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# End-user perspectives on preventive antimalarials: A review of qualitative research

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## ABSTRACT

Antimalarials have been administered widely to prevent clinical malaria and researchers have explored how end-users' perspectives influence uptake and adherence. Drawing on a systematic search, this review aims to synthesise qualitative research on end-user perceptions of antimalarials for disease prevention. Searches were undertaken in PubMed and ISI Web of Knowledge. After applying exclusion criteria, identified sources underwent thematic analysis. Identified sources were published between 2000 and 2020 and drew on studies undertaken across Africa, Asia, Europe, Oceania and America. The sources revealed end-user concerns about the potential benefits and harms of preventive treatment that are entwined with broader understandings of the disease, the intervention, its implementation, accompanying information, and how it is embedded in wider healthcare and social relationships. The implications for antimalarials as preventive therapy encompass the need to build trust, including interpersonal trust, engage diverse stakeholders and to address broader health and wellbeing concerns during implementation.

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## KEYWORDS

Malaria; treatment as prevention; prophylaxis; qualitative research; end-users

## Introduction

Since the antimalarial properties of the bark of the cinchona tree were recognised, drugs have been administered to prevent or reduce the severity of malaria infection (Gachelin et al., 2018; Shanks, 2016). Troops in endemic areas have received malaria prophylaxis, as have other travellers to high-prevalence settings. For permanent residents of endemic settings, preventive antimalarial administration, such as intermittent preventive treatment (IPT) (Vallely et al., 2007; White, 2005) is also used. Preventive antimalarials are administered in some areas of seasonal transmission (seasonal malaria chemoprevention [SMC]) (Coldiron et al., 2017) and in low-transmission contexts (e.g. mass drug administration [MDA]) (World Health Organization, 2017). Preventive treatment has most commonly been aimed at falciparum malaria, but vivax has also been targeted through MDA (White, 2017). A variety of antimalarials have been delivered as prevention, with the target group, regimen, tolerability and patterns of parasite resistance, influencing the choice of regimen (Desai et al., 2018; White, 2017).

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Intermittent preventive treatment (IPT) entails administering an antimalarial to a population group at particular risk of malaria-related morbidity or mortality (pregnant women, infants, or school-going children) without testing infection status (Gosling et al., 2010). Among infants and pregnant women, IPT has reduced morbidity and mortality related to *Plasmodium falciparum* (Desai et al., 2018; Esu et al., 2019). Also, used in endemic areas, IST involves testing with a rapid diagnostic test (RDT) and administering an antimalarial after a positive result, which includes sub-clinical/asymptomatic cases (Desai et al., 2018).

In SMC, monthly doses of antimalarial are delivered to children (regardless of infection) in areas of seasonal transmission during the malaria season. This maintains a constant concentration of antimalarial in the blood and clears parasitaemia (Coldiron et al., 2017). In MDA, antimalarials are delivered to an entire community, regardless of symptoms or parasitaemia, often with the goal of interrupting transmission in a defined area (Seidlein & Dondorp, 2015; World Health Organization, 2017), which requires high levels of uptake (Von Seidlein et al., 2019).

The ultimate impact of these interventions depends on end-user uptake. End-users' attitudes to preventive interventions are particularly significant because the immediate benefits are likely to be less apparent than treatment when ill (Gysels et al., 2009; Pell et al., 2011; Smith Paintain et al., 2011). Research alongside clinical evaluations or the implementation of these interventions has assessed end-user perceptions of preventive antimalarial treatment, how they influence uptake and how to design strategies to promote uptake (e.g. Sahan et al., 2017). Researchers have employed qualitative research methods, including in-depth interviews, focus group discussions and observations, to generate in-depth information on end-user perceptions and their impact on intervention uptake (e.g. Adhikari et al., 2016; Dial et al., 2014; Gysels et al., 2009; Okello et al., 2012; Sahan et al., 2017; Smith Paintain, et al., 2011)

Drawing on a systematic search strategy, this review provides a comprehensive overview of qualitative research on end-user perceptions of preventive antimalarial administration. The aim is to identify key insights relevant for delivering antimalarials as prevention.

