integrity Research Journals

Journal of Public Health and Diseases
Volume 8(4), pages 77-93, October 2026
Article Number: 818D84131
ISSN: 2705-2214
https://doi.org/10.31248/JPHD2025.192
https://integrityresjournals.org/journal/JPHD

Review Article

Facilitators and behavioural barriers to the uptake and sustained use of malaria prevention interventions in Sub-Saharan Africa: A Mixed-Methods Systematic Review

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Received Date: 28 August 2026 | Accepted Date: 24 September 2026 | Published Date: 30 October 2026

ABSTRACT: Malaria prevention requires that those eligible to receive it get it, accept it, use it properly, complete it and keep it up. Evidence on these behaviours is scattered across interventions, settings and study designs. This mixed-methods systematic review identified and synthesised individual, perceptual, interpersonal, household, community, economic, health-system and structural determinants of actual malaria-prevention behaviour in Sub-Saharan Africa and examined evaluated implementation strategies. PubMed/MEDLINE, African Journals Online, Global Index Medicus, Cochrane CENTRAL, OpenAlex, APA PsycINFO, ClinicalTrials.gov and Google Scholar were searched without date or language restrictions on 15 and 16 July 2026, and reference lists were scanned. Eligible reports measured an actual or consequential prevention behaviour, at least one determinant and an empirical determinant–behaviour connection. Risk of bias was assessed with design-specific tools, and quantitative and qualitative findings were synthesised separately and integrated through a joint display with COM-B and ecological-level mapping. After removal of duplicates, 19,517 records remained for title and abstract screening; 1,124 full-text reports were assessed. All data included resulted from 69 unique studies conducted in 25 countries, with 47 studies focusing on insecticide-treated nets or long-lasting insecticidal nets. The following factors were associated with uptake and continuity: intervention-specific knowledge, self-efficacy, perceived effectiveness and safety, trust, comfort of the product, household support, costs, geographical access, commodity availability, provider behaviour and delivery reliability. Facilitators included door-to-door delivery, free provision, service integration, practical demonstrations, trusted counselling and follow-up. Self-reported data was the predominant type of evidence collected, and behaviour lasting longer than a single day or night was less commonly assessed than current or previous-night use. In conclusion, malaria-prevention behaviour reflects co-occurring determinants of capability, opportunity, and motivation across individual, household, community, and service-delivery levels. Programmes should measure actual and continued behaviour, not just the distribution or ownership of commodities.

Keywords: Barriers and facilitators, COM-B, health behaviour, intervention adoption, health intervention adherence, , implementation science, malaria prevention.

INTRODUCTION

Malaria continues to be a significant global disease threat, especially in Sub-Saharan Africa, which contributes the largest proportion of disease cases and deaths (WHO, 2025a). Insecticide-treated nets (ITNs) and long-lasting

insecticidal nets (LLINs), indoor residual spraying (IRS), intermittent preventive treatment in pregnancy (IPTp), chemoprevention of malaria (IPM) and community vector-control activities (CVCA) are increasingly playing their part in prevention and will be increasingly part of a portfolio of interventions that is required to prevent the disease (WHO, 2025b).

Availability of or the success of an intervention does not imply protection is provided. A house might have a net but not use it, a pregnant woman might attend antenatal care but not g*et al*l of the doses of IPTp, and a household member might take the first dose of a preventive programme without taking subsequent doses. Malaria prevention behaviour is therefore defined as acquisition, receipt, acceptance, proper use, adherence, completion, continuing use, refusal, discontinuing and non-use.

Barriers have been discussed previously in specific interventions or populations such as malaria prevention in pregnancy, non-use of mosquito-net and vaccine acceptance and IRS participation (Aberese-Ako *et al*., 2022; Hill *et al*., 2013; Ladu *et al*., 2024; Pitua *et al*., 2026; Sulaiman *et al*., 2022; Thiam *et al*., 2013; Agbo *et al*., 2026; Maslove *et al*., 2009). In most cases, however, coverage, ownership, and hypothetical willingness were treated as equivalent to actual behaviour. This review added the requirement for observed or consequential behaviour, a directly measured determinant, and an empirical link between them to this limitation.

The review was conducted using a mixed-methods design that incorporated both a quantitative and qualitative assessment of the relationships and experiences of handling risk, trust, household relationships, service organisation and practical constraints. COM-B was adopted as an interpretation framework to map capability, opportunity and motivation at the level of the individual, household, community, health-system and structural level (Michie *et al*., 2011).

Objective and review questions

The objective was to identify, critically appraise and synthesise empirical evidence on determinants of the uptake and sustained use of eligible malaria-prevention interventions in Sub-Saharan Africa. Hence, the review questions are:

1. Which individual, perceptual and interpersonal determinants influence uptake, correct use, adherence, completion, continued or sustained use, refusal, discontinuation and non-use?
2. Which household, community, social, cultural, economic, practical, health-system, programme-delivery and structural determinants facilitate or hinder these behaviours?
3. How do determinants vary by intervention, behavioural stage, population and setting?
4. What implementation strategies have been tested in reality, what behaviours have been reported, and which COM-B domains and ecological levels do they target?

METHODOLOGY

Review design and reporting standards

This mixed-methods systematic review used a convergent segregated design (Stern *et al*., 2021). Two types of evidence – quantitative and qualitative were synthesised separately, after which a joint display was created. Integration examined convergence, complementarity, expansion and dissonance. Reporting of PRISMA 2020, PRISMA-S and SWiM was supported by qualitative synthesis based on thematic synthesis and ENTREQ guidance (Campbell *et al*., 2020; Page *et al*., 2021; Rethlefsen *et al*., 2021; Thomas and Harden, 2008; Tong *et al*., 2012).

Different study designs and populations were included deliberately because they answer complementary questions. Quantitative studies estimate the direction and strength of associations between determinants and behaviour, while qualitative studies explain how and why those determinants operate within households, communities and services. Malaria-prevention interventions also target different groups: pregnant women for IPTp, caregivers of young children for chemoprevention and vaccination, and whole households for nets, spraying and larval source management. Including these populations allowed the review to distinguish determinants shared across interventions from those specific to a particular group or behavioural stage. Designs were not pooled statistically. Each evidence type was synthesised on its own terms and compared through the joint display, and differences in design, population and outcome definition were taken into account when judging the consistency of findings.

Protocol registration and pre-search amendments

The review was registered in PROSPERO on 7 July 2026 (CRD420261441718). The creation of protocols and pilot testing was ongoing at the time of registration, but formal searches in databases, screening of titles and abstracts, screening of full text, extraction, appraisal and synthesis had not started.

The review team finalised the mandatory determinant–behaviour linkage rule, determined that no publication-date restrictions would be applied, clarified the boundaries for behaviours and intervention, and completed the screening manual before conducting the literature searches on 15–16 July 2026. Both protocol versions 3.0 (24 July 2026) and 3.1 (24 July 2026) formally recorded

these pre-search decisions and incorporated the procedures that had already been carried out without making any changes to the eligibility requirements after the screening began. Therefore, all records were subsequently searched and re-screened against the same final eligibility criteria, and there was no need for retrospective re-screening.

Eligibility criteria

Studies that met the following criteria were eligible for inclusion: 1) primary quantitative, qualitative and mixed-methods studies and 2) studies that took place in Sub-Saharan Africa and examined an eligible malaria-prevention intervention. Eligible interventions were ITNs/LLINs, IRS, IPTp or IPTi, seasonal or peripheral malaria chemoprevention, post-discharge malaria chemoprevention and other malaria-specific community vector-control activities that involve individual, household and community participation, as well as malaria vaccines.

Three inclusion criteria were applied to every included study: (1) measurement of an actual or consequential prevention behaviour, such as behaviour acquired, received, accepted, refused, correctly used, adhered to, completed, sustained or consistent use, discontinued, participated or non-use of behaviour; (2) direct measurement of at least one eligible barrier or facilitator; and (3) evidence of an empirical determinant–behaviour connection, which included statistical analysis, directly elicited reasons, qualitative evidence, direct observation, behavioural-group comparison or an intervention effect. The study was a discrete choice, but hypothetical choices were omitted, as were consequential real payments for that component that validate the real payments.

Coverage, distribution, availability, ownership, clinical effectiveness, epidemiological outcomes, general knowledge, and hypothetical willingness were not eligible unless they were related to an eligible observed behaviour. Reviews, protocols, editorials, commentaries, case reports or series, modelling-only, laboratory-only and entomological-only reports, and conference abstracts without sufficient primary data were excluded. No publication-date or language restriction was applied.

Information sources and search strategy

A literature search was conducted through PubMed/MEDLINE, African Journals Online, WHO Global Index Medicus, Cochrane CENTRAL, OpenAlex, APA PsycINFO, ClinicalTrials.gov and Google Scholar databases on 15-16 July 2026. A forward referencing search and backward referencing search were carried out by screening the first 300 relevance-ranked results on Google Scholar. Search concepts covered malaria, eligible preventive interventions, prevention behaviours, and behavioural or implementation determinants. No date, language, design, or geographical search filter was applied, and a geographical criterion was applied during screening. Strategies and yields at source are available in Supplementary Table S1. Embase, Scopus and CABI Global Health/CAB Abstracts were not searched as subscription access was not possible. To mitigate this limitation, biomedical, behavioural, multidisciplinary, African regional, trials and grey literature sources were all combined. The development of the search strategy was informed by PRESS guidance (McGowan *et al*., 2016).

Record management and study selection

Duplicate records were removed first in EndNote, and then in CADIMA (Kohl *et al*., 2018). Titles and abstracts were screened by two reviewers independently, and full texts were assessed. The potentially eligible reports were moved on to full-text assessment by either reviewer. All disagreements were adjudicated by third reviewers, as necessary, and/or discussed. Several reports from a single underlying study were tied together and considered one study for synthesis.

Full-text assessment was performed using a hierarchical primary exclusion reason. Not all full-text reports excluded were maintained at the category level in the exported CADIMA dataset that was available for manuscript preparation. The review thus provides the verified count of exclusions at all levels of the hierarchy of reasons for exclusion and the prespecified hierarchy, but does not create reason-level exclusions in retrospect. It is explicitly stated that this is a limitation.

Data extraction

Study characteristics, interventions and delivery context, precise behavioural outcomes and timeframes, determinants, empirical linkage type, quantitative estimates, qualitative findings, source locations and appraisal information were all recorded on a standardised form. One reviewer extracted and another checked and resolved in case of disagreement. If there were eligible and ineligible outcomes, only the eligible determinant–behaviour evidence was extracted. This procedure is called eligible-outcome-only extraction in this manuscript and does not imply a conscious intent to not include certain eligible fields.

Risk-of-bias and methodological-quality assessment

Design-appropriate tools were used: JBI checklists for qualitative and observational evidence, Cochrane RoB 2 for randomised trials, ROBINS-I for non-randomised intervention studies, MMAT where an explicit mixed-

methods integration appraisal was available, and a JBI/DCE framework for the consequential economic component (Aromataris *et al*., 2024; Hong *et al*., 2018; Sterne *et al*., 2016; Sterne *et al*., 2019). Original tool-specific terminology and narratives were retained. The categories of cross-tools were not considered to be of the same level of risk of bias.

Seven of the 14 mixed-methods studies had an explicit MMAT integration assessment in the extraction record, while seven others were reviewed using JBI tools that were suitable for the predominant empirical methods. The evidence was interpreted taking into account the fact that this was not a fully integrated model of the use of mixed methods. One study, Cho *et al*. (2024), was not provided with an overall judgement of the tool that could be interpreted, and was not classified as such, but instead was retained as unclassified.

Synthesis methods

Quantitative findings were grouped by intervention, behavioural stage, determinant, population and design. Effect estimates and their corresponding confidence intervals, reference groups and methodological limitations, if available, were used for adjusted estimates. Qualitative results were coded line-by-line, organised into descriptive themes and elaborated into analytical themes. Studies could contribute to more than one theme.

A random-effects meta-analysis was considered only when at least three studies were sufficiently comparable in intervention, determinant definition, behavioural-outcome definition, effect measure and study design. The number of candidates in each group did not reach the minimum number set by the authors for performing a meta-analysis, and therefore, no meta-analysis was conducted. The pooling-feasibility assessment is presented in Supplementary Table S6. The quantitative synthesis was based on SWiM principles and was not carried out using voting on the basis of statistical significance.

The quantitative and qualitative results were synthesised and displayed together after being obtained separately. Evidence streams were classified as convergence, complementarity, expansion, or dissonance, depending on whether evidence from the streams all pointed to the same interpretation, provided other explanatory detail, extended the interpretation to another level, or pointed in materially different directions. The integration classifications were checked by two reviewers, and any differences were resolved by consensus.

COM-B and ecological-level mapping

Each eligible determinant–behaviour finding was mapped to one or more COM-B domains and ecological levels using a prespecified coding guide. The unit of coding was the empirical determinant–behaviour relationship rather than the article as a whole; study-level frequencies indicate whether a domain appeared at least once in a study. The second reviewer checked out and any disagreements were settled by consensus. Frequencies were understood as coverage of mapped evidence rather than effect size, causality/certainty.

Exploration of variation, reporting bias and confidence in findings

Variation was examined narratively within and between interventions, behavioural stages, population groups, delivery platforms, countries and settings. They were exploratory stratified syntheses and not statistical subgroup analyses. No meta-analysis was conducted, and so formal assessment of publication bias was not possible. Observational studies included were not uniformly available for protocols and registrations, so that selective reporting could not be evaluated in detail.

Conclusions were discussed in terms of the study design, consistency, directness, precision, and data richness and the risk of bias. The review did not involve any patient or public participation, and ethics approval was not required as only published or publicly available evidence was used.

RESULTS

Study selection

Searches yielded 28,371 results, including 28,311 results from the database or register search, and 60 results from backward citation search. After EndNote removed 2,985 duplicates, CADIMA removed another 5,869, leaving 19,517 records for screening by title and abstract. Of these, 18,393 were excluded. All 1,124 reports sought for retrieval were obtained and assessed at full text; 1,055 were excluded, and 69 unique studies were included.

The quality assurance of the post-screening revealed one extraction row in which the bibliographic details of an unrelated record had been paired with duplicated Baume et al. (2009) extraction data. The row was removed, and Baume et al. (2009) was counted only once. This was a correction to the data management and not an extra PRISMA exclusion stage.

Figure 1 presents the report-level study-selection process separately from the subsequent quality-control correction applied to the extraction dataset. Detailed category-level counts for full-text exclusions were not available in the exported CADIMA audit file and were therefore not reconstructed retrospectively.

Characteristics of included studies

The 69 studies (Cho *et al*., 2024; Baume *et al*., 2009;

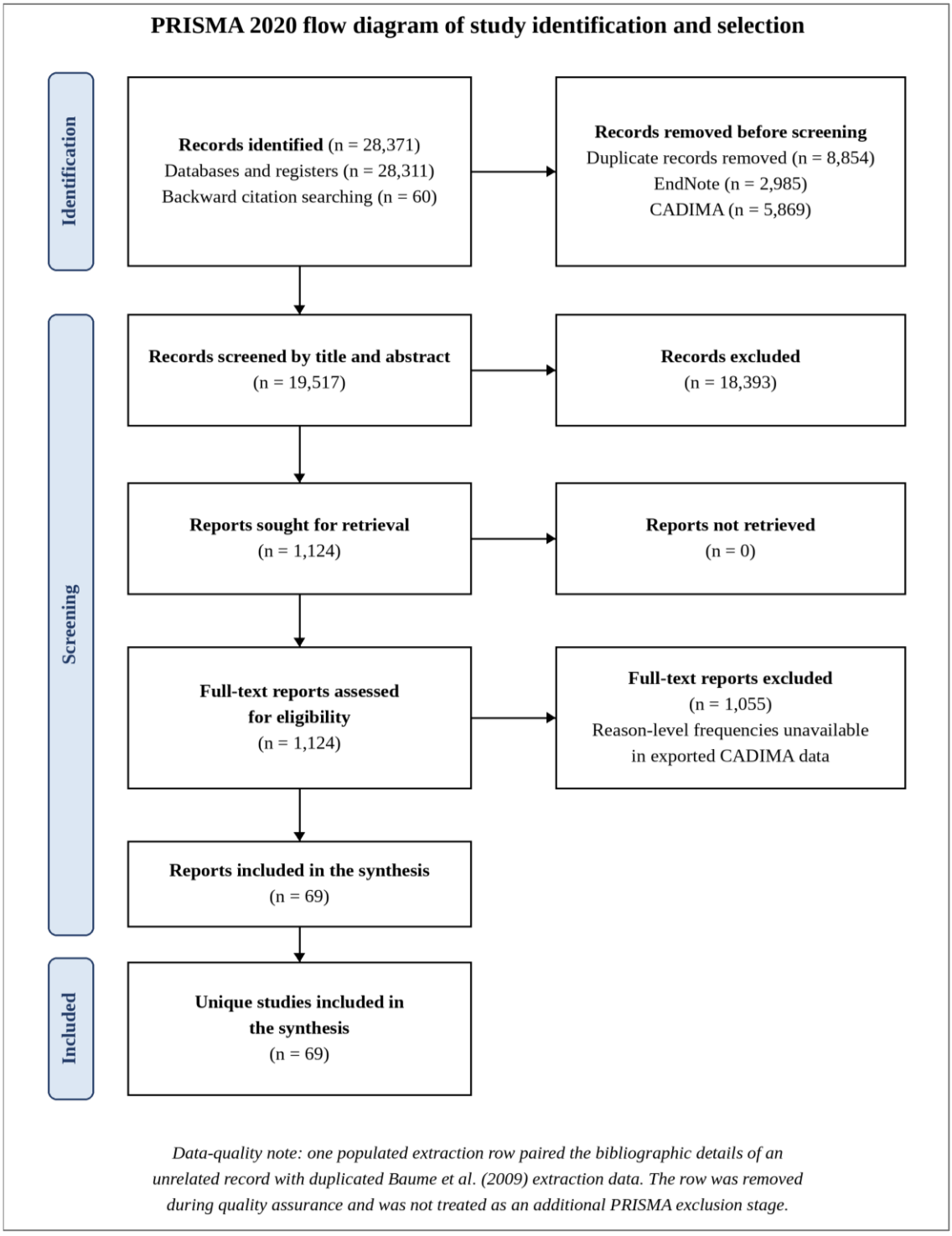

Figure 1. PRISMA 2020 flow diagram of study identification and selection.

