

Reasons for mosquito net non-use in malaria-endemic countries: A review of qualitative research published between 2011 and 2021

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Abstract

Mosquito nets, particularly insecticide-treated nets, are the most recommended method of malaria control in endemic countries. However, individuals do not always have access to insecticide-treated nets or use them as recommended. The current paper expands on a previous review published in 2011 which highlighted a need for more qualitative research on the reasons for mosquito net non-use. We present a systematic review of qualitative research published in the past decade to assess the growth and quality of qualitative papers about net non-use and examine and update the current understanding. A comprehensive literature search was carried out in MEDLINE, CINAHL, and Global Health, in addition to a citation search of the initial review. Relevant papers were screened and discussed. The critical appraisal assessment tool was used to ensure quality. Thematic synthesis was used to extract, synthesise, and analyse study findings. Compared with the initial review, the results showed a 10-fold increase in qualitative research on the reasons for mosquito net non-use between 2011 and 2021. In addition, the quality of the research has improved, with more than 90% of the papers receiving high scores, using the critical appraisal assessment tool. The reported reasons for non-use were categorised into four themes: human factors, net factors, housing structure, and net access. More than two thirds of the studies (25/39) were led by authors affiliated with institutions in malaria-endemic countries. Despite the distribution of free mosquito nets in malaria-endemic countries, earlier reported challenges remain pertinent. The most common reasons for net non-use across all regions of Malaria endemic countries pertained to human- and net-related factors. The research focus should shift towards intervention studies to address these issues.

KEYWORDS

endemic countries, insecticide-treated nets, malaria, mosquito nets, non-use, review

INTRODUCTION

There were an estimated 247 million malaria cases across 84 malaria-endemic countries in 2021, with more than 90% of the cases recorded in Sub-Saharan Africa. The mortality rate ranges between 0.3%–2.2% and can be as high as 11%–30% for severe malaria [1]. Malaria infection may further affect an individual's social and economic life. Many individuals in malaria-endemic countries are poor; thus, infection with the disease increases their financial burden

through drug procurement and travel expenses to health centres or clinics. Other economic costs from the illness include loss of wages due to absence from work, and frequent infection can also impact the learning of children who miss school [2].

Malaria can be prevented and controlled in malaria-endemic countries through the routine use of mosquito nets [2, 3]. There are two kinds of mosquito nets: insecticide-treated nets, an “umbrella” term encompassing “all nets treated with an insecticide, insect growth regulator and or synergist” [4], and untreated mosquito nets. An untreated net protects the individual/s resting within against

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mosquito and other pest/insect bites [5, 6]. While insecticide-treated nets offer personal protection to those under the net and kill mosquitoes conferring a more comprehensive household/community benefit [7]. An estimated 1.2 billion cases of malaria and 7.1 million deaths were averted between 2004 and 2019 in sub-Saharan Africa following antimalaria campaigns, with insecticide-treated nets making the single most significant contribution accounting for an estimated 68% of these figures [8].

The cumulative shipments of all forms of mosquito nets to malaria-endemic countries increased from 436 million in 2010 to ~2.6 billion in 2021 [9]. While insecticide-treated net access, defined as ‘the proportion of the population with access to an insecticide-treated net within their household’, may have improved in malaria-endemic countries over this time, this does not imply increased use (where use is defined as ‘the proportion of the population that slept under an insecticide-treated net the night before’) [8, 10]. Although WHO guidelines recommend using insecticide-treated nets every night in malaria-endemic areas, regardless of the weather conditions, individuals in a household may still choose not to use them when they are available (and, of course, insecticide-treated nets cannot be used when they are unavailable) [4, 11]. Nevertheless, insecticide-treated nets remain a cost-effective strategy for controlling and preventing malaria [12] and global support remains to increase insecticide-treated net access and use in malaria-endemic countries, particularly in sub-Saharan Africa [2].