## Methods

### Literature search

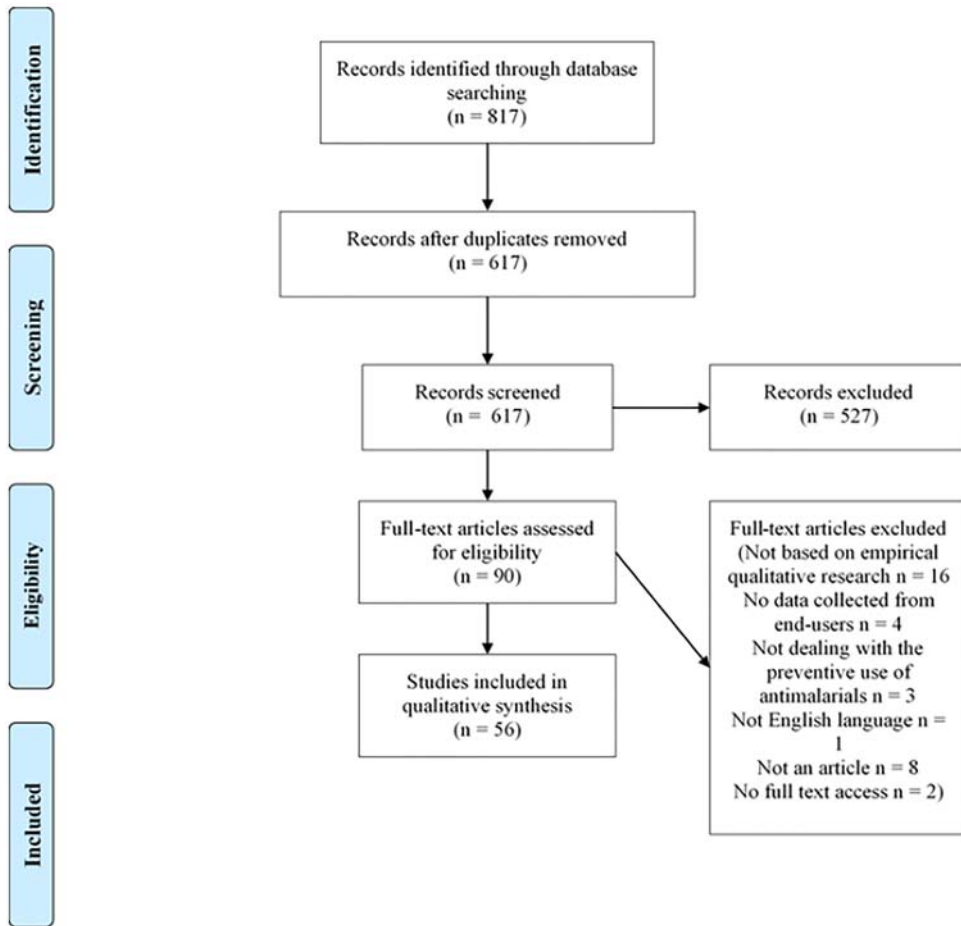
Searches were undertaken in the following databases: PubMed and ISI Web of Knowledge (May 2020). Drawing on past strategies for identifying qualitative research (Nofal et al., 2019; Pell et al., 2011), search terms included 'perception', 'attitude', 'interview', 'focus group', 'intermittent preventive treatment' etc. (see Table 1).

### Study selection

The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) Guidelines were followed to screen the records using EndNote (see Figure 1 for the PRISMA flow diagram). First, all results were screened for duplicates. Second, titles and abstracts were screened and exclusion criteria applied: (1) not about malaria; (2); not based on empirical qualitative research; (3) not

**Table 1.** Search terms

	PubMed and ISI Web of Knowledge
AND	Malaria
OR narrative OR 'focus group'	Qualitative OR interview OR ethnog* OR perception OR belief* OR attitude*
AND	'Mass drug administration' OR MDA* OR 'intermittent preventive
treatment' OR IPT* OR 'seasonal malaria chemoprevention' OR SMC* OR prophylaxis	



**Figure 1.** PRISMA flow diagram.

reporting perceptions of end users; (4) reporting perception of any intervention other than the preventive administration of antimalarials; (5) not about humans; or (6) not an article; (7) not in English. The same exclusion criteria were then applied to the full-text versions of the remaining sources (with the addition of availability of the full text). A total of fifty-six articles were selected for inclusion in the qualitative synthesis.

### **Data analysis**

The selected articles were analysed thematically. Reading each article, a deductive and inductive approach to analysis was taken to identify themes that appeared salient to perceptions regarding antimalarial interventions and uptake. Relevant data were extracted and categorised based on the thematic content.