Abiache *et al*., 2025; Adeneye *et al*., 2014; Adeola and Okwilagwe, 2015; Afolaranmi *et al*., 2015; Agyeman *et al*., 2023; Ahorlu *et al*., 2019; Akello *et al*., 2022; Akinleye *et al*., 2009; Alaii *et al*., 2003; Alfonso *et al*., 2020; Amoran *et al*., 2011; Amoran *et al*., 2012; Ampofo *et al*., 2023; Anikwe *et al*., 2020; Ankomah *et al*., 2012; Antwi *et al*., 2016; Aoki *et al*., 2025; Arnaldo *et al*., 2018; Asingizwe *et al*., 2019; Aweis *et al*., 2023; Ayeni *et al*., 2020; Ayubu *et al*., 2017; Azizi *et al*., 2018; Babalola *et al*., 2022; Badolo *et al*., 2025; Balami *et al*., 2018; Balami *et al*., 2019; Bam *et al*., 2023;

Table 1. Summary characteristics of included studies (N = 69).

Characteristic	Distribution, n (%)
Publication period	Before 2010: 5 (7.2%); 2010–2019: 39 (56.5%); 2020–2026: 25 (36.2%)
Countries	25 countries; Nigeria: 15 (21.7%); Ghana: 12 (17.4%); Ethiopia: 7 (10.1%); Cameroon: 5 (7.2%); other settings: 30 (43.5%)
Interventions	ITN/LLIN: 47 (68.1%); IPTp: 9 (13.0%); combined ITN/LLIN + IPTp: 4 (5.8%); SMC/PMC: 4 (5.8%); malaria vaccine: 2 (2.9%); other categories: 3 (4.3%)
Designs	Cross-sectional quantitative: 37 (53.6%); mixed methods: 14 (20.3%); intervention/programme evaluation: 8 (11.6%); qualitative: 6 (8.7%); other observational or DCE designs: 4 (5.8%)
Populations	Households/caregivers/children: 29 (42.0%); pregnant/postpartum/reproductive-age women: 28 (40.6%); general/community: 6 (8.7%); special populations: 4 (5.8%); providers/programme actors: 2 (2.9%)

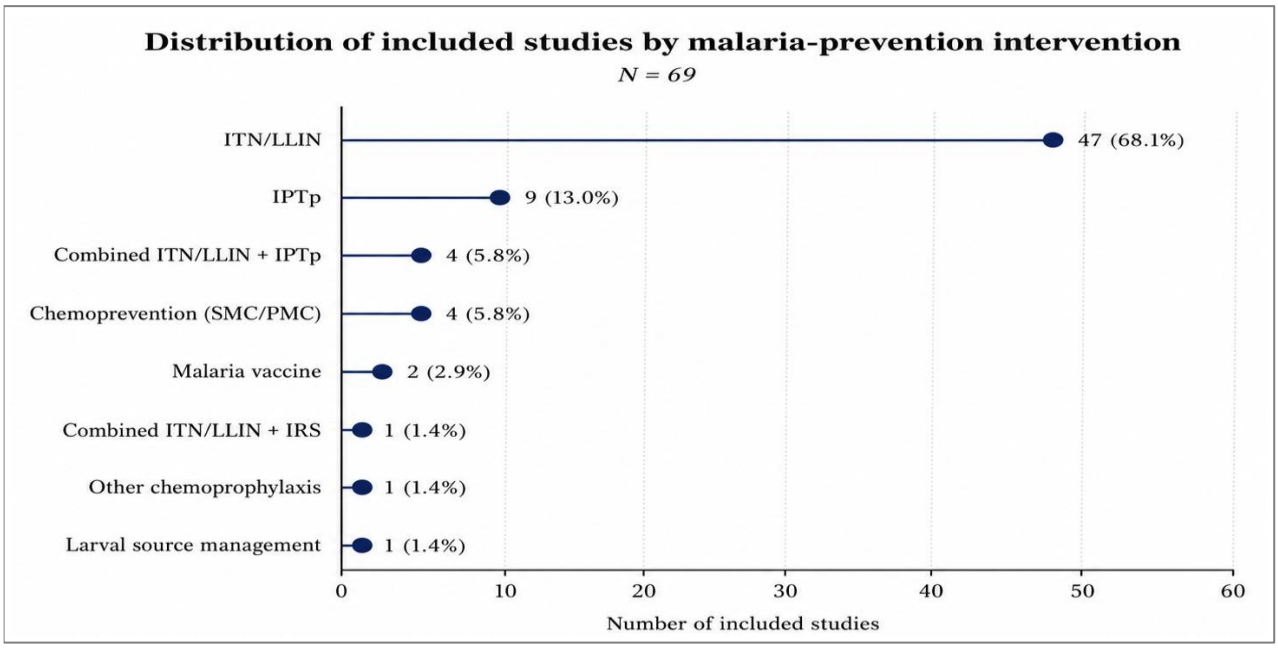

Figure 2. Distribution of included studies by malaria-prevention intervention.

Barry *et al*., 2018; Begashaw et al., 2026; Belay and Deressa, 2008; Berkessa *et al*., 2016; Berthe *et al*., 2014; Biadgilign *et al*., 2015; Binka and Adongo, 1997; Brooks *et al*., 2017; Chivasa *et al*., 2026; Chukwuocha *et al*., 2010; Clark *et al*., 2016; Créach *et al*., 2016; Dambach *et al*., 2018; Darko *et al*., 2019; Deressa *et al*., 2011; Diabaté *et al*., 2014; Diallo *et al*., 2021; Diallo et al., 2026; Diawara *et al*., 2022; Diengou *et al*., 2020; Doku *et al*., 2016; Dun-Dery *et al*., 2021; Dun-Dery *et al*., 2022; Ekholuenetale *et al*., 2026; Ernst *et al*., 2016; Esimai *et al*., 2015; Eteng *et al*., 2014; Exavery *et al*., 2014; Ezire *et al*., 2015; Faye, 2012; Fernández Montoya *et al*., 2023; Finlay *et al*., 2017; Fokam *et al*., 2017; Forty and Keetile, 2022; Fru *et al*., 2021; Fuge *et al*., 2015; García-Basteiro *et al*., 2011; Zegers de Beyl *et al*., 2017; Zegers de Beyl *et al*., 2018) were published from 1997 to 2026 and represented 25 Sub-Saharan African countries. Evidence was concentrated in Nigeria, Ghana, Ethiopia, and Cameroon and was dominated by ITN/LLIN studies and cross-sectional designs. Table 1 summarises the principal characteristics; complete study-level information is provided in Supplementary Table S3. Table 1 shows that the review evidence was heavily weighted toward ITN/LLIN use, household or caregiver populations and cross-sectional measurement. Evidence on vaccination, IRS, larval-source management and sustained behaviour was limited. Figure 2 demonstrates the marked concentration of evidence on ITNs and LLINs; all other interventions contributed substantially fewer studies.

Quantitative synthesis

In quantitative studies, knowledge of interventions and practical confidence were more strongly related to behaviour than was general malaria knowledge (Table 2).

Table 2. Selected quantitative determinant–behaviour findings.

Study/intervention (sample size)	Determinant or strategy (reference group)	Behavioural outcome	Estimate	Appraisal
Ezire *et al*. (2015), ITN; n = 850 pregnant women	Confidence to hang/use ITN (ref: Not confident; use vs non-use)	Previous-night use	aOR 9.51 (95% CI 2.28–39.70)	JBI; some concerns
Exavery *et al*. (2014), IPTp; n = 1,267 women	Malaria-in-pregnancy counselling (ref: No counselling; optimal uptake vs no dose)	Optimal uptake	RRR 6.47 (95% CI 4.66–8.97)	JBI; some concerns
Dun-Dery *et al*. (2021), IPTp; n = 697 pregnant women	Additional ANC contact (ref: Per additional ANC contact)	Number of doses	IRR 1.255 (95% CI 1.212–1.299)	MMAT; some concerns
Abiache *et al*. (2025), vaccine; n = 410 caregivers	Provider information (ref: Information from family or friends)	Actual vaccine uptake	aOR 7.60 (95% CI 3.82–15.08)	JBI; high concern
Barry *et al*. (2018), SMC; n = 2,035 children surveyed	Door-to-door vs fixed-point delivery (ref: Fixed-point delivery)	Full completion	74.1% vs 60.1%; p = .009	RoB 2; some concerns
Clark *et al*. (2016), LLIN; n = 583 (3 months) and 541 (18 months) individuals	Targeted distribution with follow-up (ref: No comparison group; 3 vs 18 months)	Previous-night use	47% at 3 months; 21% at 18 months	ROBINS-I; high concern

Confidence on how to hang/use an ITN had a slightly larger association with the previous night use in Nigeria (adjusted odds ratio [aOR] 9.51, 95% confidence interval [CI] 2.28–39.70) compared to knowledge that ITNs protect pregnant women (aOR 1.81, 95% CI 1.14–2.88) (Ezire *et al*., 2015). In the other countries where ITN usage was consistently reported, self-efficacy was also found to be associated with the use of ITNs, but confidence intervals were not provided in the extracted record (Babalola *et al*., 2022).

Several behaviours were related to perceived effectiveness, risk and trust; direction was context-dependent. The results of the multicountry ITN study were positive, inverse, or null in the countries (Babalola *et al*., 2022). The military found that taking chemoprophylaxis at the same time of day was associated with adherence (aOR 2.37; 95% CI 1.17–4.78), and tiredness and memory loss were associated with lower adherence (both aOR 0.67) (Créach *et al*., 2016).

IPTp and vaccination were the primary health-service contacts. Counselling about malaria in pregnancy was associated with partial IPTp uptake (relative risk ratio [RRR] 4.24, 95% CI 3.00–6.00) and optimal uptake (RRR 6.47, 95% CI 4.66–8.97) (Exavery *et al*., 2014). For every additional antenatal-care contact, there was an increase in IPTp doses (incidence rate ratio 1.255, 95% CI 1.212–1.299) (Dun-Dery *et al*. 2021). Malaria vaccine uptake was associated with provider information (aOR 7.60, 95% CI 3.82–15.08), trust in health workers (aOR 6.12, 95% CI 2.97–12.61) and routine vaccination attendance (aOR 5.51, 95% CI 3.10–9.78) (Abiache *et al*., 2025).

Implementation comparisons indicated that the behaviour changed as a result of the delivery design. Compared to fixed-point delivery, Door-to-Door delivery had more complete deliveries (74.1% vs 60.1%, p = .009) and less complete non-receipts (1.5% vs 5.8%, p = .002) (Barry *et al*., 2018). Education and demonstration of LLIN usage and reminders followed by the increase in previous-night LLIN use (from 10.7% to 82.1%) and consistent use (from 6.0% to 48.8%), which was attributed to the provision of free LLINs, but the effects of these components could not be separated (Afolaranmi *et al*., 2015).

Table 2 presents selected estimates illustrating the principal mechanisms, with the sample size and reference group for each estimate. The complete quantitative synthesis, including outcome definitions, reference groups and extracted appraisal information, is provided in Supplementary Table S4.

Qualitative synthesis

Twenty studies contributed qualitative evidence, including six qualitative studies and 14 mixed-methods studies. Themes were non-mutually exclusive. The number of qualitative and/or mixed-methods studies reporting perceived effectiveness, safety and trust, and household or social influences were each 19; product comfort and practical compatibility, 17; health-service or provider behaviour and economic constraints, 16 each; knowledge and communication, 15; access and delivery reliability, 13; and habit, memory or seasonality, 10 (Table 3).

Some of the factors cited by participants for not owning a net to use the net were heat, suffocation, odour, irritation, difficult installation, damage to the product, and unsuitable housing (Ahorlu *et al*., 2019; Alaii *et al*., 2003; Baume *et al*., 2009; Dun-Dery *et al*., 2022). Antwi *et al*. (2016), Asingizwe *et al*. (2019), Bam *et al*. (2023) and Dambach *et al*. (2018) reported that trust and previous experience influenced acceptance of vaccination, IRS, SMC and larviciding, while rumours, fear of toxicity, adverse effects and poor worker conduct influenced refusal or discontinuation.

Household relationships operated through both approval

Table 3. Principal qualitative themes and study contribution.

Analytical theme	Qualitative/mixed-methods studies, n	Illustrative barriers	Illustrative facilitators	Representative studies
Effectiveness, safety and trust	19	Toxicity fears; doubts about efficacy; adverse experiences; distrust	Reassurance; trusted workers; observed benefit; positive previous experience	Bam *et al*. (2023); Asingizwe *et al*. (2019); Dambach *et al*. (2018)
Household and social influence	19	Partner opposition; resource control; rumours; allocation conflict	Family assistance; peer reinforcement; supportive norms	Antwi *et al*. (2016); Chukwuocha *et al*. (2010); Babalola *et al*. (2022)
Product comfort and compatibility	17	Heat; irritation; difficult hanging; unsuitable housing; damaged nets	Appropriate shape/size; easier installation; perceived comfort	Ahorlu *et al*. (2019) (31); Baume *et al*. (2009) (25); Dun-Dery *et al*. (2022)
Provider and service behaviour	16	Stock-outs; missed doses; poor counselling; absent staff	Respectful care; clear schedules; repeated contact; trusted counselling	Dun-Dery *et al*. (2021); Bam *et al*. (2023); Antwi *et al*. (2016)
Economic and access constraints	16	Transport; waiting time; lost work; purchase costs; distance	Free provision; home delivery; integrated services	Barry *et al*. (2018); Adeneye *et al*. (2014); Antwi *et al*. (2016)

and practical assistance. Partner authority and control, allocation of limited nets, caregiver presence and family support influenced acquisition, use and completion. Stock-outs, missed opportunities, limited delivery time, poor communication and provider absence were directly cited as barriers by service level accounts, indicating that they may represent failure to deliver and not just lack of interest. Service level accounts described stock out, missed opportunity, limited delivery time, poor communication and provider absence as direct barriers, suggesting that poor uptake may not reflect a lack of interest, but rather failure to deliver.

The qualitative evidence explained how structural and practical conditions modified motivation and translated intervention availability into actual use, non-use or discontinuation. Study-level coding and illustrative extracted findings are provided in Supplementary Table S5.

Variation across interventions, populations and behavioural stages

The difference between interventions and behavioural stages was the greatest for the determinants. Household sufficiency, installation, product condition, comfort, allocation and seasonality were all factors in acquiring and using ITN/LLIN. Completion of IPTp was driven by timely and frequent ANC visits, access to medicines, and provider action and management of adverse effects. Chemoprevention involved multiple contacts with the programme, availability of the caregiver, and administration of subsequent doses. Effective communication by trusted providers and attendance in routine immunisation systems were key factors in vaccine uptake. IRS and larval-source management needed trust of programme staff and acceptance of activities taking place in the households or community. Initial receipt was most strongly linked to access, affordability, eligibility and provider recommendation, while correct use and continued use of the commodity were more likely to be linked to the product's compatibility, forming a routine and reminders, and continued commodity availability. There was limited evidence of direct comparisons of determinants by sex, age, socioeconomic position, urbanicity or humanitarian setting. Distance and supply barriers were often cited as issues in rural and remote studies, while good rural–urban effect comparisons were rare.

Evaluated implementation strategies

Eight studies assessed implementation strategies that were identified. Interventions with positive behavioural outcomes often involved changing the physical opportunity, such as by moving interventions closer to households, or by making them part of existing services or ensuring they were available for free. For psychological capability, education, demonstrations and written materials were used, and for social opportunity, trusted community workers and family support were used. There was little evidence targeting automatic motivation. Door-to-door SMC delivery performed better than fixed-point

Table 4. Joint display of quantitative and qualitative evidence.

Integrated determinant	Quantitative evidence	Qualitative evidence	Integration	Interpretation
Access and delivery	Receipt/completion associated with accessible services, ANC contact and door-to-door delivery	Stock-outs, distance, caregiver absence and restricted delivery times were direct reasons for missed receipt	Convergence	Physical opportunity was a recurrent enabling or constraining condition
Knowledge and self-efficacy	Intervention-specific knowledge and confidence associated with ITN use and IPTp completion	Demonstrations, clear schedules and practical confidence explained how knowledge became action	Complementarity	Actionable skills were more relevant than general awareness alone
Effectiveness, safety and trust	Perceived effectiveness and provider trust associated with adherence and uptake	Positive experience and reassurance supported acceptance; toxicity fears and distrust supported refusal	Convergence/ expansion	Trust connected individual beliefs with provider and programme relationships
Product compatibility	Net condition, shape and sleeping arrangements associated with use	Heat, odour, irritation, difficult installation and unsuitable housing explained non-use	Complementarity	Compatibility influenced the transition from ownership to correct and continued use
Vulnerability and message exposure	Positive, inverse or null associations across countries	Seasonality and local interpretations changed perceived need over time	Dissonance	Risk and communication effects were context dependent

delivery with respect to full completion (Barry *et al*., 2018). Having a maternal and child health handbook was also associated with completing at least three IPTp doses (aOR 1.47, 95% CI 1.11–1.95) (Aoki *et al*., 2025). An increased ITN coverage was reported through continuous distribution via antenatal care, child-welfare clinics and schools, though delayed implementation and incomplete channels reduced the actual coverage (Zegers de Beyl *et al*., 2018). When the net availability of households decreased, Clark *et al*. (2016) found that there was no guarantee of long-term use if families received a large volume initially. The implementation findings are reported in detail in Supplementary Table S7.

Mixed-methods integration

Table 4 combines both the quantitative and qualitative syntheses. Most evidence streams converged or were complementary. In the multicountry ITN analysis, the greatest discrepancies were found between countries for the association between perceived vulnerability and message exposure. The integrated findings indicate that the same intervention can fail for different reasons at different behavioural stages and ecological levels. They also caution against assuming that communication or risk-perception effects transfer unchanged across settings.

COM-B and ecological-level mapping

COM-B domains were non-mutually exclusive (Figure 3). Physical opportunity was mapped in 59 studies (85.5%), psychological capability and social opportunity in 56 studies each (81.2%), reflective motivation in 52 (75.4%), automatic motivation in 23 (33.3%) and physical capability in six (8.7%). These frequencies indicate how often a domain appeared in the coded evidence; they do not rank causal importance or certainty. Physical and social opportunity were mapped as frequently as psychological capability and reflective motivation, indicating that information-focused approaches alone would not address many reported barriers.

Risk of bias and methodological quality

JBI tools were used for 54 studies after correction of the clearly mistyped Diabaté *et al*. (2014) appraisal label; five studies had combined JBI and MMAT records, two had MMAT records, two had RoB 2 assessments, four had ROBINS-I assessments, and one had a JBI/DCE assessment (Table 5). Cho *et al*. (2024) remained unclassified because no valid overall tool-specific judgement was available. Original tool-specific terminology was retained rather than converted into a common validated scale.

The evidence base was therefore dominated by observational studies with limitations in temporal inference, self-reported outcomes, sampling and control of confounding. Complete study-level appraisals are provided in Supplementary Table S8. Figure 4 summarises non-mutually exclusive limitations recorded in appraisal narratives. It is not a substitute for the original domains and judgements of the design-specific tools.