A previous review by Pulford et al. [13] examined reasons for net non-use as reported in the published literature. This review identified discomfort due to heat and perceived low density of mosquitoes as the primary reasons for net non-use [13], although Pulford et al. [13] concluded that more and better quality research examining reasons for insecticide-treated net non-use was needed and especially qualitative studies. In the decade that has passed since the publication of this review, a wide range of research has been completed, and a more comprehensive understanding of reasons for insecticide-treated net non-use appears to be emerging. A recent analysis of data obtained from 27 national household surveys (conducted predominantly in sub-Saharan Africa) reported that the most cited reasons for not using an available insecticide-treated net the night before the respective survey were that the insecticide-treated net was being kept for later use and a perceived ‘low’ risk of malaria infection [10]. Qualitative studies are also increasingly contributing to our understanding of insecticide-treated net non-use. For example, Asmamaw et al. [14] reported on the perceived ineffectiveness of the insecticide-treated nets when ‘the net stopped killing bedbugs’.

In this article, we present an up-to-date review of published qualitative research exploring mosquito net non-use conducted in the decade since the original review by Pulford et al. [13]. Our specific objectives were to assess the extent and quality of qualitative research published between 2011 and 2021 and, drawing on the findings from this literature, update current understanding of reasons for mosquito net non-use in malaria-endemic countries.

TABLE 1 Original reviews search terms, adjusted for year and study type.

Search ID no.	MeSH terms
S8	S7 AND S6
S7	‘qualitative*’ OR ‘focus*group’ OR ‘interview*’ OR ‘mixed method’
S6	S4 AND S5
S5	‘non-use*’ OR ‘obstacle*’ OR ‘misuse*’ OR ‘disuse*’ OR ‘challenge*’ OR ‘neglect*’ OR ‘abandon*’ OR ‘barrier*’ OR ‘use*’
S4	S2 AND S3
S3	‘Mosquito Bed Net*’ OR ‘Mosquito Net*’ OR ‘Mosquito Bednet*’ OR ‘Insecticid*treated’ OR ‘ITN*’ OR ‘LLIN*’ OR ‘Insecticide-treated Bednets’ OR ‘Bednet*’
S2	‘Malaria*’ (2011–2021)
S1	‘Malaria*’

It is hoped the results may inform the design and selection of net-use promoting interventions.

METHODOLOGY

We conducted a structured literature review of qualitative studies published between 2011 and 2021 which examined reasons for mosquito net non-use in malaria-endemic countries.

Search strategy

A structured electronic search of peer-reviewed articles was conducted using the following three databases: MEDLINE, CINAHL, and Global health. An additional citation search of the original Pulford et al. [13] review was conducted to identify and retrieve relevant papers. The search terms used in the original Pulford et al. [13] review were adapted and applied for this study: (1) Malaria AND, (2) Mosquito Bed Net AND, (3) Non-use AND, and (4) Qualitative, with variants of the terms (Table 1).

Study selection

All retrieved publications were imported into Endnote, and duplicates removed. Publications were initially screened by title and abstract against specified inclusion criteria, with the remaining publications subject to full-text review. All publications were independently reviewed for inclusion at both stages by two authors (HIL and US), with any disagreements resolved by discussion until consensus was reached. The inclusion criteria included studies: conducted in malaria-endemic countries, research focused on mosquito net non-use (as either primary or secondary objective),

published in English between 2011 and 2021, employed qualitative methods or a mixed method study design with transparent reporting on qualitative methods and results.

Quality appraisal

The critical appraisal skill programme (CASP) checklist was utilised to assess the quality of the retrieved papers. CASP consists of 10 structured questions that cover the following topics: study purpose, appropriateness of qualitative design, suitability of study design, sampling strategy, data collection method, ethical consideration, data analysis, findings, and study relevance (see Table 3). Each set of questions has three scoring options: Yes (1), No (0), or Can't tell (0). Each set of questions has hints to guide the researcher in evaluating papers. Studies with a cumulative score of eight and above were regarded as high quality, five to seven as medium quality, and below five as low-quality studies [15, 16]. Two authors independently assessed all publications against the CASP criteria (HIL and US). An agreement was reached between both authors on the CASP scoring for each paper.

Data extraction and analysis

The lead researcher extracted the following information into an Excel file from each paper; Research title, authors (first and last), institution of lead author, year of publication, study objectives, study settings, country of focus, study participants, study type (qualitative alone or mixed study) and Information on data collection tools, analysis, and sampling methods. Finally, a summarised version of the key findings reported within each paper concerning reasons for insecticide-treated net non-use was extracted.