## **Results**

### **Nature of evidence**

The identified 56 sources were published between 2000 and 2020 in 25 countries: on the African continent, Benin, Burkina Faso, Democratic Republic of Congo, Eswatini, Gabon, The Gambia,

Ghana, Nigeria, Tanzania, Uganda and Zambia; in Asia, Cambodia, Indonesia, Laos, Myanmar, and Vietnam; in Oceania, in Papua New Guinea and the Solomon Islands; one in Brazil; one in the US and one in the UK. Thirty reported studies conducted alongside a clinical trial. Thirty-nine were based on in-depth interviews, 44 drew on focus group discussions, 18 involved observations, and three on semi-structured interviews. The interventions included IPT (31 articles), MDA (16), IST (eight), SMC (three), chemoprophylaxis with chloroquine (a precursor to IPTp, three), post-discharge malaria chemoprevention (one). Some articles addressed more than one strategy. See [Table 2](#) for the characteristics of the reviewed sources.

### ***Awareness of and concern about malaria***

Participants from Burkina Faso, Eswatini, Ghana, Laos, Mozambique and Nigeria described malaria as one of the most common and important health problems in their communities (Adhikari et al., 2018a, 2018b; Baltzell et al., 2019; Chatio et al., 2019; Miaffo et al., 2004; Pell et al., 2019; Portugaliza et al., 2019; Strachan et al., 2016). Past experience of malaria compounded concerns about the disease in South-East Asia and Eswatini, though there were few contemporaneous clinical cases (Baltzell et al., 2019; Pell et al., 2017; Pell et al., 2019). Community members from South-East Asia were worried about malaria infection because of the personal economic consequences (Pell et al., 2017; Pell et al., 2019).

In Mozambique and Indonesia, respondents had little awareness malaria-related risk, let alone the particular risks during pregnancy (Arnaldo et al., 2019; Hoyt et al., 2018). In the Solomon Islands, although malaria was recognised as serious, pregnant women were not seen as particularly vulnerable (Dulhunty et al., 2000). This contrasted with other studies across Africa, where pregnant women and infants were seen as suffering disproportionately from malaria (Antwi et al., 2016; Diala et al., 2013; Hill et al., 2016; Onyeneho et al., 2015; Pell et al., 2013a; Rassi et al., 2016). Indeed, elsewhere in Mozambique, the danger of malaria to a pregnancy were well known, though not necessarily those to unborn child (Boene et al., 2014). The prospect of reducing this burden and preventing malaria transmission encouraged respondents in studies in sub-Saharan Africa (e.g. Burkina Faso and Ghana) and South-East Asia to adhere to interventions (Chatio et al., 2019; Pell et al., 2019; Peto et al., 2018b; Pitt et al., 2012). By contrast, for Londoners who travel to visit family ties in Africa, malaria was treatable and prophylaxis not a priority (Morgan & Figueroa-Munoz, 2005).

### ***Malaria symptoms, treatment and prevention***

A lack of symptoms discouraged community members in Indonesia, Brazil and Kenya from participating in anti-malarial interventions. Mothers rather saved the drugs for a child when ill (Hoyt et al., 2018; Murta et al., 2019; Okello et al., 2012). In other studies of IPTi, IPTp and chemoprophylaxis, respondents revealed confusion about whether the intervention was preventing or treating malaria or fever (Andrew et al., 2015; Dulhunty et al., 2000; Hill et al., 2016; Pell et al., 2013a), particularly if infants received vaccinations at the same visit, with mothers accustomed to post-vaccination fever (de Sousa et al., 2011; Gysels et al., 2009; Pool et al., 2008). Some pregnant women were unaware that IPTp was specifically for malaria prevention, seeing it rather as promoting overall health (Andrew et al., 2015; Diala et al., 2013; Pell et al., 2013a).

In Kenya, IST participants were tested regardless of symptoms and treated if the RDT result was positive. They expressed concerns about testing but some, swayed by the idea of 'hidden malaria', were less worried about receiving the antimalarial (Shuford et al., 2016). 'Hidden malaria' was also mentioned in Zambia to make sense of receiving an antimalarial when asymptomatic (Silumbe et al., 2020). Most participants from Eswatini were unaware that MDA treats sub-clinical infections and gives short-term protection against malaria (Baltzell et al., 2019). In Cambodia, MDA was associated with malaria elimination, understood on an individual basis, with the antimalarials clearing the parasite from their bodies (Peto et al., 2018b).