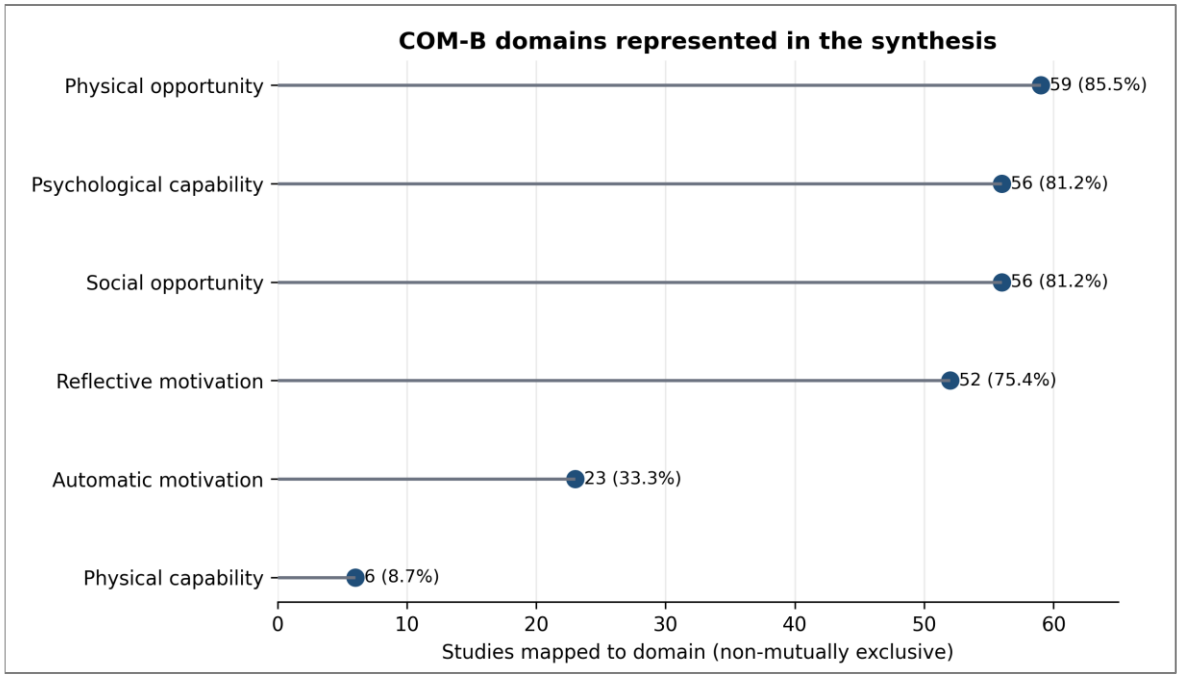

Figure 3. COM-B domains represented in the synthesis.

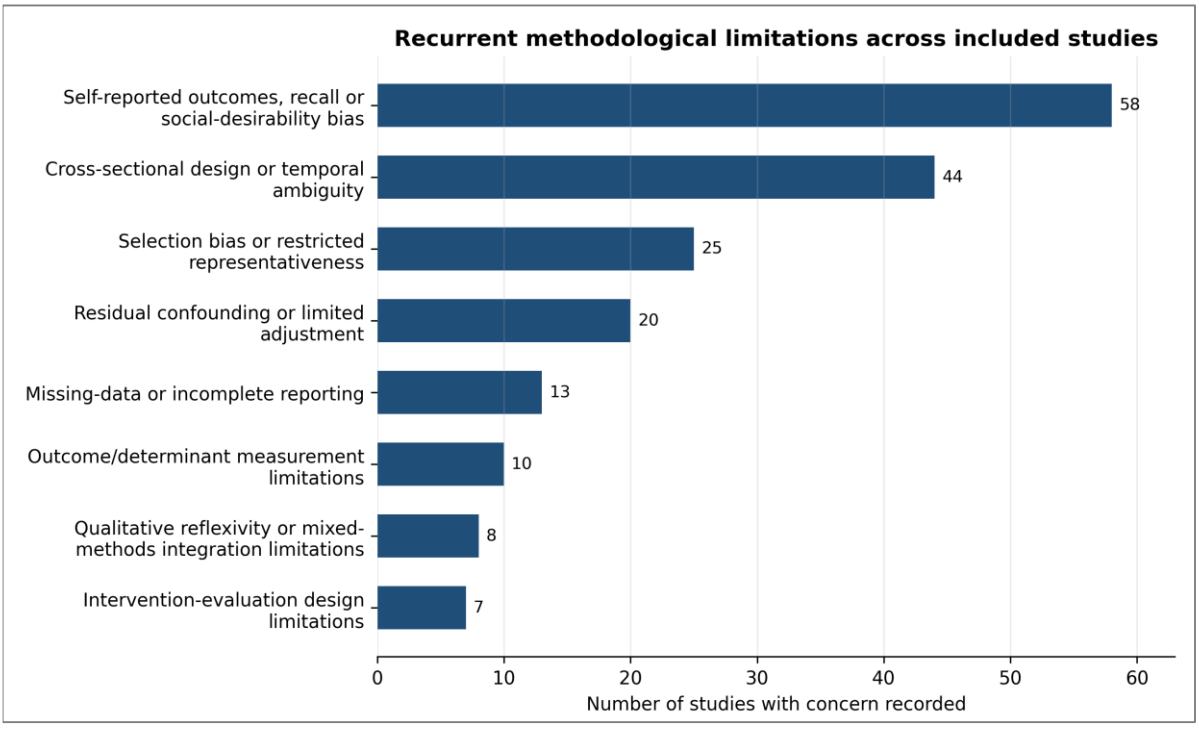

Figure 4. Recurrent methodological limitations across included studies.

Reporting bias, confidence and pooling feasibility

No meta-analysis was conducted, and formal funnel-plot or small-study-effectiveness analysis was not conducted. For most observational studies, there was no report of protocols or registrations available, or they were only partially reported, making a comprehensive assessment of selective reporting not possible.

Table 5. Tool-specific methodological appraisal summary.

Tool/application	Studies, n	Recorded overall judgements	Principal recurring concerns
JBI design-specific	54	Low: 1; some concerns: 35; high concern: 18	Cross-sectional temporality; self-report; representativeness; confounding; measurement
JBI + MMAT	5	Some concerns: 2; high concern: 3	Component limitations and incomplete mixed-methods integration
MMAT	2	Some concerns: 2	Sampling, measurement and integration reporting
RoB 2	2	Some concerns: 2	Cluster recruitment/randomisation information; open-label delivery; reported completion
ROBINS-I	4	High concern: 3; critical concern: 1	Confounding; selection; deviations; missing data; limited comparators
JBI/DCE	1	Some concerns: 1	Residual hypothetical bias and restricted external validity
Unclassified	1	No valid overall judgement recorded	Cho *et al*. (2024) (24): appraisal record did not contain an interpretable overall judgement

None of the sets of at least three studies was found to be sufficiently similar in intervention, definition of the determinant, definition of behavioural outcomes, effect measure, or design; therefore, a meta-analysis was not conducted. Most of the challenges encountered in pooling were related to the lack of consensus on definitions of use and sustained use, determinant measures used for interventions, heterogeneous dose-completion thresholds, different reference categories, and the different types of evidence (adjusted and unadjusted, qualitative and intervention-effect).

DISCUSSION

A review of 69 studies in 25 Sub-Saharan African countries identified individual, interpersonal, household, service-delivery and structural factors that were associated with malaria-prevention behaviour. The most salient is that availability, ownership, or stated willingness to perform a desired behaviour is not necessarily the same as the actual, correct, completed, or sustained behaviour. The knowledge and self-efficacy of the intervention supported action, while physical opportunity was the most frequently mapped COM-B domain, representing frequent barriers to the intervention related to the supply of commodities, distance, cost, delivery platform, product compatibility, and the organisation of services. It is important to note that this frequency is not an indication of the causal impact of opportunity compared to other domains, but rather an indication of evidence coverage.

These findings are broadly consistent with earlier syntheses. Maslove *et al.* (2009) reviewed 39 qualitative studies from across Africa and found that poor understanding of how malaria is transmitted, the belief that it cannot be prevented and reliance on ineffective prevention methods were the main barriers to prevention, and Agbo et al. (2026) reviewed evidence on how human behavioural factors influence the effectiveness of malaria interventions in endemic regions. The present review extends this work in three ways. It required an actual or consequential behaviour rather than coverage, ownership or stated willingness; it linked each determinant to a specific behavioural stage, and it examined nets, IPTp, chemoprevention, vaccination, spraying and larval source management together rather than a single intervention.

The key difference for ITNs and LLINs was between access and use. Self-efficacy, perceived effectiveness and adequate household supply were linked to use, whereas product discomfort, net condition, installation and housing constraints, low perceived risk and seasonal discontinuation were associated with non-use. The results are consistent with the study by Ladu *et al*. (2024), which categorised non-use around human, product, housing and access factors, and they complement and build on that study as they relate the determinants to behavioural stages. Clark *et al*. (2016) also demonstrated an inverse association between use and the availability of the household, suggesting that distribution alone is not a replacement for a continuity and replacement system.

In IPTp, repeated ANC contact was more consistently associated with completion than did each individual motivation, while having counselling and having the medicine available were also associated with completion. This discovery corroborates the results of the syntheses conducted by Hill *et al*. (2013), Thiam *et al*. (2013) and Aberese-Ako *et al*. (2022) which showed that individual, social, economic and health-system barriers interact. The present review reiterates the message that not receiving all IPTp doses should not be considered adherence failure when eligible doses were not available or offered.

The key issues of chemoprevention evidence were delivery design and caregiver support. Trust in CHWs, notification, and availability and manageability of caregivers were linked to repeated participation, and door-to-door delivery was linked to higher completion, as compared to fixed-point delivery (Antwi *et al*. 2016; Barry *et al*. 2018). Vaccine evidence was minimal, but it did separate between having been given and being accepted. Factors such as provider information and attendance at

routine clinics were found to be associated with uptake (Abiache *et al*. 2025), and qualitative data identified various factors related to safety, effectiveness and positive post-vaccination experience as determinants of vaccine acceptance (Bam *et al*. 2023). This is relevant since the willingness estimates may be overestimated if they are pooled (Sulaiman *et al*. 2022).

There was limited evidence of IRS and community vector control in the form of comments indicating that household participation was influenced by trust, perceived safety, worker conduct, intervention quality and household preparation requirements. The results are similar to the qualitative IRS synthesis of Pitua *et al*. (2026). There are few studies on vaccination, IRS, and larvae source management and sustained chemoprevention behaviour, which is a significant research gap.

Several factors are likely to explain why findings varied across studies. First, the interventions demand different behaviours: a net must be hung and used every night, IPTp depends on repeated antenatal contact, chemoprevention requires caregivers to complete several doses, and vaccination depends on attendance at routine immunisation services, so the same determinant can matter at one stage and not at another. Second, the populations differed in risk and in their contact with services; pregnant women, caregivers, military personnel and displaced households faced different constraints. Third, settings differed in seasonality, housing, commodity supply and campaign timing, which helps explain why perceived risk and trust were positively, inversely or not associated with behaviour in different countries (Babalola et al. 2022). Finally, methods differed: outcomes ranged from previous-night use to completion of all doses, most measures were self-reported, and adjustment for confounding was inconsistent. These differences are also why pooled estimates were not considered appropriate.

The integrated synthesis suggests that education will not be an effective solution for the lack of commodities, services, and product availability. The most helpful communication was in terms of transfer of skills, schedules, reassurance, and trusted follow-up. Social opportunity through norms of approval by household and community norms, and norms of resource control and direct assistance. Programmes should thus be integrated by ensuring reliable procurement and delivery, appropriate communication with providers, household engagement, reminders, product appropriateness and continuity mechanisms.

It has a wide range of strengths: breadth of intervention coverage, presence of African regional sources, no date or language restrictions, an actual-behaviour and determinant-linkage rule, separation of quantitative and qualitative evidence, integration of mixed-methods, and explicit COM-B and ecological mapping. The rules for eligibility decisions were pre-determined and followed consistently during the screening process.

Limitations are that data are not available for Embase, Scopus and CABI Global Health/CAB Abstracts; most evidence comes from a small number of countries and interventions; most evidence is cross-sectional and self-reported; the definition of current, correct and sustained behaviour is inconsistent; seven mixed-methods studies had incomplete explicit MMAT assessment, one was unclassified, and full-text exclusion counts for each category were not recovered from the exported CADIMA dataset. Impossible to carry out formal certainty and reporting-bias assessments. These limitations restrict causal inference and require cautious interpretation of apparent consistency. Because most studies were cross-sectional with self-reported outcomes, the associations reported here show where determinants and behaviour occur together; they do not show that changing a determinant will change behaviour. Stronger inference is possible only where delivery approaches were compared experimentally, such as door-to-door versus fixed-point delivery of seasonal malaria chemoprevention (Barry et al. 2018), and such studies were few. The conclusions below should be read with this in mind.

Use of standard definitions for behavioural outcomes, and separation of acquisition, initiation, correct use, completion and sustained use should be included in future studies, and adjusted estimates should be reported with reference groups and confidence intervals, comparable to those reported in this study. Multilevel strategies should be tested through implementation trials and longitudinal studies to see if gains last beyond campaigns, or with a drop in commodity age and delivery intensity.

Conclusion

In Sub-Saharan Africa, knowledge about the intervention, practical ability, perceived effectiveness and safety, trust, household support, economic and geographical access, commodity reliability, provider behaviour and programme continuity were associated with malaria-prevention behaviour. These conclusions rest mainly on cross-sectional studies of insecticide-treated nets, which made up 47 of the 69 included studies; only two studies addressed malaria vaccines, and few addressed indoor residual spraying, larval source management or chemoprevention. Findings for these other interventions should therefore be treated as preliminary rather than generalised from the net evidence. Intervention-specific, multilevel strategies that involve capability, opportunity, and motivation are essential for effective implementation. National programmes must go beyond distribution and ownership of commodities to indicate and facilitate real, correct, completed, and sustained prevention behaviour.

COMPETING INTERESTS

The authors declare no financial or non-financial competing interests relevant to this review.

DATA AVAILABILITY

The study-characteristics dataset, determinant–outcome extraction records, search strategies, source-level counts, appraisal records, thematic coding, COM-B mapping, pooling-feasibility assessment and synthesis tables are provided in the accompanying supplementary materials. Copyrighted primary-study files are not redistributed.

USE OF ARTIFICIAL INTELLIGENCE

OpenAI ChatGPT was used during July 2026 for language refinement, manuscript organisation, data-structure checking, table and figure preparation and internal consistency review. It was not authorised to make unverified final eligibility, extraction or appraisal decisions. All study-selection decisions, extracted findings, mappings, appraisals and interpretations were reviewed against the source records by the human review team, who take full responsibility for the manuscript.

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SUPPLEMENTARY MATERIALS

Facilitators and Behavioural Barriers to the Uptake and Sustained Use of Malaria Prevention Interventions in Sub-Saharan Africa

Contents

S1. Information sources, search dates and record counts
S2. PRISMA reconciliation and full-text exclusion hierarchy
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S7. Evaluated implementation strategies
S8. Study-level methodological appraisal
S9. Protocol and data-quality decisions
S10. Included-study bibliography
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Supplementary Table S1. Information sources, search dates and record counts

Source	Date	Limits/coverage	Records
PubMed/MEDLINE	15 July 2026	No date or language limits	7,794
African Journals Online	15 July 2026	No date or language limits	471
WHO Global Index Medicus	15 July 2026	No date or language limits	370
Cochrane CENTRAL	15 July 2026	No date or language limits	1,982
OpenAlex	16 July 2026	No date or language limits	15,700
APA PsycINFO	16 July 2026	No date or language limits	83
ClinicalTrials.gov	16 July 2026	Relevant statuses; no date limit	1,611
Google Scholar	16 July 2026	First 300 relevance-ranked results	300
Backward citation searching	16 July 2026	Reference lists	60
Total		Before deduplication	28,371

Supplementary Table S2. PRISMA reconciliation and full-text exclusion hierarchy.

Flow element	Count
Records identified	28,371
Duplicates removed in EndNote	2,985
Records imported to CADIMA	25,386
Additional duplicates removed in CADIMA	5,869
Records screened	19,517
Records excluded at title/abstract	18,393
Reports sought/retrieved/assessed	1,124
Full-text reports excluded	1,055
Reports/unique studies included	69

Full-text exclusions were assigned using the following hierarchy: population or setting outside Sub-Saharan Africa; ineligible intervention; no eligible behavioural outcome; no eligible determinant; no empirical determinant–behaviour connection; provider outcome not linked to client or community behaviour; ineligible design or publication type; eligible data not separately extractable; and duplicate or overlapping report without unique data. Reliable category-level frequencies were not preserved in the exported CADIMA dataset and were not reconstructed retrospectively. Quality-control note: one populated row paired Bediako et al. (2025) metadata with duplicated Baume et al. (2009) extraction data. The row was removed, and Baume et al. was retained once. This correction was not treated as an additional PRISMA exclusion stage.

Supplementary Table S3. Characteristics of included studies.