Summarised versions of the key findings were analysed thematically in Excel. The first step was to become acquainted with the data. This entailed reading the extracted data repeatedly, identifying common themes pertinent to our study objectives, and highlighting related quotes that emphasise and elaborate on the themes. Subsequently, an agreement was reached on the framework to be used for data coding in Microsoft excel by two authors (HL and JP). Data were then systematically coded against this framework and a final set of themes and associated sub-themes identified. All other extracted data were analysed using descriptive statistics as presented in the results section below.

RESULTS

Study selection

As depicted in Figure 1, the initial search yielded 892 articles, of which 81 met the inclusion criteria for a full-text review.

Following full-text review, 39 articles were included in the final sample.

Characteristics of included papers

Cumulatively, the 39 papers pertained to 19 malaria-endemic countries, with most ($n = 34$) studies conducted in Africa (Table 2). The remaining five studies were from Southeast Asia. Most publications (25/39) were led by authors affiliated with institutions in malaria-endemic countries.

A full description of the study characteristics of publications included in this review can be found in Supplementary file S1 one. As shown, over two thirds (34) of the study populations were drawn from rural settings. Most studies (25/39) employed a qualitative study design alone, compared with a third (14/39) that used a mixed methods study design. Data collection methods variously included focus group discussions, key informant interviews, in-depth interviews, observation, and participatory activities. Sampling methods included snowballing, and convenient selection, although the majority used purposive sampling (20/39) to recruit study participants. More than two thirds of studies (30) utilised thematic analysis.

Quality assessment

Table 3 provides a summary of the quality assessment outcome. A CASP score of at least eight, considered to be high, was present in about 90% (35/39) of reviewed studies. The remaining 10% (4/39) received a score of six and seven, considered medium quality. No studies scored below five, and no publications were disregarded for this review based on the CASP score. As given in Table 3, all studies (39/39) made clear their aims and objectives, and the majority clearly stated the suitability of their choice of a qualitative study design (38/39). The recruitment strategy and data collection methods were appropriate in almost all reviewed papers (38/39 and 37/39, respectively). Regarding reflexivity, nine studies provided details on how they evaluated their role, potential bias, influence during data collection, and how they reacted to events and any changes during the study. However, 28 of the studies did not provide information on reflexivity. Almost all studies (38/39) indicated how ethical approval was obtained. In addition, most of the studies' data analyses (28/39) were sufficiently thorough, and their findings (37/39) were clear and concise.

Thematic analysis of key findings

Reported reasons for net non-use across the 39 publications included in the review were subsequently categorised under four main themes, each with two or more sub-themes.