**Table 2.** Characteristics of the reviewed articles.

First author	Year	Country	Qualitative methods*	End-users	Intervention
Dulhunty, J.M.	2000	Solomon Islands	FGDs, observations	Caregivers of children	Chemoprophylaxis (chloroquine)
Miaffo, C.	2004	Burkina Faso	FGDs, IDIs	Pregnant women and their husbands	Chemoprophylaxis (chloroquine)
Enguita-Fernández, C.	2020	Democratic Republic of Congo (DRC), Madagascar, Mozambique and Nigeria	IDIs, FGDs	Pregnant women, women of reproductive age	Community-based IPTp
Matangila, J.R.	2017	DRC	IDIs, FGDs	Parents	IPTc
Pitt, C.	2012	Burkina Faso	IDIs, FGDs	100 caregivers of children	IPTc
Okello, G.	2012	Kenya	IDIs, FGDs	Parents	IPTc
de Sousa, A.	2012	Benin, Madagascar, Senegal	FGDs, IDIs, observations	Over 400 infant caregivers	IPTi
Gysels, M.	2009	Gabon, Ghana, Kenya, Malawi, Tanzania	IDIs, FGDs, observations	Parents	IPTi
Pell, C.	2010	Papua New Guinea	IDIs, FGDs	Mothers	IPTi
Pool, R.	2006	Mozambique	IDIs, semi-structured interviews, observations	308 mothers including trial participants	IPTi
Pool, R.	2008	Tanzania	IDIs, FGDs, participant observation	200+ mothers of infants	IPTi
Aberese-Ako, M.	2020	Ghana	IDIs, observations	Pregnant women	IPTp
Boene, H.	2014	Mozambique	Observations, IDIs, free-listing and pairwise comparisons	85 pregnant women	IPTp
Brabin, L.	2009	The Gambia	IDIs, FGDs	Women and girls, men	IPTp
Diala, C.C.	2013	Nigeria	IDIs, FGDs	Pregnant women and pregnant adolescents or women/adolescents who accessed ANC in last 2 years	IPTp
Doku, D.T.	2016	Ghana	IDIs, observations	Pregnant women (36 weeks +), postnatal mothers with children under 12 weeks (health workers)	IPTp
Hildon, Z.J.	2020	Mozambique	IDIs, FGDs	Women	IPTp
Hill, J.	2015	Kenya	FGDs	Women who were either pregnant or mothers of a child under 1 year, and adolescent girls	IPTp
Klein, M.C.	2016	Mali	IDIs, FGDs	Pregnant women	IPTp
Launiala, A.	2007	Malawi	FGDs, IDIs, observations	42 pregnant women	IPTp
Mubyazi, G.M.	2010	Tanzania	IDIs, FGDs, observations	Pregnant women, mothers with infants	IPTp
Onyeneho, N.G.	2015	Nigeria	IDIs, FGDs	246 women 15–49 years who gave birth in past 6 months, husbands	IPTp
Peeters Grietens, K.	2010	Burkina Faso	IDIs, FGDs, participant observation	32 pregnant women, health staff, community members	IPTp
Pell, C.	2013	Ghana, Kenya, Malawi	IDIs, FGDs	774; pregnant women, relatives, opinion leaders, community members, health providers	IPTp
Rassi, C.	2016	Uganda	IDIs	15 pregnant women or recently attended ANC	IPTp

(Continued)