Study	Year	Country	Intervention	Design	Population	Behavioural outcome	Eligible extraction
Abiache et al. (2025)	2025	Cameroon	Malaria vaccine	Cross-sectional quantitative	Households/caregivers /children	Actual malaria-vaccine uptake	Eligible-outcome-only
Adeneye et al. (2014)	2014	Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual LLIN ownership and use; hypothetical willingness to pay	Eligible-outcome-only
Adeola and Okwilagwe (2015)	2015	Nigeria	Combined ITN/LLIN + IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual ITN use; consistent ITN use; receipt of two IPTp-SP doses; future willingness to use IPTp	Eligible-outcome-only
Afolaranmi et al. (2015)	2015	Nigeria	ITN/LLIN	Intervention/programme evaluation	Special populations	Previous-night LLIN use and consistent LLIN use	Eligible-outcome-only
Agyeman et al. (2023)	2023	Ghana	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Preventive-dose completion	Eligible-outcome-only
Adongo et al. 2019	2019	Ghana	ITN/LLIN	Qualitative	Providers/programme actors	Actual ITN use (regular, occasional, seasonal, non-use)	Full
Byagamy et al., (2022)	2022	Uganda	ITN/LLIN	Mixed methods	Households/caregivers /children	Consistent bed net use	Full
Falade CO, Ajayi IO. (2009)	2009	Nigeria	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Uptake, adherence and acceptance of IPTp	Full
Alaii et al. (2003)	2003	Kenya	ITN/LLIN	Qualitative	Providers/programme actors	ITN acceptance, uptake and sustained use	Full
Alfonso (202)	2020	Ghana	ITN/LLIN	Discrete choice experiment	Households/caregivers /children	Willingness-to-pay / willingness to purchase	Eligible-outcome-only
Amoran et al. 2012 – ITN health education – Nigeria	2012	Nigeria	ITN/LLIN	Intervention/programme evaluation	Households/caregivers /children	Primary: ITN ever use. Secondary hypothetical outcomes: readiness to use an ITN if given free and amount willing to pay to own an ITN.	Eligible-outcome-only
Amoran et al. (2011)	2011	Nigeria	ITN/LLIN	Cross-sectional quantitative	Special populations	Ever use and current use of ITN	Eligible-outcome-only
Ampofo 2023 – IPTp-SP and ITN uptake – Ghana	2023	Ghana	Combined ITN/LLIN + IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Completion of ≥3 IPTp-SP doses; previous-night ITN use; ITN non-use.	Eligible-outcome-only
Anikwe 2020 – LLITN use in pregnancy – Nigeria	2020	Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	LLITN use, daily use, occasional use and non-use.	Eligible-outcome-only
Ankomah 2012 – ITN use among pregnant women – Nigeria	2012	Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Previous-night ITN use and non-use among pregnant net owners.	Eligible-outcome-only
Antwi et al. 2016 – Extended SMC uptake – Ghana	2016	Ghana	Chemoprevention (SMC/PMC)	Intervention/programme evaluation	General/community population	Optimal or suboptimal receipt of SMC cycles.	Eligible-outcome-only

Aoki et al. 2025 – ITN use and IPTp completion – Angola	2025	Angola	Combined ITN/LLIN + IPTp	Intervention/programme evaluation	Pregnant/postpartum or reproductive-age women	Previous-night ITN use; IPTp 3+ and IPTp 4+ completion.	Eligible-outcome-only
Arnaldo et al., 2018	2018	Mozambique	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual IPTp-SP dose receipt (uptake) during pregnancy	Eligible-outcome-only
Asingizwe et al. 2019 – LLIN use and IRS acceptance – Rwanda	2019	Rwanda	Combined ITN/LLIN + IRS	Mixed methods	Households/caregivers/children	Frequent LLIN use, previous-night LLIN use, LLIN non-use and IRS acceptance or reluctance.	Eligible-outcome-only
Aweis et al. 2023 - Long-lasting insecticidal nets (LLINs) use among	2023	Somalia	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual previous-night LLIN use (sleeping under LLIN)	Eligible-outcome-only
yeni et al. 2020	2020	South Sudan	ITN/LLIN	Case-control	General/community population	Actual year-round LLIN utilization (regular use throughout the year) (Page 8, Table 4); participant-reported non-use of LLINs	Eligible-outcome-only
Ayubu and Kidima 2017 – IPTp-SP uptake – Tanzania	2017	Tanzania	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Receipt of IPTp-SP doses, non-receipt and incomplete dose uptake.	Eligible-outcome-only
Azizi et al. (2018)	2018	Malawi	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual IPTp-SP dose receipt (uptake) during pregnancy	Eligible-outcome-only
Babalola et al. 2022 – Consistent ITN use – Cameroon, Côte d'Ivoire and Sierra Leone	2022	Cameroon, Côte d'Ivoire and Sierra Leone	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Consistent ITN use.	Eligible-outcome-only
Badolo et al. 2025 – Previous-night ITN use – Burkina Faso	2025	Burkina Faso	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Previous-night ITN use and non-use.	Eligible-outcome-only
Balami et al. 2019 – Weekly LLIN use – Nigeria	2019	Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Weekly LLIN-use frequency.	Eligible-outcome-only
Balami et al. 2018 – Weekly ITN use – Nigeria	2018	Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Weekly ITN use and non-use.	Eligible-outcome-only
Bam et al. 2023 – RTS,S vaccine acceptance – Ghana	2023	Ghana	Malaria vaccine	Qualitative	Households/caregivers/children	Actual caregiver acceptance and child receipt; continued acceptance	Eligible-outcome-only
Barry et al. 2018 – SMC delivery and completion – Mali	2018	Mali	Chemoprevention (SMC/PMC)	Intervention/programme evaluation	Households/caregivers/children	Complete SMC receipt, partial receipt and non-receipt	Eligible-outcome-only
Baume et al. 2009 – ITN use and non-use – Ethiopia	2009	Ethiopia	ITN/LLIN	Mixed methods	Households/caregivers/children	Previous-night ITN use, non-use and never use	Eligible-outcome-only

Begashaw et al. (2026)	2026	Ethiopia	ITN/LLIN	Mixed methods	Households/caregivers /children	Previous-night use, non-use, irregular use, seasonal use and repurposing.	Eligible-outcome-only
Belay and Deressa 2008 – ITN acquisition and use – Ethiopia	2008	Ethiopia	ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Household acquisition/non-acquisition; pregnant-woman previous-night use/non-use; under-five previous-night use; conventional-ITN retreatment.	Eligible-outcome-only
Berkessa et al. 2016 – Household ITN use and non-use – Ethiopia	2016	Ethiopia	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Household ITN use and non-use; self-reported year-round or intermittent use; previous-night use among pregnant women and children; repurposing and disposal.	Eligible-outcome-only
Berthe et al. 2014 – Continued and seasonal net use – Senegal	2014	Senegal	ITN/LLIN	Mixed methods	Households/caregivers /children	Previous-night use, year-round use, seasonal use, continued use despite discomfort, rare or never use and discontinuation.	Eligible-outcome-only
Biadgilign et al. 2015 – ITN retreatment and non-retreatment – Ethiopia	2015	Ethiopia	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual retreatment and non-retreatment of mosquito nets.	Eligible-outcome-only
Binka & Adongo 1997	1997	Ghana	ITN/LLIN	Mixed methods	Households/caregivers /children	Actual bednet use (acceptance, hanging, seasonal use, washing behaviour, correct deployment)	Full
Brooks et al. 2017	2017	Democratic Republic of the Congo	ITN/LLIN	Mixed methods	Special populations	Actual bed net use (slept under bed net previous night); bed net ownership; bed net retention/sale	Full
Chivasa et al. 2026	2026	Zimbabwe	ITN/LLIN	Retrospective observational	General/community population	Actual LLIN use (slept under LLIN the night before the survey)	Eligible-outcome-only
Cho et al. 2024 – LLIN use – Cameroon	2024	Cameroon	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Previous-night LLIN use by children aged 0–5 years, the entire household and the household head; self-reported regular LLIN use	Eligible-outcome-only
Chukwuocha et al. 2010 – ITN use in pregnancy – Nigeria	2010	Nigeria	ITN/LLIN	Qualitative	Pregnant/postpartum or reproductive-age women	Current ITN use, non-use and rare community use	Eligible-outcome-only
Clark et al. 2016 – Targeted LLIN distribution and use – Uganda	2016	Uganda	ITN/LLIN	Intervention/programme evaluation	Households/caregivers /children	Actual LLIN receipt; sleeping under an LLIN the previous night; non-use because the household had no LLIN, owned but did not hang an LLIN, or hung an LLIN that the individual did n	Eligible-outcome-only
Creach et al. 2016	2016	Central African Republic	Other chemoprophylaxis	Retrospective observational	Special populations	Actual chemoprophylaxis compliance (no missed doses vs. at least one missed dose)	Eligible-outcome-only
Dambach et al. 2018	2018	Burkina Faso	Larval source management	Qualitative	General/community population	Community acceptance of larviciding; willingness to participate/support program financially; perceived success (mosquito reduction, malaria reduction); reported behaviour change (I	Full

Darko et al. 2019 – LLIN use among pregnant women – Ghana	2019	Ghana	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Previous-night LLIN use and non-use	Eligible-outcome-only
Zegers de Beyl et al. 2018 – Continuous ITN distribution – Ghana	2018	Ghana	ITN/LLIN	Intervention/programme evaluation	Pregnant/postpartum or reproductive-age women	Actual receipt or acquisition of an ITN through school, ANC or CWC distribution; previous-night ITN use as a secondary behavioural outcome	Eligible-outcome-only
de Beyl et al. 2017	2017	Madagascar	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual ITN ownership; ITN use the night before survey; coupon requesting and redemption behaviour	Eligible-outcome-only
Deressa et al. 2011 – ITN ownership and use – Ethiopia	2011	Ethiopia	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Previous-night ITN use by at least one household member; use by all household members, children under five, pregnant women and respondents	Full
Diabate et al. 2014	2014	Burkina Faso	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual ITN use among under-five children (slept under ITN previous night); ITN ownership; intra-household saturation; ITN hanging and physical condition	Eligible-outcome-only
Diallo et al. 2021 – LLIN and IPTp-SP uptake – Guinea	2021	Guinea	Combined ITN/LLIN + IPTp	Cross-sectional quantitative	General/community population	Regular LLIN use, adequate SP uptake and a composite measure of full malaria-prevention uptake	Eligible-outcome-only
Diallo et al. 2026 – LLIN use – Guinea	2026	Guinea	ITN/LLIN	Cross-sectional quantitative	General/community population	Previous-night LLIN use and non-use	Eligible-outcome-only
Diawara et al. 2022	2022	Mali	Chemoprevention (SMC/PMC)	Intervention/programme evaluation	Households/caregivers/children	Actual SMC coverage (receipt of 3 days of treatment across all four rounds); adherence; reasons for missing doses; adverse events	Eligible-outcome-only
Diengou et al. 2020 – IPTp-SP uptake – Cameroon	2020	Cameroon	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Receipt of at least one IPTp-SP dose, receipt of no dose and completion of three doses	Eligible-outcome-only
Doku et al. 2016	2016	Ghana	IPTp	Mixed methods	Pregnant/postpartum or reproductive-age women	Actual IPTp dose receipt/completion (dropout between IPT1 and IPT3)	Full
Dun-Dery et al. 2022 – ITN use among pregnant women – Ghana	2022	Ghana	ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Previous-night ITN use and non-use	Full
Dun-Dery et al. 2021 – IPTp-SP uptake – Ghana	2021	Ghana	IPTp	Mixed methods	Pregnant/postpartum or reproductive-age women	Number of IPTp-SP doses received during the current pregnancy; incomplete uptake or default defined as receipt of SP2 or fewer	Eligible-outcome-only
Ekholuenetale et al. 2026 – PMC acceptability and receipt – Nigeria	2025	Nigeria	Chemoprevention (SMC/PMC)	Qualitative	Households/caregivers/children	Caregiver attendance at health facilities for PMC, collection or acceptance of SP and administration of PMC to eligible children	Eligible-outcome-only

Ernst et al. 2016	2016	Kenya	ITN/LLIN	Mixed methods	Households/caregivers /children	Actual use (slept under bed net previous night) and non-use (unused bed net present in household with at least one person sleeping without net) (Page 6, 8, 12). WHO indicators incl	Full
Esimai & Aluko 2014	2014	Nigeria	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual current use of ITN	Full
Eteng et al. 2014	2014	Nigeria	ITN/LLIN	Mixed methods	Households/caregivers /children	Actual consistent use: child aged 0-47 months always slept under a treated bed net in the malaria season in households owning nets	Eligible-outcome-only
Exavery et al. 2014	2014	Tanzania	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual uptake of IPTp-SP doses during pregnancy	Full
Ezire et al. 2015	2015	Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual use of ITN/LLIN	Full
Faye 2012	2012	Niger	ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Actual use (previous-night use) and non-use of LLINs among those possessing nets	Full
Fernandez Montoya et al. 2023	2023	Mozambique	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual LLIN use: slept under a net the night before the survey	Eligible-outcome-only
Finlay et al. 2017	2017	Madagascar	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual LLIN use: slept under a LLIN the previous night	Eligible-outcome-only
Fokam et al. 2017	2017	Cameroon	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual LLIN/ITN use: slept under a net the previous night	Eligible-outcome-only
Forty et al. 2021 – ITN ownership/utilization – Malawi	2022	Malawi	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual ITN utilisation and ownership	Eligible-outcome-only
Fru et al. 2021	2021	Cameroon	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual LLIN use: slept under LLIN the previous night (SULPN); universal utilisation (all household members slept under	Eligible-outcome-only
Fuge et al. 2015 – ITN utilization – Ethiopia	2015	Ethiopia	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	ITN ownership, actual use, previous-night sleeping under ITN	Eligible-outcome-only
Garcia-Basteiro et al. 2011	2011	Equatorial Guinea	ITN/LLIN	Cross-sectional quantitative	Households/caregivers /children	Actual net use: slept under a net the night before the survey	Eligible-outcome-only

Supplementary Table S4. Complete quantitative synthesis.

Study	Intervention	Design	Population	Behavioural outcome	Determinant(s)	Extracted quantitative result	Appraisal

Abiache et al. (2025)	Malaria vaccine	Cross-sectional quantitative	Households/caregivers/children	Actual malaria-vaccine uptake	Health-service accessibility; vaccine-information source; trust in health workers; routine childhood vaccination; caregiver and household characteristics	Accessible services: aOR 2.30, 95% CI 1.18–4.48, p=0.020. Healthcare-provider information versus family/friends: aOR 7.60, 95% CI 3.82–15.08, p<0.001. No information versus family/friends: aOR 0.05, 95% CI 0.01–0.24, p<0.001. Trust in health workers: aOR 6.12, 95% CI 2.97–12.61, p<0.001. Routine vaccination attendance: aOR 5.51, 95% CI 3.10–9.78, p<0.001.	JBI; High concern
Adeneye et al. (2014)	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual LLIN ownership and use; hypothetical willingness to pay	LLIN awareness, affordability, availability of purchase outlets, heat/discomfort, preference for chemical spraying, interest in nets and ANC facility type.	Among pregnant women, 26.8% of public-hospital ANC attendees owned and used LLINs versus 9.5% of private-hospital attendees. Reported OR 0.29, 95% CI 0.13–0.64, p=0.00; comparison coding was not clearly stated.	JBI; High concern
Adeola and Okwilagwe (2015)	Combined ITN/LLIN + IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual ITN use; consistent ITN use; receipt of two IPTp-SP doses; future willingness to use IPTp	Drug reaction; ease of purchasing ITNs; comfort when sleeping under an ITN; healthcare-facility type; rural or urban location; acceptance of malaria-prevention tools	Government versus faith clinics: IPTp utilisation, mean 3.42 versus 2.70, t(630)=5.81, p<0.001, Cohen's d=0.23; ITN utilisation, mean 7.79 versus 6.30, t(630)=3.99, p<0.001, d=0.16. Rural versus urban government-clinic attendees: IPTp utilisation, mean 3.61 versus 3.20, t(580)=−6.41, p<0.001, d=0.26; ITN utilisation was not significantly different, p=0.089. Acceptance correlated with utilisation in government clinics, r=0.398, p<0.001, and faith clinics, r=0.379, p=0.007.	JBI; High concern
Afolaranmi et al. (2015)	ITN/LLIN	Intervention/programme evaluation	Special populations	Previous-night LLIN use and consistent LLIN use	Combined free LLIN provision, health education, practical demonstration and reminder materials	Previous-night use: 10.7% pre-intervention versus 82.1% post-intervention, χ^2=86.15, p<0.001. Consistent use: 6.0% versus 48.8%, χ^2=38.80, p<0.001. The separate effects of free provision and education were not estimated.	ROBINS-I; Critical concern
Agyeman et al. (2023)	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Preventive-dose completion	Number of ANC visits; trimester of first ANC attendance; level of health facility attended	Four or more ANC visits versus 1–3 visits: aOR 1.65, 95% CI 1.11–2.45, p=0.014. First ANC in second trimester versus first trimester: aOR 0.63, 95% CI 0.49–0.80, p<0.001. First ANC in third trimester versus first trimester: aOR 0.38, 95% CI 0.19–0.75, p=0.006. District hospital versus teaching hospital: aOR 0.49, 95% CI 0.36–0.66, p<0.001. Regional hospital versus teaching hospital: aOR 1.10, 95% CI 0.80–1.52, p=0.552	JBI; High concern

Adongo et al. 2019	ITN/LLIN	Qualitative	Providers/programme actors	Actual ITN use (regular, occasional, seasonal, non-use)	Barriers: heat, insecticide reactions, design, gender norms. Facilitators: malaria fear, habit, cost-saving, education.	No regression. Consensus ranking: heat = #1 barrier; malaria prevention = #1 facilitator.	JBI; Low concern
Byagamy et al., (2022)	ITN/LLIN	Mixed methods	Households/caregivers/children	Consistent bed net use	Perceived malaria risk, perceived susceptibility, net size preference, net shape preference, cost, discomfort/heat, household sleeping arrangements.	Perceived risk of malaria: adjusted OR 0.57, 95% CI 0.35–0.92, p=0.02 for those not perceiving malaria risk compared with those perceiving risk. Preferred larger nets: adjusted OR 1.87, 95% CI 1.07–3.28, p=0.03. Preferred rectangular shape: adjusted OR 0.58, 95% CI 0.36–0.94, p=0.03.	JBI; Some concerns
Falade CO, Ajayi IO. (2009)	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Uptake, adherence and acceptance of IPTp	IPTp knowledge, fear of medication during pregnancy, concern about SP adverse effects, clinic cup acceptability, drug availability, income-related affordability barriers.	Women able to correctly define IPTp were significantly more likely to receive IPTp ($p < 0.001$). Women with lower income were more likely not to use IPTp ($p < 0.001$).	JBI; Some concerns
Alaii et al. (2003)	ITN/LLIN	Qualitative	Providers/programme actors	ITN acceptance, uptake and sustained use	Perceptions of malaria causes, insecticide safety concerns, trust in research, cultural practices, household sleeping arrangements, heat discomfort and communication quality	Approximately half of distributed ITNs were unused one month after distribution.	JBI; Some concerns
Alfonso (202)	ITN/LLIN	Discrete choice experiment	Households/caregivers/children	Willingness-to-pay / willingness to purchase	Price; shape (conical, R1p, R4p); size (queen, double); entry design (zipper, lift-over-head, flap-overlapping)	Price: -0.13% per GHS 1 ($p<0.00$). Shape: conical +3.56% ($p<0.00$); R1p +2.22% ($p<0.05$). Size queen: +3.31% ($p<0.00$). Entry zipper: +3.83% (vs lift, $p<0.00$); +4.22% (vs flap, $p<0.00$) (p. 8, Table 3). Reference categories: R4p shape; double size; flap-overlapping entry. Marginal effects with all other variables at means.	JBI + DCE/JBI; Some concerns