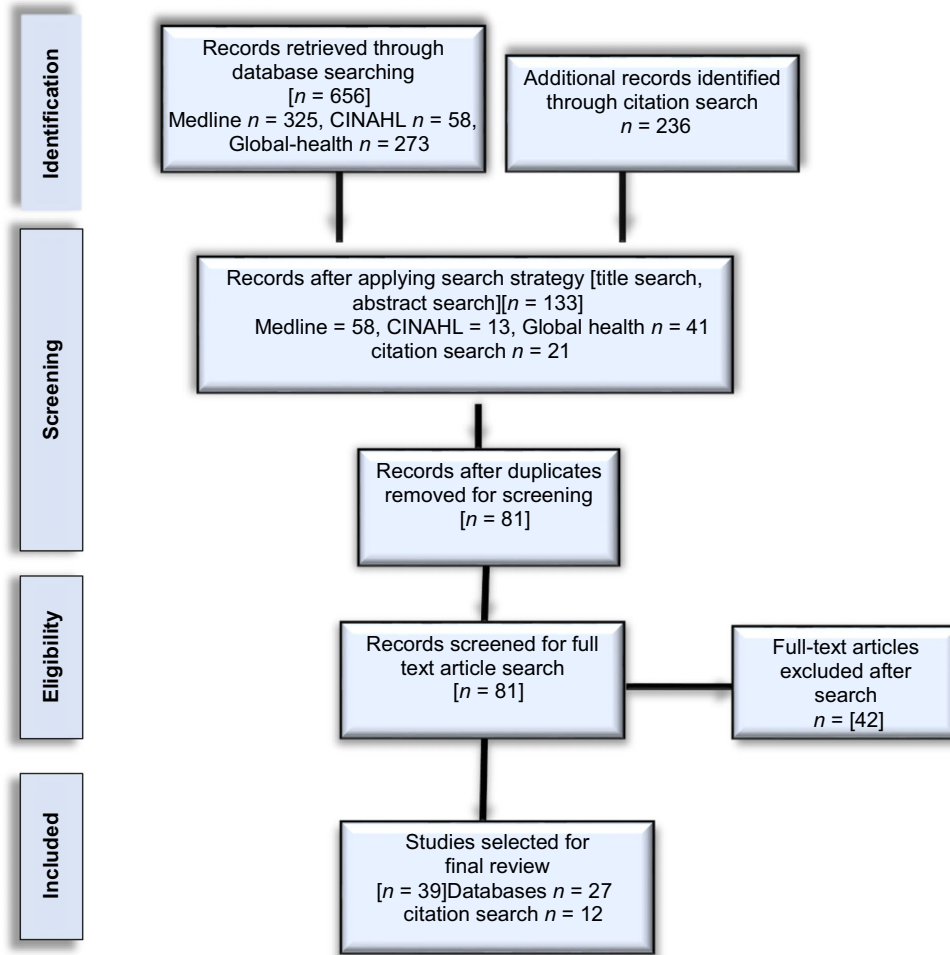


FIGURE 1 PRISMA flowchart showing the process of searching and selecting the relevant studies.

Each theme and sub-theme is presented in turn below, alongside relevant quotes taken from reviewed publications to illustrate key points. All themes and sub-themes are summarised in Table 4.

Human factors

This theme describes the reasons for net non-use that pertain to human perceptions, preferences, or experiences. A majority of the reasons for net non-use were categorised under this theme across six sub-themes:

Response efficacy

Results suggest that participants do not always consider insecticide-treated nets to be effective or considered other preventive methods to be more effective. For example, the absence of dead insects at the side of the mosquito nets gave some participants the impression that treated nets had

become ineffective [14, 17–20]. Net cleanliness was also a factor in some cases [21]. Fourteen studies had findings categorised under this sub-theme [22–28].

This net is more or less similar to an ordinary mosquito net because we found a mosquito with it even after hanging before sleeping (2018, Bangladesh). [17]

If the area is fumigated even once a month by the government, then we will be free day and night from mosquito bite and not only in night (2017, Nigeria). [27]

Because of cleanliness, some husbands do not like dirty bed nets. They want nets to be washed every few days. So, if he gets home and finds that the bed net has not been washed, he will put it away. This may result in the family or couples sleeping without a bed net (2017, Tanzania). [21]

Discomfort

In eight studies, discomfort was presented as a reason for non-use, including the feeling of suffocation while sleeping under the nets, especially in a hot climate, or the fear of experiencing some reaction, such as skin irritation [25, 27, 29–34].

There's a lot of insecticides. Sometimes it's too strong and difficult to sleep under the net for the first time. The insecticide prevents me from breathing well and it's very difficult to breathe around this product (2014, Senegal). [33]

'I heard that one man slept inside the net and vomited blood', and I heard that it causes skin irritation because the chemical is too much. [31]

I am still afraid of malaria, but I could not sleep. It was too hot to sleep under the nets in the summer (2013, Nigeria). [30]

Mosquito density

Reported in three studies, many participants felt that using nets during seasons when mosquitoes were perceived to be less numerous, such as hot seasons, was unnecessary. At the same time, net use was more prevalent during rainy seasons when mosquitoes were perceived to be more prevalent [29, 33, 35]:

We were given these nets during the rainy season when there were a lot of mosquitoes. I hung the nets, and the children slept in them that time. When the rainy season was over, we removed the nets because during that time, there was no mosquitoes (2016, Uganda). [35]

Prioritising nets

In four studies, prioritising certain family members, such as infants, children under five, and pregnant women, were highlighted as a reason for other members of the family not using insecticide-treated nets. Youth and older adults generally received less attention and prioritisation, although in one study, the head of the house received priority over other family members [36]. The reason for prioritising mosquito nets was often associated with insufficient insecticide-treated nets in the homes to cater for all family members [21, 31, 37].

