy (ACT) for patients testing positive ranged from 30%-99%, and was more than 85% in five studies [116]. Of those testing negative, provision of antimalarials varied from 2%-83% and was less than 20% in eight studies[116]. Longer provider training, lower RDT retail prices and frequent supervision appeared to have a positive effect on RDT uptake and provider adherence to test results[116].

A study by Aung and colleagues in Myamar looked at improving uptake and use of malaria RDTs in the context of artemisinin drug resistance containment in eastern Myanmar[117]. Their evaluation of an incentive schemes among informal private healthcare providers showed that training and quality supervision of informal private healthcare providers resulted in improved demand for, and appropriate use of RDTs in drug resistance containment areas in eastern Myanmar.

4. Discussion

The purpose of this report was to review the available evidence on the economics of access to selected core malaria control interventions at public, private and community-level providers. This review was guided by a conceptual framework including three themes focusing on demand- and supply-side constraints and strategies for addressing these constraints.

The literature reviewed under Theme 1 showed a large number of studies reporting evidence on the different socioeconomic characteristics of those using preventive and curative services for malaria across populations. However, much fewer studies reported *how* these differences influenced access. The body of evidence on financial and economic factors influencing access to curative services was found to be larger than for preventive treatment. More evidence was available for IPTp than for SMC in terms of financial issues and their influence on coverage. Most of the evidence related to the ability pay or opportunity cost dimension of our conceptual framework, pointing out to potential interventions on service costs, commodity prices and community-level provision. Many of the findings in this review would not be surprising to those familiar with the socio-economic literature on malaria treatment seeking. This report found that populations in lower socioeconomic categories were often reported as more likely to delay treatment for malaria fever than those of higher socio-economic status (SES) categories; rural residents and poorer SES populations were reported to seek care at lower level or informal providers; higher SES groups and urban population spent higher amounts on health care, whilst lower socio-economic groups generally spent a higher proportion of their income on malaria treatment than wealthier populations.

Theme 2 looked at economic and financial supply-side issues. The reduction or abolition of user fees policies was reported as increasing the access to malaria related services. While nearly always reported as a positive strategy for stimulating demand, there was mention of the charging of unofficial fees by health workers including when treatment should have been provided for free. Some studies pointed out to the limited resources available to health workers and facilities as one driver of these informal behaviours. The review highlighted the importance of the private commercial sector in the supply of malaria treatment and the potential to work with those to improve access to prompt testing and treatment. One economic barrier that was identified under theme 1 related to the resources (including time) spent travelling and waiting for care. In the general literature there has been talk of a move to bring services closer to the end user, therefore shifting the financial/ economic burden from the users to the facility. Community-health care services have been one strategy although it seemed to remain a standalone intervention not formerly part of the regular primary health care system, with implications on implementation costs and sustainability.

The limited insights into the economic aspect of accessing IPTp and SMC could be due in part to their funding mechanisms. For example IPTp-SP is a relatively inexpensive intervention (compared to vector control and case management) and, for that reason, it is often excluded from grant applications to international funders. The resulting dependence on domestic funds then results in insufficient resource mobilisation. Also, the relatively recent introduction of SMC, when compared to other interventions, means evidence on its effects, costs and cost-effectiveness in routine delivery is extremely limited. SMC is often entirely dependent on external funding and implementation plans have been driven by the capacity of programs/partners to mobilise funds for this intervention. Theme 3 focused on strategies that have been conducted to improve demand and supply of core malaria control interventions. Robust evidence was very thin: some impact evaluations of supply-side strategies were identified whilst none of demand-side strategies.

Appendices

Appendix A: Literature Search Key Terms under PubMed and EconLit

Date	Keywords (all 2010-present)
08/11/2017	(malaria, access, chemoprevention) AND ("2010"[Date - Publication] : "3000"[Date - Publication])
10/11/2017	(malaria, treatment seeking, financ*) AND ("2010"[Date - Completion] : "3000"[Date - Completion])
10/11/2017	(malaria, access, financ*) AND ("2010"[Date - Completion] : "3000"[Date - Completion])
	(malaria, determinants, access) AND ("2010"[Date - Completion] : "2017"[Date - Completion])
13/11/2017	(malaria, access, providers) AND ("2010"[Date - Completion] : "3000"[Date - Completion])
13/11/2017	(malaria, access, SMC) AND ("2010"[Date - Completion] : "3000"[Date - Completion])
13/11/2017	(malaria, cost, pay) AND ("2010"[Date - Completion] : "3000"[Date - Completion])
17/11/2017	(malaria, access, facilit*, financ*) AND ("2010"[Date - Completion] : "3000"[Date - Completion])

Supplementary searches Jan 2018:

removal user fees malaria

demand IPTp

supply IPTp

Appendix B Geographical spread of studies

	Number of studies		
	Theme 1	**Theme 2**	**Theme 3**
AFRICA (studies that focus on the whole region)	**2**	**6**	**3**
Algeria			
Angola			1
Benin		3	
Botswana			
Burkina Faso	1	2	1
Burundi			
Cabo verde			
Cameroon	1	2	
Central African Republic			
Chad			
Comoros			
Congo			
Côte d'Ivoire			
Democratic Republic of the Congo	1	4	
Equatorial Guinea	1		
Eritrea			
Ethiopia	2	1	1
Gabon			
Gambia	2		
Ghana	3	4	
Guinea			
Guinea-Bissau	1		
Kenya	4	7	6
Liberia			1
Madagascar		4	
Malawi	3		1
Mali	4		2
Mauritania			
Mayotte			
Mozambique		2	
Namibia		1	
Niger	1	2	
Nigeria	9	12	2
Rwanda	1	1	
Sao Tome and Principe			
Senegal	2		1
Sierra Leone	2		
South Africa			
South Sudan			
Swaziland			
Togo			
Uganda	7	11	4
United Republic of Tanzania	1	11	5
Zambia		3	
Zimbabwe	1		
AMERICA			
Belize			
Bolivia			
Brazil			
Colombia			
Dominican Republic			
Ecuador			
El salvador			
French Guyana			

Guatemala			
Guyana			
Haiti			
Honduras			
Mexico			
Nicaragua			
Panama			
Peru			
Suriname			
Venezuela			
EASTERN MEDITERRANEAN			
Afghanistan			
Djibouti			
Iran			
Pakistan			
Saudi Arabia			
Somalia			
Sudan			
Yemen			
EUROPE			
Tajikistan			
SOUTH EAST ASIA			
Banglasdesh	1		
Bhutan	2		
Democratic People's Republic of Korea			
India	1	1	1
Indonesia		1	
Myanmar		2	1
Nepal			
Thailand			1
Timor-Leste			
WESTERN PACIFIC			
Cambodia		3	
China			
Lao People's Democratic Republic			
Malaysia		1	
Papua New Guinea		1	
Philippines			
Republic of Korea			
Solomon Islands			
Vanuatu		1	
Viet Nam			
NO SPECIFIC COUNTRY FOCUS	6	16	3

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