Amoran et al. 2012 – ITN health education – Nigeria	ITN/LLIN	Intervention/programme evaluation	Households/caregivers/children	Primary: ITN ever use. Secondary hypothetical outcomes: readiness to use an ITN if given free and amount willing to pay to own an ITN.	Exposure to structured health education.	Actual use: intervention group, 29.5% to 72.6%, reported p<0.001; control group, 27.5% to 31.6%, p=0.37. The paper reports a 45.2-percentage-point change for the intervention group, although the displayed proportions differ by 43.1 percentage points; this inconsistency must be retained. Hypothetical readiness: intervention group, 69.5% to 100%, p<0.001; control group, 72.0% to 73.9%, p=0.68. Belief in efficacy: intervention group, 60.5% to 97.4%, p<0.001; control group, 62.0% to 60.0%, p=0.69. These belief results were not statistically linked	ROBINS-I; High concern
Amoran et al. (2011)	ITN/LLIN	Cross-sectional quantitative	Special populations	Ever use and current use of ITN	Perceived effectiveness of ITN; frequency of malaria infestation; price perception; information source	Perceived effective ITN: aOR 29.30 (95% CI 17.17-50.01, p=0.0001) vs non-effective; High malaria frequency: aOR 1.55 (95% CI 0.97-2.47, p=0.06) vs ≤once in 6 months. Reference categories: non-effective ITN; frequency ≤once in 6 months. Adjustment variables: ITN price, information source	JBI; High concern
Ampofo 2023 – IPTp-SP and ITN uptake – Ghana	Combined ITN/LLIN + IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Completion of ≥3 IPTp-SP doses; previous-night ITN use; ITN non-use.	Knowledge of malaria in pregnancy; gestational age at ANC initiation; discomfort; lack of motivation; inability to hang the net; perceived absence of mosquitoes.	Good MiP knowledge versus poor: AOR 2.67, 95% CI 1.37–5.19, p=0.004 for ≥3 IPTp-SP doses. ANC booking after 13 weeks versus ≤13 weeks: AOR 0.18, 95% CI 0.09–0.35, p<0.001.	JBI; Some concerns
Anikwe 2020 – LLITN use in pregnancy – Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	LLITN use, daily use, occasional use and non-use.	Discomfort/heat, chemical fear, use of alternatives, husband's disapproval, room untidiness, perceived absence of mosquitoes, perceived ineffectiveness and knowledge of malaria causation.	Knowledge of mosquito causation: 148/384 users among knowledgeable women versus 2/16 among women without correct knowledge; χ^2=4.430, p=0.035. The article reports OR 4.38, 95% CI 0.983–19.591; the confidence interval and p-value are inconsistent.	JBI; High concern
Ankomah 2012 – ITN use among pregnant women – Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Previous-night ITN use and non-use among pregnant net owners.	Knowledge that ITNs prevent malaria; misconceptions about malaria prevention; perceived harmfulness of malaria in pregnancy; knowledge of pregnancy-related malaria risks.	Knowledge that ITNs prevent malaria: AOR 2.931, 95% CI 1.864–4.610, p<0.0001. No prevention misconceptions: AOR 1.551, 95% CI 1.029–2.339, p=0.036. Perceived malaria as harmful: 29.3% use versus 20.3%, p=0.009; knowledge of pregnancy risks: 27.0% versus 12.3%, p=0.015, but neither remained significant after adjustment.	JBI; Some concerns

Antwi et al. 2016 – Extended SMC uptake – Ghana	Chemoprevention (SMC/PMC)	Intervention/programme evaluation	General/community population	Optimal or suboptimal receipt of SMC cycles.	Trust in authorities and CHWs; supportive networks; positive experience; communication; delivery method; travel distance; caregiver absence; work commitments; dosing burden; perceived side effects; perceived need for preventive medication.	Not applicable.	JBI; Some concerns
Aoki et al. 2025 – ITN use and IPTp completion – Angola	Combined ITN/LLIN + IPTp	Intervention/programme evaluation	Pregnant/postpartum or reproductive-age women	Previous-night ITN use; IPTp 3+ and IPTp 4+ completion.	Timing of first ANC and MCH-HB intervention allocation.	Second- versus first-trimester ANC: AOR 0.72, 95% CI 0.61–0.86, p<0.001. Third- versus first-trimester ANC: AOR 0.30, 95% CI 0.25–0.37, p<0.001. MCH-HB intervention versus control: AOR 1.47, 95% CI 1.11–1.95, p=0.01.	RoB 2; Some concerns
Arnaldo et al., 2018	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual IPTp-SP dose receipt (uptake) during pregnancy	Non-institutional delivery (with reasons: lack of transport, unexpected delivery date); timing of first ANC visit; knowledge about IPTp-SP; education level	Low IPTp uptake (<3 doses): Non-institutional delivery AOR=2.9 (1.8-4.5), P<0.001; First ANC ≥28 weeks AOR=5.4 (2.9-9.8), P<0.001; Poor IPTp knowledge AOR=1.6 (1.2-2.2), P=0.002; None/primary education AOR=1.3 (1.0-1.7), P=0.041 (Table 2, Page 7). All adjusted for covariates (not fully specified in table, but multivariate analysis included variables with P<0.20 in univariate analysis	JBI; Some concerns
Asingizwe et al. 2019 – LLIN use and IRS acceptance – Rwanda	Combined ITN/LLIN + IRS	Mixed methods	Households/caregivers/children	Frequent LLIN use, previous-night LLIN use, LLIN non-use and IRS acceptance or reluctance.	Behavioural intention; LLIN availability; heat; irritation; bed bugs; perceived malaria risk; perceived LLIN effectiveness and mesh size; non-malaria protection; trust in sprayers; perceived spraying quality.	Behavioural intention was associated with LLIN use: standardised β=0.10, p<0.05; and IRS acceptance: β=0.22, p<0.001. Exact p-values and confidence intervals were not reported. Availability and accessibility did not moderate LLIN use: β=−0.05 and β=0.07, both non-significant.	MMAT + JBI; Some concerns
Aweis et al. 2023 - Long-lasting insecticidal nets (LLINs) use among	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual previous-night LLIN use (sleeping under LLIN)	Large household size; un-partnered marital status (single/widowed/divorced/separated); older nets (lifespan); physical integrity (holes, burns, old appearance); cost/affordability; net availability	LLIN utilization: Large household size AOR 0.83 (95% CI: 0.74-0.94), p=0.002; Un-partnered status unadjusted OR 0.34 (95% CI: 0.14-0.82), p=0.017; Nets obtained 25-48 months ago unadjusted OR 0.42 (95% CI: 0.17-0.99), p=0.047; Net hung previous night p<0.001 (Page 13, Table 7). Source: mass distribution 78.8% used; market 93.8% used	JBI; Some concerns

yeni et al. 2020	ITN/LLIN	Case-control	General/community population	Actual year-round LLIN utilization (regular use throughout the year) (Page 8, Table 4); participant-reported non-use of LLINs	Having LLIN; awareness of LLIN benefits; being taught on LLIN use; understanding LLIN use; cost/affordability; availability; forgetfulness; comfort; knowledge/perception	Year-round LLIN use: Having LLIN OR 5.78 (95% CI: 3.46-9.00), p<0.001; Awareness of benefits OR 8.76 (95% CI: 3.02-25.37), p<0.001; Being taught on use OR 3.35 (95% CI: 2.17-5.18), p<0.001; Understanding use OR 3.80 (95% CI: 2.01-7.20), p<0.001 (Page 8, Table 4). All significant associations p<0.001 for access to LLIN, awareness of LLIN benefits, taught on LLIN use, understanding LLIN use	JBI; Some concerns
Ayubu and Kidima 2017 – IPTp-SP uptake – Tanzania	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Receipt of IPTp-SP doses, non-receipt and incomplete dose uptake.	SP availability at ANC; knowledge of adverse effects of placental malaria; whether SP was provided during follow-up visits.	Knowledge of placental-malaria consequences was associated with uptake: OR 11.81, 95% CI 5.755–24.23, p=0.0001; reference category and coding were not reported. SP availability correlated with uptake: Spearman r=0.67, 95% CI 0.54–0.77, p=0.0001	JBI; High concern
Azizi et al. (2018)	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual IPTp-SP dose receipt (uptake) during pregnancy	Number of ANC visits; DOT adherence; health facility location (rural/urban); age group; spouse escort; distance to HF; transport problems; religion; education; occupation; marital status; worry about drugs/providers	Adjusted (AOR): Rural HF 0.31 (0.13-0.70); ≤3 ANC visits 0.29 (0.18-0.48); Not taking SP under DOT 0.18 (0.05-0.63); Catholic/Anglican 0.53 (0.28-0.97); Age 25-34 1.72 (1.06-2.78); Spouse escort problem 2.03 (1.26-3.26) (Page 8-10, Table 6). Unadjusted (OR): Distance (big problem) 0.37 (0.19-0.71); Transport problem 0.42 (0.23-0.78); Worried no drugs 0.54 (0.34-0.84) (Page 9-10, Table 6).	JBI; Some concerns
Babalola et al. 2022 – Consistent ITN use – Cameroon, Côte d'Ivoire and Sierra Leone	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Consistent ITN use.	Attitudes towards ITNs; perceived vulnerability and severity; response efficacy; self-efficacy; community norm; malaria discussion; message exposure; household net sufficiency; ceiling integrity.	Cameroon: positive attitudes AOR 3.171, p<0.001; vulnerability 2.322, p<0.001; self-efficacy 7.026, p<0.001; community norm 2.891, p<0.001; sufficient nets 2.978, p<0.001; message exposure 0.586, p<0.05. Côte d'Ivoire: positive attitudes 7.593, p<0.001; vulnerability 0.731, p<0.05; malaria discussion 2.209, p<0.001; response efficacy 2.005, p<0.001; self-efficacy 3.951, p<0.001; community norm 1.319, p<0.05; sufficient nets 3.044, p<0.001; message exposure 1.489, p<0.01; sealed ceiling 0.578, p<0.01. Sierra Leone: positive attitudes 1.455, p<0.	JBI; Some concerns
Badolo et al. 2025 – Previous-night ITN use – Burkina Faso	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Previous-night ITN use and non-use.	Net textile type and age of the ITN.	Polyester versus polyethylene: AOR 1.227, 95% CI 1.136–1.325, p<0.01. Net age 6–11 months versus ≥12 months: AOR 1.748, 95% CI 1.359–2.248, p<0.01. Net age <6 months versus ≥12 months: AOR 1.922, 95% CI 1.482–2.492, p<0.01.	JBI; High concern

Balami et al. 2019 – Weekly LLIN use – Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Weekly LLIN-use frequency.	Malaria and LLIN information; personal and social motivation; behavioural skills.	Information → behaviour: β=0.220, p<0.001. Motivation → behaviour: β=0.108, p=0.033. Behavioural skills → behaviour: β=0.031, p=0.278. Confidence intervals were not reported.	JBI; High concern
Balami et al. 2018 – Weekly ITN use – Nigeria	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Weekly ITN use and non-use.	ITN awareness and care knowledge; perceived social approval; ability to persuade others to support ITN use.	ITN awareness, correct versus “don’t know”: AOR 5.66, 95% CI 1.43–22.42, p=0.014. Correct rejection of washing ITNs monthly versus “don’t know”: AOR 3.60, 95% CI 1.18–11.06, p=0.025. Important others supporting more frequent use: AOR 3.06, 95% CI 1.35–6.96, p=0.007. Effective persuasion of others: AOR 2.37, 95% CI 1.14–4.94, p=0.021.	JBI; High concern
Bam et al. 2023 – RTS,S vaccine acceptance – Ghana	Malaria vaccine	Qualitative	Households/caregivers/children	Actual caregiver acceptance and child receipt; continued acceptance	Health-worker education; perceived malaria severity; perceived vaccine safety and efficacy; manageable side effects; observed child health; perceived reductions in hospital visits, costs and lost work time	Not applicable.	JBI; Some concerns
Barry et al. 2018 – SMC delivery and completion – Mali	Chemoprevention (SMC/PMC)	Intervention/programme evaluation	Households/caregivers/children	Complete SMC receipt, partial receipt and non-receipt	Door-to-door versus fixed-point delivery; directly observed versus non-directly observed treatment.	Door-to-door versus fixed-point full completion: 74.1% (95% CI 68.5–79.8) versus 60.1% (95% CI 50.2–70.0), p=0.009. No SMC received: 1.5% versus 5.8%, p=0.002. At least two rounds: 93.9% versus 84.2%, p=0.001.	RoB 2; Some concerns
Baume et al. 2009 – ITN use and non-use – Ethiopia	ITN/LLIN	Mixed methods	Households/caregivers/children	Previous-night ITN use, non-use and never use	Perceived effectiveness; perceived malaria or mosquito risk; net condition; net age; shape; hanging difficulty; misinformation; saving for future use; alternative household use; purchase status; household IRS.	Household IRS versus no IRS: adjusted OR 1.89, 95% CI 1.36–2.63, p<0.001. ITN age >12 months versus 0–6 months: adjusted OR 0.55, 95% CI 0.37–0.82, p=0.003. Conical versus rectangular: adjusted OR 2.27, 95% CI 1.10–4.68, p=0.027. Purchased versus free: adjusted OR 2.16, 95% CI 1.32–3.53, p=0.002	MMAT + JBI; High concern
Begashaw et al. (2026)	ITN/LLIN	Mixed methods	Households/caregivers/children	Previous-night use, non-use, irregular use, seasonal use and repurposing.	389/700 households, 55.6% (95% CI 51.9%–59.3%), met the use definition; 311/700 did not.	High versus low perceived severity: AOR 1.50, 95% CI 1.08–2.07, p=0.01. Adequate versus inadequate LLIN-to-family-size ratio: AOR 2.09, 95% CI 1.51–2.91, p=0.001.	MMAT + JBI; High concern

Belay and Deressa 2008 – ITN acquisition and use – Ethiopia	ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Household acquisition/non-acquisition; pregnant-woman previous-night use/non-use; under-five previous-night use; conventional-ITN retreatment.	Access to ITNs; perceived ITN effectiveness; perceived malaria or mosquito risk; household allocation; distribution fairness and convenience; family/husband encouragement; CHW and health-worker emphasis; insecticide availability and retreat	Among 334 households without ITNs, 68.3% reported lack of access and 27% reported that ITNs could not prevent malaria. No adjusted estimate was reported for an eligible behavioural determinant.	MMAT + JBI; High concern
Berkessa et al. 2016 – Household ITN use and non-use – Ethiopia	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Household ITN use and non-use; self-reported year-round or intermittent use; previous-night use among pregnant women and children; repurposing and disposal.	Knowledge that mosquito bites transmit malaria; heat; housing and hanging constraints; absence of a bed; perceived absence of mosquitoes; toxicity fears; perceived lack of malaria protection; net age, disposal and repurposing.	Knowledge that mosquito bites transmit malaria, yes versus no: AOR 3.44, 95% CI 1.80–6.59, p<0.05. ITN ever washed, yes versus no: AOR 2.66, 95% CI 1.35–5.26, p<0.05; this was retained as an associated maintenance behaviour, not interpreted as a confirmed facilitator.	JBI; High concern
Berthe et al. 2014 – Continued and seasonal net use – Senegal	ITN/LLIN	Mixed methods	Households/caregivers/children	Previous-night use, year-round use, seasonal use, continued use despite discomfort, rare or never use and discontinuation.	Perceived mosquito density; insecticide irritation, odour and safety concerns; perceived protection from malaria and insects; improved sleep; familiarity and habit; laziness or inconvenience; desire to preserve the net; product size and sha	Dry season: 72.5% previous-night use among occupied sleeping spaces with nets. Rainy season: 86.6%. No statistical comparison, confidence interval or adjusted association was reported.	MMAT + JBI; Some concerns
Biadgilign et al. 2015 – ITN retreatment and non-retreatment – Ethiopia	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual retreatment and non-retreatment of mosquito nets.	Availability of retreatment services and receipt of information about retreatment.	Among respondents whose nets had not been retreated, 93 were reported as citing lack of a nearby service and 69 as citing lack of information or knowledge. The article reported 53.4% and 39.7%, respectively, but did not clearly state the denominator in the results text.	JBI; High concern
Binka & Adongo 1997	ITN/LLIN	Mixed methods	Households/caregivers/children	Actual bednet use (acceptance, hanging, seasonal use, washing behaviour, correct deployment)	Seasonal variation; perceived mosquito density; heat discomfort; child soiling of nets; cost/affordability; net size; traditional beliefs about malaria causation; side effects; sleeping arrangements (mats vs. beds)	Rainy season use: 99.7%; Dry season use: 20%; Correct hanging: 97%; No washing within 6 months: 93%; Mothers washing: 14%; Side effects: itching 3%, sneezing 2.1%, headaches 2.7%; Willing to pay initial purchase: 67%; Willing to pay insecticide: 78%; Preferred payment: cash 64%, barter 12%, instalments 9%	JBI; Some concerns

Brooks et al. 2017	ITN/LLIN	Mixed methods	Special populations	Actual bed net use (slept under bed net previous night); bed net ownership; bed net retention/sale	Pragmatic barriers (tent size, mud floor, daily installation, frequent washing, holes); economic barriers (selling for food, extreme poverty); comfort barriers (chemical smell, irritations, heat); source of net (NGO vs. ANC); presence of ch	Ownership: 29% households; Use: 20% individuals; 41% children under 5; Sale/exchange: 146/175 (83%); Sold to villagers: 80%; Median sale price $2.15; RDT positivity children under 5: 58%; OR for children under 5 use: 3.4 (2.0-5.8), p<0.0001; OR for ANC-received net retention: 13.3 (5.3-33.6), p<0.0001; OR for NGO net sale: 12.1 (10.7-18.9), p<0.0001; Households with children under 5 ownership: 39% vs. 6.5%, p=0.0007; Mud wall ownership: 87% vs. 25%, p=0.0075	JBI; Some concerns
Chivasa et al. 2026	ITN/LLIN	Retrospective observational	General/community population	Actual LLIN use (slept under LLIN the night before the survey)	Recent travel history; age; time to seek care; religious group; distance to health facility; education level; sex; outdoor sleeping; occupation; marital status; active breeding sites; pregnancy status	LLIN use: 51/662 (7.7%). Stratified analysis: Recent travel history associated with LLIN use (p=0.05). Multivariate logistic regression: None of the tested variables were significant predictors of LLIN use (age p=0.25; recent travel p=0.15; outdoor sleeping p=0.63; married p=0.07) (Table 2). Random Forest: AUC=0.538; sensitivity 0%; specificity 96.2%; top variables by importance: age (58.3), time to seek care (57.9), religious group (48.5), distance (48.1), education (47.1) (Figure 4).	JBI; Some concerns
Cho et al. 2024 – LLIN use – Cameroon	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Previous-night LLIN use by children aged 0–5 years, the entire household and the household head; self-reported regular LLIN use	Ownership of at least one LLIN; installation of LLINs on all household beds	Children's use: ownership, OR 23.1 (95% CI 5.4–99.2), $p=2.4\times10^{-5}$; installation on all beds, OR 1.9 (1.4–2.6), $p=1.4\times10^{-4}$. Entire-household use: ownership, OR 40.5 (5.3–310.0), $p=3.7\times10^{-4}$; installation, OR 2.2 (1.4–3.3), $p=2.6\times10^{-4}$. Regular use: ownership, OR 2.9 (1.3–6.2), $p=7.1\times10^{-3}$; installation, OR 2.4 (1.8–3.3), $p=3.1\times10^{-8}$. Outcome coding states "Yes" as reference; effect direction is therefore unclear	Unclear/not recorded; Unclear
Clark et al. 2016 – Targeted LLIN distribution and use – Uganda	ITN/LLIN	Intervention/programme evaluation	Households/caregivers/children	Actual LLIN receipt; sleeping under an LLIN the previous night; non-use because the household had no LLIN, owned but did not hang an LLIN, or hung an LLIN that the indivi	Direct free house-to-house distribution; presence or absence of an LLIN in the household; net hanging status	Receipt: 98% of eligible households received two LLINs. Use: 47% at three months and 21% at 18 months. At 18 months, 62% of non-users lived in households without an LLIN. Net ownership declined from 73% at three months to 32% at 18 months, but ownership is retained only as contextual evidence of household availability.	ROBINS-I; High concern