TABLE 2 Geographical distribution of selected studies.

Region	Country	No. of studies	Total no. of studies
Asia	Bangladesh	1	5
	Myanmar	2	
	Papua New Guinea	1	
	Thailand	1	
Central Africa	DRC	1	1
East Africa	Ethiopia	6	18
	Kenya	1	
	Madagascar	1	
	Rwanda	1	
	Tanzania	4	
West Africa	Uganda	5	11
	Benin	1	
	Burkina Faso	1	
South Africa	Ghana	4	2
	Nigeria	4	
	Senegal	1	
	Malawi	1	
Multi-country	Zimbabwe	1	2
	Ghana/Malawi/Kenya	1	
	Mali/Kenya	1	

TABLE 3 Quality assessment results.

Criteria	(Yes)	(Can't tell)	(No)
Was there a clear statement of the aims of the research?	39	0	0
Is a qualitative methodology appropriate?	39	0	0
Was the research design appropriate to address the aim of the research?	38	0	1
Was the recruitment strategy appropriate to the aim of the research?	38	1	0
Was the data collected in a way that addresses the research issues?	37	0	2
Has the relationship between researcher and participants been adequately considered?	9	2	28
Have ethical issues been taken into consideration?	38	0	1
Was the data analysis sufficiently rigorous?	28	0	11
Is there a clear statement of findings?	37	1	1
How valuable is the research?	39	0	0

TABLE 4 Summary of emerging themes.

Analytical/final theme	Sub-theme	Descriptive theme	Number of studies cited for each theme
Human factor	Response efficacy	In-effectiveness of nets	14
		Attitudes to net use	
		Preference for other preventive methods	
		Net hygiene	
	Discomfort	Adverse effect of insecticides	8
		Hot climate	
Net factor	Mosquito density	Perceived low density of mosquito	3
	Prioritising nets	Sleeping arrangement	4
	Net re-purpose	Domestic use of net	6
	Socio-cultural beliefs and practices	Social gatherings	6
		Inconsistent use when travelling	
House structure	Net materials	Characteristics of net	5
	Net set up	Challenges with Net placement	4
Net access	-	-	2
	Distribution practices	Net distribution	5
	Net cost		4

I would not give priority to the youth because they are strong and their bodies can resist malaria... I would only consider those that are more vulnerable and leave those that are strong enough to fight (2014, Uganda). [36]

We had in mind that the man, as the head of the family, should be the one to get it first; [he] has to sleep on the bed. If God provides more, then I and the kids shall get later (2014, Uganda). [36]

Net re-purpose

In six studies, old and new mosquito nets were re-purposed for another use, such as covering farm animals, farm produce, processing butter from milk, catching fish, or rearing chickens [18, 22, 34, 38–40]. In one study insecticide-treated nets had been repurposed as netting for doors and windows and, therefore, retained a protective function against mosquito bites [34].

The one I had following the distribution, frankly speaking, I didn't sleep in it because it was hard. So, I used it for my windows. I fixed them at the back of my windows and even my trap door. That is what I used. I have used it as a net for all my windows so that mosquitoes do not enter my room (2019, Ghana). [34]

We are in fear that what will happen in the future if we tell you everything... We use

bed nets to cover the toilet, separating seeds from the stem; after thoroughly washing, we use them for filtering kinetic, coffee, and milk during the separation process of milk from the butter. Those who cannot purchase clothes can use them as night clothes, as bed sheets, and it gives many more purposes (2020, Ethiopia). [18]

Socio-cultural beliefs and practices

Social norms and practices can negatively influence the use of mosquito nets as highlighted in six studies. Some cultural practices, especially those related to burial, may preclude individuals from adhering to their usual practice of sleeping under a net, during funeral ceremonies that run deep into the night or overnight [24, 41–43]. Mosquito net use was also found to be challenging for individuals active at night or who frequently travel for businesses or social engagements and may not have ready access to nets when doing so [21, 24, 39, 41, 43]

We don't sleep under the net when it's burial time... You cannot decide to put your net, who are you? How important are you? How arrogant are you? So, most of us in Teso don't even sleep when at a funeral. We sit out around the fire or even within a house, and in big numbers, so one cannot use a mosquito net (2021, Uganda). [24]

Sometimes when we go farming in the valleys [protection from mosquitoes is not possible]. You might go with the intention of coming

back but find that it gets dark, and so you decide to sleep there (2011, Tanzania). [41]

Sometimes we travel, and some homes that host us may have no bed nets, so when you stay for some days in these homes you are likely to get malaria (2017, Tanzania). [21]

Net factors

This theme refers to reasons for non-use that relate to the physical properties of mosquito nets. Findings from nine studies pertained to net factors, across two sub-themes.