**Table 2.** Continued.

First author	Year	Country	Qualitative methods*	End-users	Intervention
Tutu, E.O.	2011	Ghana	FGDs	Pregnant women	IPTp
Arnaldo, P.	2019	Mozambique	IDIs	50 pregnant women, health workers	IPTp
Pell, C.	2014	Ghana	FGDs, observations	30 pregnant women	IPTp, IST
Smith, L.A.	2010	Ghana	FGDs	Pregnant women	IPTp, IST
Almond, D.	2016	Malawi	FGDs	6-week post-partum women	IPTp, IST
Hill, J.	2016	Kenya	FGDs	61 pregnant and recently pregnant women enrolled in the trial	IPTp, IST
Hoyt, J.	2018	Indonesia	IDIs, FGDs	Pregnant women (healthcare providers)	IPTp, SSTp, ISTp
Andrew, E.	2015	Papua New Guinea	FGDs, IDIs, observations	Pregnant women, mothers of young children	IPTp/ Chemoprophylaxis (chloroquine)
Shufford, K.	2016	Kenya	FGDs, IDIs	Community members	IST
Adhikari, B.	2017	Laos	Observations		MDA
Adhikari, B.	2018	Laos	FGDs, SSIs, observations	131 community members	MDA
Adhikari, B.	2018	Laos	FGDs	100 community members	MDA
Baltzell, K.A.	2019	Eswatini	FGDs	208 community members	MDA
Dial, N.J.	2014	The Gambia	IDIs	Community members	MDA
Dierickx, S.	2016	The Gambia	IDIs, participant observation	Community members	MDA
Finda, M.F.	2020	Tanzania	FGDs	Community members	MDA
Gomes Murta, F.L.	2019	Brazil	IDIs	Malaria patients	MDA
Pell, C.	2017	Cambodia	SSIs, IDIs, FGDs	Community members	MDA
Pell, C.	2019	Cambodia, Laos, Myanmar, (Vietnam)	IDIs, FGDs, SSIs, observations	Community members	MDA
Peto, T	2018	Cambodia	IDIs, FGDs	Community members	MDA
Portugaliza, H.P.	2019	Mozambique	FGDs	Community leaders and members, traditional healers	MDA
Sahan, K.	2017	Myanmar	SSIs	Community members	MDA
Silumbe, K.	2020	Zambia	IDIs, FGDs	Community members	MDA
Tangseefa, D.	2018	Myanmar	IDIs, participant observation	Community members	MDA
Wanzira, H.	2018	Uganda	IDIs, FGDs	Community members, key informants	MDA
Svege, S.	2018	Malawi	IDIs, FGDs	55+ caregivers of children	Post-discharge malaria chemoprevention
Antwi, G.D.	2016	Ghana	FGDs, IDIs	Caregivers of children	SMC
Chatio, S.	2019	Ghana	IDIs, FGDs	Caregivers	SMC
Strachan, C.E.	2016	Nigeria	FGDs, IDIs	Mothers and female caregivers, male household heads	SMC
Morgan, M	2007	UK	FGDs	44 people of African origin living in south London	Traveller prophylaxis
Walz, E.J.	2019	USA	FGDs	172 adults who self-identified as West African and had travelled to West Africa in the past 10 years or planned to travel within 1 year	Traveller prophylaxis

\*Focus group discussions (FGDs), in-depth interviews (IDIs), semi-structured interviews (SSIs)

### **Experienced or potential side effects**

Reports of side-effects linked to the antimalarials were very common. Besides complaining about the bitter taste and quantity of pills, end-users described feeling dizzy, nauseous and tired. Some reported diarrhoea, vomiting, excessive urination and headache (Andrew et al., 2015; Boene

et al., 2014; Hill et al., 2015, Hill et al., 2016; Miaffo et al., 2004; Pell et al., 2010; Pell et al., 2013a; Rassi et al., 2016; Smith et al., 2010; Tutu et al., 2011). Mothers from Ghana felt hungry afterwards; with no money to buy extra food, they were discouraged from taking the drugs (Pell et al., 2013a). Side effects were sometimes seen as indicating effectiveness and viewed positively (Dierickx et al., 2016; Pitt et al., 2012). In Cambodia, MDA in the rainy season, when mild illness are more common, meant that the antimalarial was associated with a range of complaints (Pell et al., 2017; Peto et al., 2018b).

Mothers in Ghana were worried that their babies would grow too big, causing a difficult delivery (Pell et al., 2013a). Under trial conditions, parents from Kenya and Tanzania described concerns about severe side effects of unproven drugs, such as hydrocephalus or Stevens-Johnson syndrome (Gysels et al., 2009; Mubyazi & Bloch, 2014; Pool et al., 2008). In the DRC, mothers were afraid that the drugs would affect their children's memory and cognitive functions and – because they were free – that they were probably expired or toxic (Matangila et al., 2017). Kenyan young women suggested that the drugs were for birth control (Pell et al., 2013a). During focus group discussions, Ugandan men discussed how the antimalarials could cause impotence (Wanzira et al., 2018).

In some cases, side effects (perceived or otherwise) clearly influenced uptake. This was reported for IPTp across Africa and in Papua New Guinea (Andrew et al., 2015; Miaffo et al., 2004; Pell et al., 2013a), and for MDA across South East Asia (Pell et al., 2019) and in Zambia (Silumbe et al., 2020). In other instances, for example in the case of SMC, caregivers continued to give their children the antimalarial (Antwi et al., 2016). Often the reports of side effects, prompted efforts from those delivering the intervention to reassure participants, sometimes successfully (Pell et al., 2017; Peto et al., 2018b).