Creach et al. 2016	Other chemoprophylaxis	Retrospective observational	Special populations	Actual chemoprophylaxis compliance (no missed doses vs. at least one missed dose)	Peer-to-peer reinforcement; taking CP at same time daily; taking CP with food; bed net use; insecticide on clothing; perceived risk of malaria; perceived CP effectiveness; tobacco use; tiredness; memory loss	Adjusted AORs: Peer-to-peer reinforcement 1.38 (1.05-1.82), p=0.02; CP same time daily 2.37 (1.17-4.78), p=0.02; CP with food 1.45 (1.11-1.89), p=0.01; Bed net use 1.41 (1.08-1.84), p=0.01; Insecticide on clothing 1.90 (1.43-2.51), p<0.001; Perceived risk 1.59 (1.02-2.50), p=0.04; Perceived CP effectiveness 1.62 (1.09-2.40), p=0.02; Tobacco use 0.77 (0.60-0.99), p=0.04; Tiredness 0.67 (0.50-0.90), p=0.01; Memory loss 0.67 (0.45-0.99), p=0.05	JBI; Some concerns
Dambach et al. 2018	Larval source management	Qualitative	General/community population	Community acceptance of larviciding; willingness to participate/support program financially; perceived success (mosquito reduction, malaria reduction); reported behaviour	Perceived effectiveness (mosquito reduction, malaria reduction); perceived safety (larvicide harmless vs. concerns); perceived coverage gaps (not all water points treated); perceived frequency (more frequent spraying desired); trust in prog	Willingness to pay: 100-6000 FCFA/year (50% arm), 100-5000 FCFA/year (100% arm); most stated 500-1000 FCFA; 100 FCFA = 0.15 Euro	JBI; Some concerns
Darko et al. 2019 – LLIN use among pregnant women – Ghana	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Previous-night LLIN use and non-use	Heat-related discomfort; absence of an LLIN; preference for mosquito spray	Frequencies, proportions and effect estimates for the three eligible barriers were not reported	JBI; High concern
Zegers de Beyl et al. 2018 – Continuous ITN distribution – Ghana	ITN/LLIN	Intervention/programme evaluation	Pregnant/postpartum or reproductive-age women	Actual receipt or acquisition of an ITN through school, ANC or CWC distribution; previous-night ITN use as a secondary behavioural outcome	Availability of multiple free distribution channels; programme implementation delay; incomplete implementation of planned channels; narrow eligibility criteria	Any continuous-distribution ITN source increased from 2.2% of households at baseline to 23.8% at endline. ANC-source ownership increased from 1.6% to 8.0%, CWC from 0.6% to 5.3% and school-source ownership from 0% to 13.8%, all p<0.001	ROBINS-I; High concern

de Beyl et al. 2017	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual ITN ownership; ITN use the night before survey; coupon requesting and redemption behaviour	SBCC exposure; wealth quintile; distance to distribution point; perceived simplicity of process; perceived fairness of criteria; accessibility of community agent; reasons for not using ITNs (worn out/dirty, not needed, no space); reasons fo	ITN use: 71.2% population; 48.1% children under 5. Households heard about programme: 71.4%; requested coupon: 54.1%; received coupon: 84.5%; redeemed: 81.9%. Reasons for non-use: worn out/dirty 47%, not needed 11.2%, no space 7.8%. Reasons for requesting coupons: not enough/worn out 67.2%, vaccinated child 19.6%, pregnant woman 11.9%. Perceptions: distance very short 78.1%, exchange very simple 84.3%, agent very accessible 83%, criteria fair 86.6%.	JBI; Some concerns
Deressa et al. 2011 – ITN ownership and use – Ethiopia	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Previous-night ITN use by at least one household member; use by all household members, children under five, pregnant women and respondents	Number of ITNs in the household; number hung over beds; knowledge that ITNs kill mosquitoes; experience of problems when using an ITN; old or worn nets; uncertainty about where to obtain nets; local unavailability	Additional ITN in household: aOR 2.93, 95% CI 2.21–3.90, p<0.0001. Additional ITN hung over a bed: aOR 4.23, 95% CI 2.93–6.12, p<0.0001. Knowledge that ITNs kill mosquitoes: aOR 1.52, 95% CI 1.02–2.27, p=0.038. No experienced problem using an ITN: aOR 1.94, 95% CI 1.03–3.63, p=0.040	JBI; Some concerns
Diabate et al. 2014	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual ITN use among under-five children (slept under ITN previous night); ITN ownership; intra-household saturation; ITN hanging and physical condition	Household size; intra-household saturation; ITN physical condition; ITN hanging status; mother's vector control actions; child illness; agricultural land ownership; residential area	Adjusted ORs (Table 3): Large households: Intra-household saturation OR 1.9 (1.07-3.42), p<0.05; Mother's vector control actions OR 1.5 (1.07-2.16), p<0.05; Child illness OR 1.5 (1.03-2.12), p<0.05. Small households: Agricultural land OR 1.9 (1.10-3.30), p<0.05; Child age 12-23 months OR 2.2 (1.10-4.55), p<0.05. Descriptive: Ownership 89.9%; Saturation 37.0%; Under-five use 70%; CPR ownership vs saturation: 7.8 in rural large households; CPR hanging: 19.2 in rural large households; CPR physical condition: 14.2 in rural large households	JBI; Some concerns
Diallo et al. 2021 – LLIN and IPTp-SP uptake – Guinea	Combined ITN/LLIN + IPTp	Cross-sectional quantitative	General/community population	Regular LLIN use, adequate SP uptake and a composite measure of full malaria-prevention uptake	Number of ANC visits; means of transport used to attend ANC; distance to the health centre; education and water source as branches within the regression tree	No adjusted odds ratios, risk ratios or determinant-specific effect sizes were reported. The regression tree identified ANC as the first splitting variable, followed by transport among women classified as having adequate ANC and education or water source among women classified as having inadequate ANC	JBI; High concern

Diallo et al. 2026 – LLIN use – Guinea	ITN/LLIN	Cross-sectional quantitative	General/community population	Previous-night LLIN use and non-use	Belief that LLINs pose no health risk; belief that LLINs are very useful; belief that sleeping under an LLIN every night is the best way to avoid malaria; belief that people using nets still contract malaria; knowledge that mosquito bites c	Perceived no health risk: aOR 2.14, 95% CI 1.64–2.79, p<0.001. LLINs perceived as very useful: aOR 2.33, 95% CI 1.38–4.00, p=0.002. Nightly LLIN use perceived as the best malaria-prevention method: aOR 2.27, 95% CI 1.60–3.23, p<0.001. Belief that net users still contract malaria: aOR 0.61, 95% CI 0.48–0.78, p<0.001. Uncertainty about this statement: aOR 0.56, 95% CI 0.36–0.86, p=0.008. Knowledge that mosquito bites cause malaria: aOR 1.48, 95% CI 1.00–2.18, p=0.048	JBI; High concern
Diawara et al. 2022	Chemoprevention (SMC/PMC)	Intervention/programme evaluation	Households/caregivers/children	Actual SMC coverage (receipt of 3 days of treatment across all four rounds); adherence; reasons for missing doses; adverse events	Travel; lack of information; adverse events (drowsiness, vomiting, diarrhea, abdominal pain, itching)	Coverage: 89.1% in 2017, 81.2% in 2018 (Fig 2); Adverse events: drowsiness 11.8%, vomiting 9.1%, diarrhea 8.8%, abdominal pain 5.1%, itching 2.1% (Fig 3)	JBI; Some concerns
Diengou et al. 2020 – IPTp-SP uptake – Cameroon	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Receipt of at least one IPTp-SP dose, receipt of no dose and completion of three doses	Knowledge about IPTp-SP	Table 2 reports p<0.001 for the relationship between knowledge and any-dose IPTp uptake. Knowledgeable women represented 56.0% of the full sample and none was classified as a non-user. Among women with no knowledge, 39.2% of the full sample received IPTp and 4.8% did not. No odds ratio, risk ratio or adjusted estimate was reported.	JBI; High concern
Doku et al. 2016	IPTp	Mixed methods	Pregnant/postpartum or reproductive-age women	Actual IPTp dose receipt/completion (dropout between IPT1 and IPT3)	Shortage of SP; lack of water for DOT; unavailability of IPT during outreach; poor attitude of health workers; late ANC visits; poor monitoring; lack of health education on IPT; health worker knowledge	SP doses: one dose 8.7%, two doses 35.3%, three doses 38%, cannot remember 17.9%; 32% not given SP at first visit; 25.5% did not take SP subsequently; 56% ANC staff reported SP shortages; 67% no water for DOT; 50.9% no IPT during outreach; 17.4% shouted at; 33.6% facilities not monitored; 90% observed DOT	JBI; Some concerns
Dun-Dery et al. 2022 – ITN use among pregnant women – Ghana	ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Previous-night ITN use and non-use	ITN ownership; specific knowledge of malaria risks in pregnancy; number of ANC contacts; physical discomfort; skin itching or rashes; unsuitable hanging structures; landlord restrictions; lack of spousal support; failure to receive an ITN;	ITN ownership: OR 2.4, 95% CI 1.3–4.4, p=0.005. Good knowledge of pregnancy-specific malaria risks: OR 2.4, 95% CI 1.3–4.3, p=0.004. Number of ANC contacts: OR 1.3 per additional contact, 95% CI 1.0–1.5, p=0.018	MMAT; Some concerns

Dun-Dery et al. 2021 – IPTp-SP uptake – Ghana	IPTp	Mixed methods	Pregnant/postpartum or reproductive-age women	Number of IPTp-SP doses received during the current pregnancy; incomplete uptake or default defined as receipt of SP2 or fewer	Number of ANC contacts; timing of first ANC contact; SP stock-out; missed ANC visits; staff absenteeism or negligence; knowledge deficiencies; adverse drug reactions; change of residence; lack of spousal support; financial and transport bur	Number of ANC contacts: IRR 1.255 per additional contact, 95% CI 1.212–1.299, p<0.001. Timing of first ANC contact had an overall p=0.006, but category-specific findings were inconsistent: 13–24 weeks versus first trimester, IRR 1.132, 95% CI 1.023–1.253; 25 weeks or later, IRR 0.838, 95% CI 0.623–1.127. Among 217 women receiving SP2 or fewer, 73, 33.6%, identified SP shortage at the facility; 52, 24.0%, identified a missed ANC schedule; and 92, 42.4%, were grouped under a heterogeneous “other” category including not eating, staff absenteeism a	MMAT; Some concerns
Ekholuenetale et al. 2026 – PMC acceptability and receipt – Nigeria	Chemoprevention (SMC/PMC)	Qualitative	Households/caregivers/children	Caregiver attendance at health facilities for PMC, collection or acceptance of SP and administration of PMC to eligible children	Perceived effectiveness; observed child-health benefits; child-friendly flavoured dispersible formulation; free medicines and health services; health-worker encouragement and endorsement; trust in health workers and conventional medicine; i	Not applicable. No behavioural frequencies or determinant-specific effect estimates were reported.	JBI; High concern
Ernst et al. 2016	ITN/LLIN	Mixed methods	Households/caregivers/children	Actual use (slept under bed net previous night) and non-use (unused bed net present in household with at least one person sleeping without net) (Page 6, 8, 12). WHO indic	Directly measured perceptual, practical, social, and access-related determinants: access barriers (distance, cost, age-restrictions, stock-outs); side effects (rash, heat, suffocation); lack of knowledge; logistical difficulties (hanging, c	Adjusted associations (non-use of available nets): Using malaria drugs easier than bed net: aOR=2.2 (1.3-3.7), p=0.002; No use net will get malaria: aOR=2.3 (1.2-4.3), p=0.01; Using net difficult: aOR=2.2 (1.2-4.0), p=0.01; Community only uses in rainy season: aOR=2.8 (1.6-4.8), p<0.001; Bed net easy to get: aOR=2.4 (1.6-3.7), p<0.001; Purchased nets better than free: aOR=1.6 (1.0-2.5), p=0.05 (Table 5, Page 13-14). Adjusted for site, education, wealth, children under 5, pregnant women. Ownership associations (Table 4, Page 11): Children under	JBI; Some concerns

Esimai & Aluko 2014	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual current use of ITN	Knowledge of ITN, attitude towards ITN, marital status, ownership of ITN, free ITN, age, education, occupation, access	Adjusted logistic regression (current use): Married vs unmarried aOR=4.63 (1.58-13.50), p=0.005; Poor/no knowledge vs good aOR=0.21 (0.07-0.63), p=0.005; Positive attitude vs negative aOR=11.2 (2.18-56.90), p=0.004; Own ITN vs not own aOR=0.05 (0.01-0.18), p=0.0001; Free ITN vs paid aOR=8.26 (2.34-29.20), p=0.001; Access aOR=1.24 (0.20-7.62), p=0.82 (NS); Age aOR=0.51 (0.14-1.86), p=0.31 (NS); Education aOR=1.30 (0.52-3.21), p=0.56 (NS); Occupation aOR=0.78 (0.57-1.07), p=0.12 (NS)	JBI; Some concerns
Eteng et al. 2014	ITN/LLIN	Mixed methods	Households/caregivers/children	Actual consistent use: child aged 0-47 months always slept under a treated bed net in the malaria season in households owning nets	Quantitative (proxy mechanisms): Food sufficiency (poverty), father's education, mother's education, ANC attendance, number of young children, child age. Qualitative (direct participant-reported): Insufficient nets, distribution problems, a	Adjusted use (Cross River): Father education aOR=1.26 (1.07-1.49); Child <2 years aOR=1.58 (1.43-1.75); Mother ANC ≥4 visits aOR=1.27 (1.08-1.49); Enough food aOR=1.24 (1.02-1.51); ≤2 children under 3 aOR=1.47 (1.21-1.79) (Table 5, Page 6). Bauchi: Mother formal education + ANC ≥4 aOR=1.71 (1.38-2.12); Child <2 years aOR=1.09 (1.01-1.17) (Table 5, Page 6). Adjusted for clustering.	JBI; Some concerns
Exavery et al. 2014	IPTp	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual uptake of IPTp-SP doses during pregnancy	Health-service/communication: Counseling on dangers of malaria in pregnancy (yes/no); Timing of ANC initiation (first/second/third trimester). Structural/geographical: District of residence.	Optimal (2+) vs none: Counseling RRR=6.47 (4.66-8.97); First trimester ANC RRR=2.05 (1.18-3.57); Second trimester RRR=1.50 (0.98-2.29); Kahama RRR=3.26 (2.03-5.23); Kondoa RRR=1.55 (0.93-2.58); Mbozi RRR=1.25 (0.76-2.06); Singida RRR=1.62 (0.80-3.25); Sumbawanga RRR=1.00 (0.57-1.74) (Table 3, Page 6). Partial (1) vs none: Counseling RRR=4.24 (3.00-6.00); First trimester RRR=1.66 (0.94-2.94); Second trimester RRR=1.03 (0.66-1.59); Kahama RRR=3.26 (1.91-5.55); Kondoa RRR=2.11 (1.20-3.70); Mbozi RRR=2.63 (1.54-4.51); Singida RRR=2.86 (1.39-5.91);	JBI; Some concerns
Ezire et al. 2015	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual use of ITN/LLIN	Direct determinants: Confidence to hang or use a net (yes/no); Knowledge that use of ITN/LLIN can protect pregnant woman from malaria (yes/no	Adjusted logistic regression (use vs non-use): Confidence to hang/use net aOR=9.506 (2.276-39.700), p=0.002; Knowledge ITN protects pregnant women aOR=1.813 (1.142-2.877), p=0.012 (Table 3, Page 6). Non-significant: Location aOR=1.258 (0.763-2.072), p=0.368; Secondary+ education aOR=1.496 (0.926-2.415), p=0.099; Ever heard nets aOR=2.364 (0.532-10.497), p=0.258	JBI; Some concerns

Faye 2012	ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Actual use (previous-night use) and non-use of LLINs among those possessing nets	Direct participant-reported reasons for non-use: negligence, difficulty of use, prevents sleep/reduces ventilation, sold for food/ceremonies, cultural beliefs. Technical/environmental factors: net shape not adapted to sleeping conditions, h	Reasons for non-use among community leaders, caregivers, pregnant women (Figure 4, Page 5): Negligence: leaders ~45%, caregivers ~55%, pregnant women ~60%; Difficulty of use: leaders ~15%, caregivers ~20%, pregnant women ~15%; Prevents sleep/reduces ventilation: leaders ~20%, caregivers ~15%, pregnant women ~10%; Sold for food: leaders ~10%, caregivers ~5%, pregnant women ~8%; Sold for ceremonies: all groups ~2-3%; Cultural beliefs: all <1%. Possession vs use gap (Figure 2, Page 4): Any net: 76.7% possession vs 72.3% use (caregivers); 62.2% pos	JBI; Some concerns
Fernandez Montoya et al. 2023	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual LLIN use: slept under a net the night before the survey	Direct participant-reported: Not having a net; net not hung; dislike of net; too hot. Structural: Household size, wealth, location/administrative post, age, gender, IRS status	Reasons for non-use (Figure 5, Page 11): No net — 56.3-77.6%; Not hung — 14.7-23.3%; Dislike net — 2.9-4.9%; Too hot — 1.0-3.0%; Other — 8.0-12.5%. Optimal ownership by household size (Figure 1, Page 8): 1 member 73.1%; 2 members 64.3%; 3 members 60.0%; 4 members 55.4%; 5 members 47.9%; 6 members 42.2%; 7 members 35.3%; 8+ members 28.2%.	JBI; Some concerns
Finlay et al. 2017	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual LLIN use: slept under a LLIN the previous night	Knowledge (ITN prevents malaria), communication (hang-up information at distribution, post-campaign visit with nightly use message), household LLIN ownership, presence of children <5, household size, sleeping spaces, wealth (access model),	Adjusted use (Table 4, Page 15-16): Knowledge ITN prevents malaria aOR=3.58 (1.85-6.94), p=0.0002; More LLINs owned aOR=2.82 (1.85-4.3), p<0.0001; Children <5 aOR=2.05 (1.67-2.51), p<0.0001; Post-campaign visit with nightly message aOR=1.75 (1.26-2.43), p<0.0001; Hang-up info at distribution aOR=1.56 (1.41-1.74), p<0.0001; Household size aOR=0.81 (0.77-0.85), p<0.0001; Sleeping spaces aOR=0.55 (0.44-0.68), p<0.0001; Primary+ education aOR=0.74 (0.66-0.83), p<0.0001. Adjusted access (Table 3, Page 12): Pre-campaign visit aOR=1.20 (1.01-1.42), p=	JBI; Some concerns