Net material

Five studies reported that participants' preference for certain characteristics of nets such as colour, texture, shape, and size, influences net use [21, 34, 37, 39, 44]. In one study, participants expressed their preference to conical-shaped nets over the rectangular net [34].

I have not yet installed the new net; it is still stored in its packaging with clothing. I do not like it because it has large meshes; I still use the old ones because they are smaller. In addition, the product on the new net gives the cold. The fabric is stiff and uncomfortable, my hair hangs in there (2016, Madagascar) [37].

Net setup

In four studies, participants had difficulties with the initial or ongoing setup of the mosquito nets which impacted on their use, including difficulty in getting into the nets [19, 26, 30, 34]:

Once they fix the net and find entering the net uncomfortable, they will not sleep in it again because it did not serve their purpose. In the night, if they want to go and urinate and the net ties them up and they have to remove it, go out and come back to fix it, they feel like they are in prison and will not sleep under it (2019, Ghana). [34]

Housing structure

This theme refers to factors relating to the structure and style of homes/houses that hampered participants' continuous use of mosquito nets in two studies. Participants living in houses built on stilts, for example, were unable to use mosquito nets properly due to the gaps in the floorboards that allow mosquitoes to enter, regardless of the number of nets distributed to them [26, 45].

The fact that our houses are built with wood on stilts, there is space between the planks. Even if the bed net is well tied to the ceiling, there is always a space beneath the planks

that mosquito harnesses to get in. But I don't think there is a way to avoid mosquitoes unless we change our houses. That would require a lot of money. The best way to help us is to change our houses (2018, Benin) [26].

Net access

The theme refers to a participant's ability to access or purchase mosquito nets. Nine studies presented relevant findings across two sub-themes.

Distribution practices

Five studies highlighted participants dependence on free net distribution and potential inequalities in net access that could arise depending on the distribution model used such as health facility-based distribution or distribution that specifically targeted high-risk communities [17, 23, 46–48].

It is segregation, favouritism, and all kind of things. For example, if they received 40 Bednets, doctors give them to 5–6 people who did not visit the health centre. If we get there, they said that is it finished (2015, Kenya/Mali). [48]

These days, people get bed nets at the health centre from antenatal consultation or child vaccination at 9 months. However, those who don't attend consultation or vaccination services have a problem with getting bed nets (2019, Rwanda). [23]

I am alone and got one net, my son's family has 7 members but he got only one net which was not sufficient for them (2019, Myanmar). [46]

Net cost

Participants in four studies who could not obtain nets via distribution campaigns either had to raise money to procure new nets, or stay without them [21, 35, 45, 49].

Insecticide-treated nets are sold at the health facility at a lower price. If you don't go early, you might not get [sic] it to buy because a lot of people go there to get them. If you miss this, then you have to buy it from the open market at a relatively higher price. So, if you don't have the money, you cannot get the net to use (2017, Ghana). [49]

Nets received via free distribution campaigns were exchanged for money in some cases. One reason given for such gestures was poverty [35, 45].

We ensure free bed net distribution to pregnant women and young children, but the issue is that many of these women sell their nets (2017, DRC). [45]

DISCUSSION

In this review, we sought to assess the extent and quality of qualitative research published between 2011 and 2021 pertaining to the non-use of all types of mosquito nets and, drawing on the findings from this literature, update current understanding of reasons for mosquito net non-use in malaria-endemic countries. The focus on qualitative research was informed by an earlier review published in 2011 which identified a dearth of qualitative investigation on this topic. Our review identified substantial growth in qualitative research on the topic of mosquito net non-use with 39 qualitative or mixed methods studies published between 2011 and 2021 as compared with four between 1999 and 2010 [13]. Significantly, this growth in qualitative research was primarily driven by researchers working at institutions located in malaria-endemic countries.