### **General health impact**

Benefits of receiving antimalarials as prevention were sometimes described in general terms. After SMC and IPT, Ghanaian women described fewer visits to a doctor and overall better health (including less anaemia and fewer pregnancy complications) (Chatio et al., 2019; Smith et al., 2010; Tutu et al., 2011). These benefits were also described in financial terms because of the reduced care-seeking and related costs (Antwi et al., 2016). Mothers from across Africa and in Papua New Guinea reported improvements in their health and that of their infants (Gysels et al., 2009; Hill et al., 2015; Pell et al., 2010; Pool et al., 2008; Rassi et al., 2016) as did caregivers of children in Burkina Faso (Pitt et al., 2012). Pregnant women participated in IPT and IST because they wanted information on their (and their babies') health status. They had concerns about losing their baby, tried to avoid adverse events, and were willing to receive treatment or preventive medication (Gysels et al., 2009; Pell et al., 2010). Besides the health benefits, parents from the DRC and Kenya stated that early detection of asymptomatic malaria and implementing IPTc decreased absenteeism and improved school performance (Matangila et al., 2017; Okello et al., 2012).

### **Trust in the implementors**

In the DRC, Ghana and Tanzania, a lack of trust in the team implementing IPT and SMC affected uptake (Matangila et al., 2017; Pool et al., 2006; Smith et al., 2010). Trust was eroded by suspicions around blood draws in clinical trials, particularly venous blood sampling. In Africa and South-East Asia, community members admitted fear about perceived high-volume blood draws (Gysels et al., 2009; Pell et al., 2019). Covert HIV testing was a concern in Kenya and Tanzania (Gysels et al., 2009; Pool et al., 2008). In Kenya, trust in the implementors of IST was embedded in past experiences of the research institute (Shuford et al., 2016) and, in Cambodia and Nigeria, trust was built on fulfilling promises because communities had been previously disappointed by other non-governmental organisations or research institutes (Peto et al., 2018b; Strachan et al., 2016).



Parents from DRC and Kenya expressed positive opinions towards IPT for school-going children. In the DRC, this was because teachers administered the treatment (rather than health workers in whom parents had little trust) (Matangila et al., 2017). Parents from Kenya however preferred community health workers to deliver treatment because they were more familiar and more likely to be trusted by the children (Okello et al., 2012). For community-based IPTp, trust was based on the perceived competence of community health workers. This was built through community participation in the selection process, transparency about their qualifications and involving their superiors in healthcare system (Enguita-Fernández et al., 2020).

Outside of clinical trial settings, trust in healthcare staff and the care they delivered affected opinions of the intervention. This was particularly the care for pregnant women, in Malawi (Launiala & Honkasalo, 2007), Nigeria (Diala et al., 2013), the Solomon Islands (Dulhunty et al., 2000) and Uganda (Rassi et al., 2016), and for children in Burkina Faso (Pitt et al., 2012) and Ghana (Antwi et al., 2016). Experiences of discrimination and racism among West Africans living in the USA and travelling to Africa affected their uptake of prophylaxis (Walz et al., 2019) and negative experiences of MDAs for other diseases raised suspicions in Tanzania (Finda et al. 2020)

### ***Practicalities of implementation***

Logistical and practical issues around implementation were also raised. The timing of MDA was important for Gambian participants, with farming obligations during the rainy season affecting uptake (Dial et al., 2014). This was also the case for MDA in Myanmar (Tangseefa et al., 2018) and, in Cambodia and the Gambia, community members' work-related absence from communities reduced MDA coverage (Dierickx et al., 2016; Peto et al., 2018b). Travel also reduced IPTc uptake in Burkina Faso (Pitt et al., 2012). Respondents reported barriers of distance and cost when accessing IPTp (Aberese-Ako et al., 2020; Launiala & Honkasalo, 2007; Onyeneho et al., 2015; Pell et al., 2013a). Hence, when the option was presented, respondents were positive about house-to-house delivery (Peto et al., 2018b; Svege et al., 2018). For travellers, long queues and the last-minute nature of travel sometimes complicated access to prophylaxis (Morgan & Figueroa-Munoz, 2005; Walz et al., 2019).

### ***Informing and engaging end-users***

End-users often wanted to receive information about the antimalarials, their purpose and safety as well as general health information. Ghanaian and Mozambican participants proposed using media, such as tv, radio, pamphlets and billboards, to create more awareness on asymptomatic malaria, MDA and IPT (Chatio et al., 2019; Portugaliza et al., 2019). Visual methods, such as drama, were well received as an alternative approach by community members in Cambodia (Pell et al., 2017). In Eswatini, participants said that implementors could provide health education to build trust (Baltzell et al., 2019). Community members from the Gambia appreciated general education meetings, where local courtesies were followed, and they were able to ask questions about MDA (Dial et al., 2014). In Malawi, pregnant women valued the test results from IST (Almond et al. 2016) and, in Ghana and Myanmar, community members wanted more feedback after testing and the study results (Pell et al., 2014; Sahan et al., 2017).