Fokam et al. 2017	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual LLIN/ITN use: slept under a net the previous night	Participant-reported reasons (negligence, heat, suffocation, torn nets, not hung, washed, expired, seasonal use); environmental suitability (mosquito breeding sites); bednet density (number of nets); age groups; gender of household head; ed	Adjusted use (Table 6, Page 8): Female-headed vs male aOR=0.56 (0.31-0.99), p=0.048; Less suitable environment vs suitable aOR=0.46 (0.22-0.95), p=0.035; 3-4 nets vs 1-2 nets aOR=3.1 (1.47-6.55), p=0.003; 5+ nets vs 1-2 aOR=3.24 (0.91-11.58), p=0.07; Children <5 vs 6-25 years aOR=0.4 (0.29-0.54), p<0.0001; <5 vs 26-49 aOR=0.58 (0.42-0.81), p=0.001; <5 vs >50 aOR=0.36 (0.21-0.61), p<0.0001; Pregnant women vs others aOR=0.88 (0.24-3.21), p=0.849 (NS). Educational levels all NS.	JBI; Some concerns
Forty et al. 2021 – ITN ownership/utilization – Malawi	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	Actual ITN utilization and ownership	Radio ownership; exposure to malaria messages in previous six months	No radio: AOR 0.79, 95% CI 0.67–0.93. No malaria message exposure: AOR 0.74, 95% CI 0.64–0.87. Reference categories: radio ownership and malaria message exposure	JBI; Some concerns
Fru et al. 2021	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual LLIN use: slept under LLIN the previous night (SULPN); universal utilisation (all household members slept under	Participant-reported reasons: heat discomfort, forgetfulness, use of fan, difficulty to install, use of repellent; LLIN misappropriation (window screens, garden/fencing, drying, fishing); ownership indicators (association with use); age; ge	Adjusted ownership (Table 3, Page 5): Age ≤20 vs 41-60 — aOR=8.4 (1.7-41.1), p=0.01; Age 21-40 vs 41-60 — aOR=2.2 (0.9-5.7), p=0.09; Female vs male head — aOR=0.5 (0.2-1.0), p=0.04. Utilisation (Table 5, Page 7): Own ≥1 LLIN vs not — installation on all beds χ^2=125.07, p<0.001; universal utilisation χ^2=8.50, p=0.004. Coverage vs no coverage — installation χ^2=29.61, p<0.001; universal χ^2=20.09, p<0.001. Access vs no access — installation χ^2=43.23, p<0.001; universal χ^2=7.00, p=0.008. SULPN not significantly associated with any ownership indicato	JBI; Some concerns
Fuge et al. 2015 – ITN utilization – Ethiopia	ITN/LLIN	Cross-sectional quantitative	Pregnant/postpartum or reproductive-age women	ITN ownership, actual use, previous-night sleeping under ITN	Market unavailability; unsustainable distribution; damaged/old nets; holes; lack of installation knowledge	Not extracted for determinants. Education was associated with utilization but treated as contextual correlate only	JBI; Some concerns

Garcia-Basteiro et al. 2011	ITN/LLIN	Cross-sectional quantitative	Households/caregivers/children	Actual net use: slept under a net the night before the survey	Child age; urban/rural residence; child sick in last 14 days; household owning ITN vs untreated net; education of head; year (2008 vs 2009); knowledge of malaria transmission/prevention; IRS; number of children under 5	Adjusted use (Table 3, Page 6): Year 2009 aOR=0.44 (0.32-0.56), p<0.001; Rural aOR=0.32 (0.28-0.68), p=0.001; ITN in household 2008 aOR=3.37 (2.50-5.19); ITN in household 2009 aOR=6.64 (4.03-10.94); Child sick aOR=1.32 (1.03-1.69), p=0.030; Age 3 years aOR=0.57 (0.44-0.75); Age 4 years aOR=0.50 (0.39-0.65); Education 1-4 years aOR=1.58 (1.00-2.50); Education 5-9 aOR=1.70 (0.99-2.91); Education >9 aOR=1.58 (0.86-2.92). Adjusted ownership (Table 4, Page 8): Knowledge transmission aOR=1.75 (1.01-3.02), p=0.011; Knowledge prevention aOR=1.89 (1.44-	JBI; Some concerns

Supplementary Table S5. Qualitative study contribution and coding framework

Study	Country/ intervention	Design	Population	Extracted qualitative finding	Themes represented	Methodological limitations
Adongo et al. 2019	Ghana; ITN/LLIN	Qualitative	Providers/programme actors	I experienced a burning sensation... out of frustration I will move out (Central, p. 6). My baby died... Since that time, we sleep in it every day (caretaker, p. 7–8). I almost died... I decided to use the net regularly (Northern, p. 8).	Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	Qualitative; limited generalisability; possible social desirability; single time-point (March 2018); purposive sampling
Byagamy et al., (2022)	Uganda; ITN/LLIN	Mixed methods	Households/caregivers/children	Key informants reported that rectangular nets were difficult to hang/unhang daily in rural houses.	Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences	Cross-sectional design limits causal interpretation. Authors reported recall bias, classification bias and limited attitude measurement.
Alaii et al. (2003)	Kenya; ITN/LLIN	Qualitative	Providers/programme actors	Adoption depended on reducing uncertainty, addressing misconceptions and aligning implementation with social practices.	Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Household, social and cultural influences; Health-service contact and provider behaviour	Findings are context-specific to one Kenyan community. Some perceptions may have changed as familiarity with ITNs increased.

Asingizwe et al. 2019 – LLIN use and IRS acceptance – Rwanda	Rwanda; Combined ITN/LLIN + IRS	Mixed methods	Households/caregivers/children	Heat, irritation and bed bugs discouraged LLIN use, while perceived malaria consequences sometimes outweighed discomfort. Distrust of unfamiliar or poorly performing sprayers caused reluctance to accept IRS.	Access, supply and delivery reliability; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour	Cross-sectional self-report; “consistent use” not measured longitudinally; ordinal outcomes analysed using linear regression; clustering not clearly addressed; qualitative component conducted only in Ruhuha; rainy-season timing may have increased perceived malaria risk
Bam et al. 2023 – RTS,S vaccine acceptance – Ghana	Ghana; Malaria vaccine	Qualitative	Households/caregivers/children	A caregiver explained that information received at the health centre and the nurse’s presentation of the vaccine as safe influenced her decision to allow vaccination. Others linked continued acceptance to absence of severe effects and perceived good health after vaccination.	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour	Acceptors-only purposive sample; no refusers or non-completers; ten participants; researcher reflexivity not reported; dose receipt and completion not verified; transferability limited. The authors acknowledged that only caregivers whose children were receiving the vaccine were included.
Baume et al. 2009 – ITN use and non-use – Ethiopia	Ethiopia; ITN/LLIN	Mixed methods	Households/caregivers/children	The most frequent reported reason for non-use was belief that the ITN was no longer effective or required re-treatment. Participants also described lack of hanging space, unsuitable rectangular designs, poor net condition, low malaria risk and saving unused nets for later.	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences	Cross-sectional design; purposive stratification and exclusion of extremely inaccessible and pastoral communities; possible residual socioeconomic confounding; multiple statistical testing; limited qualitative-analysis reporting; inconsistent ITN denominators; previous-night self-report only.
Begashaw et al. (2026)	Ethiopia; ITN/LLIN	Mixed methods	Households/caregivers/children	Participants linked irregular or non-use to feared chemical harm, doubts about effectiveness, insufficient space, damaged nets, dry-season heat, seasonal risk perception and repurposing.	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Habit, memory, seasonality and continuity	Cross-sectional design; previous-night self-report; dry-season data collection; hanging observation did not verify actual sleeping; no reported adjustment for kebele clustering; short qualitative interviews; limited reflexivity; inconsistent adjusted estimates. The authors acknowledged the seasonal limitatio

Belay and Deressa 2008 – ITN acquisition and use – Ethiopia	Ethiopia; ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Participants described insufficient household net supply, unfair distribution and weak family or provider encouragement. A CHW acknowledged: “we do not encourage our wives to regularly use ITNs while sleeping.	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Household, social and cultural influences; Health-service contact and provider behaviour	Cross-sectional design; one-night outcome; purposive selection of the district; possible under-identification of early pregnancy; direct barriers were not entered into the adjusted model; cluster sampling was not clearly accounted for; qualitative saturation, reflexivity and exact FGD sample were not reported. The authors acknowledged that previous-night use may not reflect long-term use.
Berthe et al. 2014 – Continued and seasonal net use – Senegal	Senegal; ITN/LLIN	Mixed methods	Households/caregivers/children	Participants linked low dry-season mosquito density to seasonal non-use. Some rarely or never used nets because they were unaccustomed, considered use inconvenient or wanted to preserve the net. In contrast, many continued use despite insecticide irritation after airing or washing the net.	Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Household, social and cultural influences; Habit, memory, seasonality and continuity	Small purposive net-owning sample; possible social-desirability bias because some respondents mistook researchers for campaign distributors; no representative sampling; limited quantitative analysis; unclear participant attrition across phases; ITN/LLIN terminology was inconsistent; reflexivity and saturation were not reported.
Binka & Adongo 1997	Ghana; ITN/LLIN	Mixed methods	Households/caregivers/children	When I was a child there were certain leaves called mosquito leaves... These days the mosquitoes are different, they no longer fear this grass (compound head). What I have observed about the use of these nets is that when the mosquitoes touch the nets they die. I have seen the mosquitoes die on my net with my naked eyes (FGD participant). We always use the nets... even if the weather is very warm we still sleep under the net... The mosquitoes are terrible when the weather is warm (FGD participant near irrigation canals). A woman has children and one of them soils the net... will not leave the faeces on the net but has to wash off the faeces.	Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	1. Cross-sectional design cannot establish causation 2. Self-reported data subject to social desirability bias 3. Side effects likely underreported due to cultural reluctance to complain about free items 4. FGDs not systematically linked to quantitative findings 5. Study conducted in 1997; may not reflect current context (pre-LLIN era, different distribution mechanisms) 6. Free distribution may ha

Brooks et al. 2017	Democratic Republic of the Congo; ITN/LLIN	Mixed methods	Special populations	The state of our tents doesn't encourage the use of bed nets because the tent is small and the net falls on the floor, so each time we have to wash it but lack of soap is an issue (IDP). NGOs should think more about food before any bed net distribution because the bed nets that they give out aren't even suited to our tents (IDP). I used to use a bed net regularly before I became displaced. Nowadays, I don't use it because I sold the net I received at the antenatal clinic because of food problems (IDP). We told our wives to sell the bed net they received in the market because we are heads of households without work. We can't fulfill our basic	Access, supply and delivery reliability; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour	1. Cross-sectional design cannot establish causation 2. Self-reported data subject to social desirability bias (selling nets is prohibited, likely underreported) 3. Single IDP camp limits generalisability to other settings 4. HRP2-based RDT may overestimate malaria prevalence (persistent antigen up to 4 weeks) 5. No microscopy/PCR for confirmation due to resource limitations 6. Wealth index specif
Chukwuocha et al. 2010 – ITN use in pregnancy – Nigeria	Nigeria; ITN/LLIN	Qualitative	Pregnant/postpartum or reproductive-age women	Participants identified cost and non-availability as major constraints. More than half feared that net-treatment chemicals harmed adults, children or pregnancy. Users reported heat and suffocation. Women reported that husbands did not prioritise purchasing nets and could question the source of money used by women to buy them.	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour	Unclear recruitment strategy; no saturation assessment; no detailed qualitative-analysis procedure; no reflexivity or researcher positioning; treated and untreated nets not clearly distinguishable; use timeframe absent; questionnaire component not reported; limited separation of users and non-users

Dambach et al. 2018	Burkina Faso; Larval source management	Qualitative	General/community population	We realized that there are less mosquitoes now than before because of the spraying activity... the malaria cases in children were not as many as before (FGD 1, 100% intervention). Before, during the winter, our children cried at night because of mosquitoes... but nowadays everyone is sleeping peacefully (FGD 5, 50% intervention). The community appreciates the activity very much, and everyone recognizes that any initiative to eliminate mosquitoes is a good thing for us (FGD 3, 100% intervention). I inquired and was reassured that the larvicide was harmless to humans and animals. It's only to fight the mosquitoes (FGD 3, 100% intervention). Not	Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	1. Convenience sampling for FGDs may introduce selection bias 2. Snowball sampling for key informants may bias toward positive views 3. Social desirability bias likely (participants may give positive responses to please researchers/workers connected to health research centre) 4. Language barriers (French/Dioula translation) 5. Limited demographic details of participants 6. Saturation not explicitl
Doku et al. 2016	Ghana; IPTp	Mixed methods	Pregnant/postpartum or reproductive-age women	Some of the pregnant women were not given SP at their first visit (32%). It was observed that most health facilities did not have clean water supply (67%). SP shortage, suspension of IPT programme during shortage, and non-provision of IPT services during outreach could contribute to the high dropout rate. Some women indicated that they were shouted at the health facility (17.4%). None of the facilities factored in malaria in pregnancy and intermittent preventive treatment of malaria in pregnancy in their quarterly health education programme.	Access, supply and delivery reliability; Knowledge, communication and counselling; Economic constraints and opportunity costs; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	1. Cross-sectional design cannot establish causation 2. Self-reported data subject to recall and social desirability bias 3. Single metropolis (Tamale) limits generalisability 4. Data collected in 2011; may not reflect current context 5. Small sample size for pregnant women (n=184) 6. No adjusted statistical analysis (descriptive only) 7. No multivariate analysis to control for confounders 8. No q

Dun-Dery et al. 2022 – ITN use among pregnant women – Ghana	Ghana; ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Previous-night non-users described heat, suffocation, itching, facial or body rashes, inability to hang rectangular nets, landlords prohibiting nails, lack of support and failure to receive a net when distribution staff were unavailable	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	Facility-based selection; third-trimester ANC attendees only; self-reported one-night outcome; unexplained reduction from 710 to 664 participants; purposive selection of the urban district; no reported adjustment for facility clustering or sampling weights; qualitative saturation and researcher reflexivity not reported; possible reverse causation between ANC exposure, knowledge and use
Dun-Dery et al. 2021 – IPTp-SP uptake – Ghana	Ghana; IPTp	Mixed methods	Pregnant/postpartum or reproductive-age women	Women reported arriving at facilities after difficult journeys only to find SP unavailable, being asked to return or purchase it privately, encountering absent or neglectful staff, experiencing adverse effects, lacking information and support and missing doses following relocation	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	Facility-based selection; inclusion only from 25 weeks' gestation; purposive selection of the urban district; incomplete national representativeness; self-reported components of uptake; no clear adjustment for clustering by facility; qualitative saturation and reflexivity not reported; contradictory interpretation of first-ANC timing; major error in reporting three-dose coverage
Ekholuenetale et al. 2026 – PMC acceptability and receipt – Nigeria	Nigeria; Chemoprevention (SMC/PMC)	Qualitative	Households/caregivers/children	Caregivers reported bringing children for PMC because they believed it prevented malaria and reduced fever or illness. Participants said flavoured dispersible tablets were easier for children to take, free provision encouraged attendance and provider endorsement increased confidence. Lack of transport funds could prevent attendance	Access, supply and delivery reliability; Perceived effectiveness, risk, safety and trust; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour	Clinic-based recruitment; probable exclusion of caregivers who had disengaged or refused immunisation; intervention and control perspectives not always separated; no quantified uptake or refusal; no verification of individual receipt or schedule completion; many hypothetical acceptability statements; early evaluation after only three months; possible social-desirability bias; translation-related l

Ernst et al. 2016	Kenya; ITN/LLIN	Mixed methods	Households/caregivers/children	Participant quotes (Table 2, Page 5; Pages 6-8): The health clinic is far from the community members, up to 7 km (H3); Once distributed...no chances of getting replacement unless you dig deep into your pockets (L9); Some kinds of the nets have less effective chemical repellent (L9); Once one gets into contact with the net...skin rashes are developed (L7); We don't always use a bed net because during the dry season it is hot (H4); Some don't really believe that mosquito bites from infected mosquito causes malaria (H2); Those who distributed them never taught us how to use them (L8); A bed net is a multi-purpose item. Some use it for decoration	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	1) Self-reported use (social desirability bias); 2) Rare outcome of non-use limited multivariable modelling; 3) Generalisability limited to two study sites; 4) No information on housing construction or other malaria risk factors; 5) Household definition differed from KMIS, affecting comparability
Eteng et al. 2014	Nigeria; ITN/LLIN	Mixed methods	Households/caregivers/children	I have more than six children with my wives but I was only given two nets (Bauchi male); Some health workers keep the nets that are supposed to be for distribution (Cross River male); I have no card so I was not given the bed net (Bauchi female); His cow ate the net and fell down dead soon afterwards (Bauchi male); Some believe that since the net can kill a mosquito it can kill a human being too (Bauchi female); poor ventilation and overcrowding inhibits use	Access, supply and delivery reliability; Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour	Cross-sectional design prevents causality; limited economic status information; study not designed to assess campaign effectiveness; no before-after comparison; self-reported use
Faye 2012	Niger; ITN/LLIN	Mixed methods	Pregnant/postpartum or reproductive-age women	Les moustiquaires de fortune seraient plus adaptées à leurs habitudes de couchage (makeshift nets better adapted to sleeping habits). Nets used as decoration, kept in original packaging for 2 years, or spread on mattresses to kill bedbugs. Rectangular nets not adapted to outdoor sleeping during hot season; conical nets preferred for smaller rooms. Limited knowledge that mosquitoes transmit malaria; nets seen as protection against nuisance, not disease	Knowledge, communication and counselling; Perceived effectiveness, risk, safety and trust; Product design, comfort and practical use; Economic constraints and opportunity costs; Household, social and cultural influences; Health-service contact and provider behaviour; Habit, memory, seasonality and continuity	Descriptive analysis only (no adjusted statistical associations); reliance on self-reported reasons; cross-sectional design prevents causality; lack of multivariate analysis

Supplementary Table S6. Pooling-feasibility assessment.

Candidate synthesis group	Available evidence	Main incompatibilities	Decision
ITN/LLIN use determinants	47 studies	Previous-night, weekly, regular, consistent and ever-use outcomes; different determinant scales; adjusted and unadjusted measures; heterogeneous populations and reference groups	No meta-analysis
IPTp uptake/completion determinants	13 studies including combined interventions	Different dose thresholds (≥1, ≥2, ≥3 or optimal doses), pregnancy periods, ANC definitions and effect measures	No meta-analysis
SMC/PMC receipt or completion	4 studies	Different age groups, rounds, delivery modes and receipt/completion definitions; qualitative and descriptive evidence mixed with one comparative trial	No meta-analysis
Malaria-vaccine uptake	2 studies	One quantitative uptake study and one qualitative acceptance study; no common effect measure	No meta-analysis
IRS/community vector control	2 intervention categories represented by very few studies	Different interventions and predominantly qualitative acceptance outcomes	No meta-analysis
Implementation strategies across interventions	8 studies	Different interventions, comparators, designs, follow-up periods and behavioural endpoints	No meta-analysis

Supplementary Table S7. Evaluated implementation strategies.