Not only did we find growth in published, qualitative research output, but our findings also indicate the increased research output was of a generally high standard. A CASP score of at least 8 out of 10, indicative of high quality, was awarded to more than 90% of the reviewed publications. As malaria-endemic country-based researchers primarily drove the growth in qualitative research publication, this finding is especially pleasing concerning research capacity and equity issues in global health research [50]. Nevertheless, two-thirds of the reviewed papers (28/39) were rated poorly on the CASP measure of reflexivity (Table 4), suggesting this may be an aspect that needs greater attention when preparing qualitative research for publication, potentially through effective strategies such as reflexive writing or collaborative reflection [51].

With regards to updating current understanding of reasons for mosquito net non-use in malaria-endemic countries, our study re-affirms many of the findings presented in the original review by Pulford et al. [13]. The two most frequently cited reasons for mosquito net non-use determined by Pulford et al. discomfort due to heat and perceived low mosquito density were also prominent in many of the qualitative studies included in our review. The predominance of 'human factor' related reasons for mosquito net non-use identified in this review of qualitative research also chimes with Koenker et al.'s [10] recent quantitative analysis of national household survey data. Koenker et al. [10] found that the two most frequently reported reasons for not using an insecticide-treated net were that householders were preserving available nets for future use and/or they did not consider use necessary due to a perception that there was a low risk of malaria infection, especially during dry seasons. Other prominent reasons for net non-use identified in our review, such as an insufficient supply of (or access to) nets or barriers pertaining to the physical properties of available nets have also been previously

reported [12, 52]. The continued reporting of these factors over an extended period via quantitative and qualitative studies, strongly suggests that there is a common set of frequently cited barriers to mosquito net use which we now largely understand. Given these common barriers have been consistently reported over the past two decades, then our findings would also suggest that attempts to resolve these barriers have been insufficient. As human- and net- factors were the two most commonly reported barrier 'types', then Interventions aimed at changing human behaviour or more user-friendly insecticide-treated net designs in terms of style, size, and texture should be prioritised. Conversely, net non-use need not always be considered problematic in all instances and current measures of compliance may not be sufficiently sensitive to how nets are used in practice [43]. While it is therefore a worthwhile endeavour to encourage greater insecticide-treated net use in malaria-endemic countries, and research to support this will continue to be valuable, some level of net non-use is likely to always persist and quite possibly reasonably so in some cases.

This study is the first literature review that exclusively focuses on qualitative research on the reported reasons for the non-use of all forms of mosquito nets. The included papers are proven to be of high quality. Two independent researchers validated the article screening, final theme selection, and quality assessment, which we believe reduced selection bias. The synthesis findings were supported by multiple quotes from the various studies, representing a complete description of the themes, which increased trustworthiness. Despite these efforts to ensure quality, limitations remained. Only English language publications were included, and grey literature was excluded. Thus, we may have left out qualitative data related to the causes of mosquito net non-use that could have increased the value of our research results. More than two thirds of the findings informing our review were from rural populations, which raise the possibility that they may be less reflective of peri-urban or urban populations. The similarity in geographical distribution and economic status of the malaria-endemic countries in the review enhances the transferability of findings. However, the debate over decontextualizing qualitative synthesis methods may limit the transferability of the results [53].

CONCLUSION

Over the last decade, there has been a significant increase in high-quality qualitative research, contributing to a consolidated and more in-depth understanding of the reasons for mosquito net non-use. The review findings highlight the wide range of factors that influence net use. Yet, some factors have been consistently reported at high frequency over an extended time period indicating these are priority concerns to address. The research focus should shift towards intervention studies to address these issues.

ACKNOWLEDGEMENTS

The Mamco Selab scholarship at the Liverpool School of Tropical Medicine for part tuition fee in support of a

Master's degree programme for which this literature review was completed.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABLE STATEMENT

All data will be made available upon request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Ladu HI, Shuaibu U, Pulford J. Reasons for mosquito net non-use in malaria-endemic countries: A review of qualitative research published between 2011 and 2021. *Trop Med Int Health*. 2024. <https://doi.org/10.1111/tmi.14006>