When implementing MDA, to build trust and promote collaboration with the community, communication and feedback was described as key (Adhikari et al., 2017; Pell et al., 2019). Involving locals as staff, incorporating traditional healers, community health workers and schools in the programmes and providing information on malaria were strategies to improve uptake (Adhikari et al., 2017; Strachan et al., 2016). Ugandan participants appreciated community sensitisation and mobilisation of relevant stakeholders and recruiting team members from the area (Wanzira et al., 2018). In South-East Asia, community members requested more active collaboration between stakeholders, such as governments, district council, key community members, national malaria control

programmes, and health centres (Adhikari et al., 2017; Pell et al., 2019). In Myanmar, the community engagement had to be developed in light of the traumas of war and isolation, as well as the complex local politics (Tangseefa et al., 2018). Implementation team members joining community activities, such as meetings, home visits, playing sports, festivals, funerals, and sharing traditional food with community members helped engage communities (Pell et al., 2019; Sahan et al., 2017). Such community engagement was also an important in influencing attitudes to MDA in Brazil (Murta et al., 2019).

### **Interventions in the wider care context**

How care was delivered more broadly influenced attitudes to interventions. Community members from across Africa described reprimands and insults from health workers, dared not ask questions and were worried about jeopardising future care (Gysels et al., 2009; Pool et al., 2008). Unequal power relations between staff and end-users and the interactions that ensued influenced understandings of interventions, including IPTp (Brabin et al., 2009). Especially in Tanzania, participants described how some health workers favoured particular end-users, and mocked those unable to pay for healthcare, with some charges unofficial and levied unevenly (Mubyazi & Bloch, 2014). In Papua New Guinea, patients also experienced rude staff and complained about a lack of proper care (Pell et al., 2010). Pregnant adolescents were at particular risk of discrimination, which had implications for uptake of IPTp (Peeters Grietens et al., 2010; Pell et al., 2013a). The costs of care – and lack of clarity about charges – also influenced the uptake of IPTp (Klein et al., 2016; Pell et al., 2013a).

Long travel times, poor infrastructure and long clinic waiting lines discouraged Mozambican and Tanzanian community members from participating in IPT (Arnaldo et al., 2019) and potential MDA participants in South East Asia (Pell et al., 2019). Stock-outs of antimalarials were described in some Ghanaian health facilities reducing IPTp uptake of (Aberese-Ako et al., 2020) as did a lack of free water (Mubyazi & Bloch, 2014; Pell et al., 2013a).

Positive perceptions of healthcare, for example in the cases of infant vaccination (Pool et al., 2008) and the ancillary care in a clinical trial (Adhikari et al., 2018a; Pitt et al., 2012), increased uptake. With infant vaccinations seen in some francophone African countries as obligatory, IPTi was viewed similarly and hence uptake was high (de Sousa et al., 2011). For some women, visiting a health facility was a social event: attending to meet friends could promote uptake, but also potential embarrassment caused by interactions with health providers or an inability to pay fees led some to avoid facilities and reduced uptake (Gysels et al., 2009; Pell et al., 2013a).

### **Decision-making**

Husbands/fathers often had roles in decision making (Gysels et al., 2009; Pell et al., 2010; Sahan et al., 2017; Hildon et al. 2020): women were often dependent of their approval and financial support (Klein et al., 2016). Men also had a strong influence on decision-making in the context of serious concerns about clinical trials (Pool et al., 2006).

Attitudes and behaviours towards SMC and MDA were influenced by local leaders, other key community members, family members and neighbours (Adhikari et al., 2018a; Baltzell et al., 2019; Chatio et al., 2019; Pell et al., 2019). In Laos, the preference for social conformity meant that people often went along with the decisions of neighbours when participating in MDA (Adhikari et al., 2018a). In Cambodia, vocal critics of MDA influenced some family members and neighbours and convinced them not to participate, sometimes only to skip one dose (Pell et al., 2017).

### **Discussion**

The qualitative synthesis of end-user perceptions revealed that ruminations over harm and benefit of preventive antimalarial interventions are embedded in understandings of the disease, the intervention,

its implementation, accompanying information and how it is embedded in healthcare more generally. The findings also highlight how decisions about uptake are influenced by social and familial relationships. These topics merit consideration when seeking to promote uptake preventive antimalarials.

The absence of symptoms often discouraged uptake (Hoyt et al., 2018; Murta et al., 2019; Okello et al., 2012), particularly when end-users perceive side-effects as likely and severe enough to influence their daily lives and livelihoods (Pell et al., 2017). Hence, the tolerability of an antimalarial used for prevention is crucial because any unwanted health impact can reverberate in financial and other losses.

Despite patchy familiarity with malaria and its aetiology, broad concerns about the impact of illness often motivated uptake of preventive antimalarials (Pell et al., 2019; Pitt et al., 2012; Sahan et al., 2017). This encompasses economic consequences of illness (Pell et al., 2017) and suggests an opportunity to frame communication about disease prevention broadly, providing information about the intervention, disease aetiology, the symptoms and consequences of infection or severe disease. For example, for IPTc, information could be provided on the benefits of decreased school absenteeism, improved school performances, and fewer health facility visits (with the associated costs) (Okello et al., 2012).

Trust in the intervention, those implementing it and providing information was also key (Adhikari et al., 2017; Enguita-Fernández et al., 2020). Trust can be built in a variety of ways, and inter-personal trust played a particular role: involving local stakeholders, including community health workers, local leaders, traditional healers, in the delivery of interventions is one approach (Adhikari et al., 2016; Adhikari et al., 2017; Pell et al., 2019). Building positive social relationships between implementors and end-users is another. This, for example, involves demonstrating commensality with community members, through celebrating national holidays, sharing traditional food and attending funerals (Adhikari et al., 2016; Sahan et al., 2017).

What information is provided and how it is communicated is critical. Visual methods, such as appropriately designed posters and pamphlets, and in-person information meetings are important strategies (Adhikari et al., 2017; Lim et al., 2016; Peto et al., 2018a, 2018b). Feedback on the outcomes of the intervention, explaining its impact on the malaria burden is also valuable (Gysels et al., 2009). This feedback ideally encompasses the health impacts and costs averted, and safety. Communication to address concerns, for example, about side effects, should be prompt and direct (Adhikari et al., 2017; Pool et al., 2006).

How the interventions are embedded in healthcare provision also affects uptake. Some interventions, such as IPTp/i, are part of series of appointments involving a package of services. Ideally, this care package is delivered in a client (rather than intervention)-focused manner. Focusing on general health and well-being rather than delivering disease-focused interventions is likely to improve uptake, particularly for the most vulnerable (Peeters Grietens et al., 2010; Pell et al., 2013a, 2013b). Interactions between healthcare staff and clients that reflect such an approach i.e. that involves a warm welcome, providing advice, and enabling clients to ask questions, is also likely to promote uptake (Pell et al., 2013b). Demanding unofficial service charges damages trust, as can charging for anything that might ease administration or ameliorate potential side effects, such as free water (Gysels et al., 2009; Klein et al., 2016). Whether end-users incur additional direct, indirect and/or opportunity costs is relevant and can be minimised through incorporating delivery into other healthcare visits (or community-based implementation) (Peto et al., 2018b; Svege et al., 2018).

Decisions about uptake are often taken in the context of a family or wider social group. Particularly for infants, the father often leads decision-making about interventions and should not be forgotten in communication and engagement efforts (Gysels et al., 2009). Local leaders and traditional healers can influence attitudes: particularly for community-wide interventions, engaging them in implementation and communication is key (Adhikari et al., 2016; Adhikari et al., 2017).

**Strengths and limitations.** The findings are limited by the study settings and designs. Of particular significance is that thirty studies were conducted alongside a clinical evaluation of an intervention.

Clinical trials often involve additional blood sampling and ancillary care, which can promote positive and or negative attitudes. Venous blood draws can be particularly discouraging (Pell et al., 2019; Pool et al., 2006). The studies were also largely undertaken in low- and middle-income settings, mainly in Africa and Asia, and therefore potentially offer limited lessons for high-income settings: only two studies on the prophylactic use of antimalarials for travellers to endemic areas were identified.

## Conclusion

The qualitative synthesis of end-user perceptions on preventive antimalarial interventions revealed that uptake is entwined with broader understandings of the disease, the intervention, its implementation, accompanying information and how it is embedded in healthcare more generally. The findings also highlight how decisions about uptake are influenced by social and familial relationships. Several issues should therefore be considered when promoting preventive antimalarial therapy: the need to pay special attention to building different *types* of trust – including interpersonal and institutional trust; engaging varied stakeholders, and embedding the approach in a broader programme of client-centered care.

## Disclosure statement

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