Study	Strategy	Behavioural finding	COM-B/ecological interpretation	Appraisal
Afolaranmi et al. (2015)	Free LLIN provided to every participant, combined with health education on benefits and consistent use, demonstration of mounting and use, and pamphlets/posters as reminders; follow-up after three months.	Previous-night use increased from 9/84 (10.7%) to 69/84 (82.1%). Consistent use increased from 5/84 (6.0%) to 41/84 (48.8%).	Physical opportunity: free LLIN availability. Psychological capability: health education and demonstration. Reflective motivation: information on benefits and consistent use. Programme and individual levels.; Economic; communication; practical; health-service/programme	ROBINS-I; Critical concern
Amoran et al. 2012 – ITN health education – Nigeria	A structured educational programme adapted from the Nigerian National Malaria Control Programme. It covered malaria transmission, prevention, treatment, attitudes and practices. Delivery methods included one-day training sessions, lectures, exercises, posters, a storybook and Yoruba-language signs showing ITN benefits and use. Participants were org	Intervention: 29.5% before and 72.6% after. Control: 27.5% before and 31.6% after.	Non-randomised allocation with only one intervention and one control community; no adjustment for confounding; self-reported and undefined “ever use” outcome; no assessor blinding; differential attrition; possible contamination between communities; unexpected free ITN distribution in both communities; no formal analysis of the difference in change between groups; and numerical inconsistencies in reported results. The authors acknowledged external interventions and inability to guarantee prevention of crossover.; Communication and health-service/programme facilitator. The intervention also targeted behavioural capability and motivation.	ROBINS-I; High concern

Amoran et al. (2011)	Insecticide-treated nets (type not specified)	Ever use: 23.8% (156/656); Current use: 4.3% (28/656) (p. 3-4).	COM-B: Psychological capability (perceived effectiveness); Reflective motivation (perceived risk from malaria frequency). Ecological level: Individual (perceptions, experience).; Perceptual; behavioural; economic; communication	JBI; High concern
Antwi et al. 2016 – Extended SMC uptake – Ghana	Five monthly cycles of sulfadoxine-pyrimethamine plus amodiaquine over three days; first dose delivered at community gatherings or homes and remaining doses administered by caregivers.	Seven interviewed caregivers had optimal uptake and six had suboptimal uptake. Overall programme uptake prevalence was not reported in this article.	Capability: understanding chemoprevention and dosing. Opportunity: communication, distance, delivery access and social support. Motivation: trust, perceived need, side-effect beliefs and treatment norms. Levels: individual, household, community and programme.; Perceptual, social, practical, communication, health-service and geographical.	JBI; Some concerns
Aoki et al. 2025 – ITN use and IPTp completion – Angola	Previous-night ITN use; IPTp-SP dose receipt; MCH-HB containing educational messages and maternal-health records.	ITN use: 5,226/8,336 (62.7%). IPTp 3+: 4,060 (48.7%). IPTp 4+: 1,656 (20.5%). Both ITN and IPTp 3+: 2,644 (31.7%).	Capability: MCH-HB educational content. Opportunity: timely ANC contact. Levels: individual and health-service/programme.; Health-service timing and communication/programme.	RoB 2; Some concerns
Barry et al. 2018 – SMC delivery and completion – Mali	Complete SMC receipt, partial receipt and non-receipt.	Full three-round completion was 74.1% with door-to-door delivery versus 60.1% with fixed-point delivery. Non-receipt of any round was 1.5% versus 5.8%, respectively.	Physical opportunity: household access through door-to-door delivery. Programme level: delivery platform. COM-B domain: Opportunity; Health-service and programme delivery.	RoB 2; Some concerns
Clark et al. 2016 – Targeted LLIN distribution and use – Uganda	Two polyester LLINs treated with deltamethrin were delivered free of charge to each available household through direct house-to-house distribution. Education was provided during distribution and through later health-worker visits.	Two LLINs were received by 98% of eligible households. Previous-night use was 47% at three months and 21% at both 15 and 18 months. Among children under five, use declined from 50% at three months to 20% at 18 months.	Physical Opportunity: an LLIN present and accessible in the household. Programme/47rganizational level: direct free house-to-house distribution. Individual, household and community levels.; Health-service/programme delivery and household physical opportunity	ROBINS-I; High concern
Zegers de Beyl et al. 2018 – Continuous ITN distribution – Ghana	Continuous distribution through first ANC visits, measles-II child welfare visits and selected primary-school classes. Radio messages and dramas accompanied school distribution, while health-facility recipients received malaria and net-use information.	At endline, 23.8% of households owned at least one ITN attributed to any continuous-distribution channel. Among households eligible across the two assessed school rounds, 37.5% reported receiving a school ITN. Receipt was 24.8% among households with a pregnant woman or infant and 20.2% among households with a child aged 12–35 months	Physical Opportunity: free nets available through health facilities and schools. Social Opportunity/Communication: radio messaging and counselling. Organisational level: timing, channel selection, eligibility, coordination, training and programme reach.; Health-system and programme-delivery opportunity	ROBINS-I; High concern

Diawara et al. 2022	Sulfadoxine-pyrimethamine (SP) + amodiaquine (AQ); four monthly rounds (July-October); children 60-120 months received 1.5 tablets SP + 3×1.5 tablets AQ; door-to-door delivery by CHWs/CBDs; first dose observed, remaining doses administered by caregiver at home	Coverage: 89.1% (2017) and 81.2% (2018) received all 3 days of treatment across 4 rounds. Adverse events: drowsiness 11.8%, vomiting 9.1%, diarrhea 8.8%, abdominal pain 5.1%, itching 2.1%.	Opportunity: Physical opportunity (travel barriers, access to delivery); Social opportunity (information availability); Motivation: Reflective motivation (adverse events as deterrents); Ecological levels: Individual, Household, Health-service/programme; Practical (travel); Communication (lack of information); Product-related/perceptual (adverse events)	JBI; Some concerns	

Supplementary Table S8. Study-level methodological appraisal.

Study	Design	Tool	Original overall judgement	Appraisal narrative/key limitations
Abiache et al. (2025)	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Cross-sectional design; self-reported uptake; single district; clustering not adjusted; missing-data handling not reported; inconsistent vaccinated count and dose totals. The authors acknowledged recall bias and limited generalisability.
Adeneye et al. (2014)	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Use was poorly defined and partly combined with ownership; determinants were analysed mainly descriptively; no confounding adjustment; two LGAs only; mixed clinic and household sampling.
Adeola and Okwilagwe (2015)	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Purposive sampling; very small faith-clinic group; self-reported behaviour; ITN and IPTp outcomes combined in some analyses; unclear composite acceptance and utilisation scoring; no confidence intervals for regression coefficients; direct barrier and facilitator items were not separately tested against specific outcomes; health-facility type was confounded by location because faith clinics were only urban
Afolaranmi et al. (2015)	Intervention/programme evaluation	ROB INS-I	Critical concern	ROBINS-I: Critical concern No control group; intervention components bundled together; self-reported use; small single-facility sample; no adjustment for secular or Hawthorne effects; three-month follow-up only; regression estimates for knowledge, season and ventilation were extremely unstable; no sustained long-term assessment
Agyeman et al. (2023)	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Cross-sectional design; facility-based sample; excluded miscarriages, preterm deliveries, women with HIV and women with G6PD deficiency; possible selection bias; retrospective reporting; no direct participant-reported reasons; unclear use of ordered versus binary logistic regression; sample accounting is inconsistent because 1,188 minus 46 exclusions does not equal the reported 1,146 analysed.
Adongo et al. 2019	Qualitative	JBI	Low concern	JBI qualitative checklist: Low concern Qualitative; limited generalisability; possible social desirability; single time-point (March 2018); purposive sampling
Byagamy et al., (2022)	Mixed methods	JBI	Some concerns	JBI Analytical Cross-sectional Checklist. Overall judgement: Some concerns. Cross-sectional design limits causal interpretation. Authors reported recall bias, classification bias and limited attitude measurement.
Falade CO, Ajayi IO. (2009)	Cross-sectional quantitative	JBI	Some concerns	JBI Analytical Cross-sectional Checklist. Overall judgement: Some concerns. Single rural LGA limits generalisability. Cross-sectional design prevents causal inference. Authors noted hospital/clinic-based sampling may exclude women not accessing ANC.
Alaii et al. (2003)	Qualitative	JBI	Some concerns	JBI Qualitative Research Checklist: Moderate concerns Findings are context-specific to one Kenyan community. Some perceptions may have changed as familiarity with ITNs increased.

Alfonso (202)	Discrete choice experiment	JBI + DCE /JBI	Some concerns	DCE quality checklist / JBI for cross-sectional. Overall judgement: Some concerns. Selection: adequate (stratified two-stage cluster). Outcome measurement: DCE with real payment validation improves validity; however, hypothetical bias remains possible. Confounding: controlled via experimental design and regression. Analysis: appropriate. External validity: middle-income households only; not generalisable to poor populations. Hypothetical DCE with real payment only for subset; middle-income population only (not generalisable); possible social desirability bias; possible anchoring (48.25% always-buyers); unfamiliarity with R1p shape; price range limited (may underestimate elasticity at higher prices); no measure of actual sustained use.
Amoran et al. 2012 – ITN health education – Nigeria	Intervention/programme evaluation	ROBINS-I	High concern	ROBINS-I. Overall judgement: High concern. Non-randomised allocation with only one intervention and one control community; no adjustment for confounding; self-reported and undefined “ever use” outcome; no assessor blinding; differential attrition; possible contamination between communities; unexpected free ITN distribution in both communities; no formal analysis of the difference in change between groups; and numerical inconsistencies in reported results. The authors acknowledged external
Amoran et al. (2011)	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Selection: some concerns (low response rate 43.7%, total sampling of consenting only). Outcome measurement: some concerns (self-reported use, recall bias). Determinant measurement: some concerns (single-item measures, not validated). Confounding: partially adjusted. Analysis: appropriate. External validity: limited to youth corps members Low response rate (43.7%) with potential non-response bias; cross-sectional design prevents causation; single-item measures for perceived effectiveness and malaria frequency; recall bias for ever use; youth corps members are not representative of all Nigerian youth; 2006 data may not reflect current situation; current use was assessed prior to camp (not night-before).
Ampofo 2023 – IPTp-SP and ITN uptake – Ghana	Cross-sectional quantitative	JBI	Some concerns	Revised JBI analytical cross-sectional tool: Some concerns. Single tertiary facility; cross-sectional design; previous-night ITN use used as a proxy for pregnancy use; self-reported ITN behaviour; arbitrary and unvalidated knowledge cut-off; limited socioeconomic assessment.
Anikwe 2020 – LLITN use in pregnancy – Nigeria	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Single tertiary facility; consecutive booking attendees only; women without household net access excluded; self-reported use; no adjusted analysis; possible recall and social-desirability bias.
Ankomah 2012 – ITN use among pregnant women – Nigeria	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist: Some concerns. Cross-sectional design; self-reported previous-night use; only 21 supported states included; use analysis restricted to net owners; composite misconception measures were insufficiently described; survey weighting and adjustment for cluster sampling were not clearly reported.
Antwi et al. 2016 – Extended SMC uptake – Ghana	Intervention/programme evaluation	JBI	Some concerns	JBI Qualitative Checklist: Some concerns. Actual ingestion of home doses was not verified; social-desirability risk; no suboptimal rural caregiver with no health facility attended interview; saturation not reported; caregiver FGDs included active-treatment and placebo participants; transcripts were not returned to participants.
Aoki et al. 2025 – ITN use and IPTp completion – Angola	Intervention/programme evaluation	RoB 2	Some concerns	Cochrane RoB 2 for the cluster-randomised handbook effect: Some concerns. ANC attendees only; ITN use self-reported; limited measurement of knowledge and health-facility factors; COVID-19 may have affected service use; supplementary analyses unavailable
Arnaldo et al., 2018	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns: limited rural representation (29.4% of sample vs. higher rural population in district), possible overestimation of coverage due to under-representation of rural women at higher risk of low uptake; HIV-positive women excluded; self-report recall within 3 months may introduce recall bias but minimised; unclear adjustment variables specification; cross-sectional design cannot establish causati 1. Under-representation of rural population (29.4% vs. district demographics), potentially overestimating IPTp coverage 2. HIV-positive women excluded, limiting generalisability 3. Dose receipt based on self-report and ANC records, not directly observed administration 4. Cross-sectional design, cannot establish causation 5. Adjustment variables in multivariate analysis not fully specified 6. No assessment of SP stockouts or provider-level barrier

Asingizwe et al. 2019 – LLIN use and IRS acceptance – Rwanda	Mixed methods	MMAT + JBI	Some concerns	JBI analytical cross-sectional and qualitative checklists with MMAT integration principles: Some concerns. Cross-sectional self-report; “consistent use” not measured longitudinally; ordinal outcomes analysed using linear regression; clustering not clearly addressed; qualitative component conducted only in Ruhuha; rainy-season timing may have increased perceived malaria risk
Aweis et al. 2023 - Long-lasting insecticidal nets (LLINs) use among	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns: Self-reported outcomes (previous-night use, income) subject to recall and social desirability bias; sample size not achieved (409 vs. 544 target) due to COVID-19; cross-sectional design cannot establish causation; only 155 of 409 households owned nets (limited sample for utilization analysis); missing adjustment for income in multivariable utilization model; univariable findings for marital 1. Inability to reach target sample size (409 vs. 544) due to COVID-19 restrictions 2. Self-reported outcomes (net use, income, washing frequency) subject to recall and social desirability bias 3. Limited sample for utilization analysis (only 237 nets in 155 households) 4. Cross-sectional design cannot establish causation 5. Income not included in multivariable utilization model (despite being significant in ownership analysis) 6. Only previous-n
yeni et al. 2020	Case-control	JBI	Some concerns	JBI analytical cross-sectional checklist (case-control design); Some concerns: Self-reported data subject to recall bias; cases identified through RDT at health facilities (selection bias possible); case-control design may not represent general population; matching only for age and sex; odds ratios from 2x2 tables may not fully adjust for confounders; limited sample size; unclear blinding of interviewers to case/control status 1. Self-reported compliance data subject to recall and social desirability bias (Page 10) 2. Cases identified through health facility records may not represent all malaria cases in community 3. Case-control design; matching only for age and sex 4. Odds ratios from Fisher Exact test may not fully adjust for confounding 5. Single county in South Sudan; limited generalisability 6. Treatment and prevention outcomes combined in analysis 7. Illiteracy
Ayubu and Kidima 2017 – IPTp-SP uptake – Tanzania	Cross-sectional quantitative	JBI	High concern	JBI case-control checklist: High concern. Purposive clinic selection; cross-sectional self-report; small third-trimester subgroup; no multivariable adjustment; unclear sampling procedure; substantial inconsistencies in dose denominators and percentages. The authors acknowledged the small third-trimester sample and possible sampling bias.
Azizi et al. (2018)	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns: Health facility-based recruitment excludes women who deliver at home without postnatal care (20% of births); cross-sectional design cannot establish causation; recall bias inherent in self-report but minimised by ANC card verification; only two facilities sampled; HIV-positive women excluded; purposive selection of Zomba district due to low uptake limits generalisability; unadjusted associa 1. Health facility-based recruitment (Page 11) - excludes women delivering at home without postnatal care (20% of births in Malawi) 2. Only two health facilities sampled (one urban, one rural) 3. Cross-sectional design cannot establish causation 4. Recall bias possible despite ANC card verification 5. Purposive selection of Zomba district (low uptake) limits generalisability to other districts 6. HIV-positive women excluded (Page 2) 7. Health sys
Babalola et al. 2022 – Consistent ITN use – Cameroon, Côte d’Ivoire and Sierra Leone	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist: Some concerns. Cross-sectional design; self-reported behaviour and determinants; households without ITNs excluded; limited geographical representativeness in Cameroon and Sierra Leone; survey timing differed relative to net-distribution campaigns; no confidence intervals; possible ITN misclassification.
Badolo et al. 2025 – Previous-night ITN use – Burkina Faso	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Cross-sectional design; self-reported use; security-related replacement of districts and enumeration zones; unclear analytical unit; no reported adjustment for household or district clustering; exact behavioural denominator not reported.
Balami et al. 2019 – Weekly LLIN use – Nigeria	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Single-hospital ANC sample; cross-sectional self-report; LLIN ownership/access omitted from the model; single ordinal behavioural item; only 8.3% of behavioural variance explained; no confounding adjustment within the structural model.
Balami et al. 2018 – Weekly ITN use – Nigeria	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Cross-sectional temporality; self-reported use; single-facility ANC sample; scale categories collapsed; behavioural access and net ownership not adequately controlled; several inconsistent table entries.

Bam et al. 2023 – RTS,S vaccine acceptance – Ghana	Qualitative	JBI	Some concerns	JBI qualitative checklist: Some concerns. Acceptors-only purposive sample; no refusers or non-completers; ten participants; researcher reflexivity not reported; dose receipt and completion not verified; transferability limited. The authors acknowledged that only caregivers whose children were receiving the vaccine were included.
Barry et al. 2018 – SMC delivery and completion – Mali	Intervention/programme evaluation	RoB 2	Some concerns	Cochrane RoB 2 for cluster-randomised trials: Some concerns. Open-label delivery; caregiver-reported completion; possible recall bias; only 2,035 of 5,296 randomised children were surveyed; unclear post-randomisation recruitment effects; retrospective trial registration; inconsistent arm denominators
Baume et al. 2009 – ITN use and non-use – Ethiopia	Mixed methods	MM AT + JBI	High concern	JBI analytical cross-sectional and qualitative checklists with MMAT integration principles: High concern. Cross-sectional design; purposive stratification and exclusion of extremely inaccessible and pastoral communities; possible residual socioeconomic confounding; multiple statistical testing; limited qualitative-analysis reporting; inconsistent ITN denominators; previous-night self-report only.
Begashaw et al. (2026)	Mixed methods	MM AT + JBI	High concern	JBI analytical cross-sectional and qualitative checklists, with MMAT integration principles: High concern. Cross-sectional design; previous-night self-report; dry-season data collection; hanging observation did not verify actual sleeping; no reported adjustment for kebele clustering; short qualitative interviews; limited reflexivity; inconsistent adjusted estimates. The authors acknowledged the seasonal limitatio
Belay and Deressa 2008 – ITN acquisition and use – Ethiopia	Mixed methods	MM AT + JBI	High concern	JBI analytical cross-sectional and qualitative checklists with MMAT integration principles: High concern. Cross-sectional design; one-night outcome; purposive selection of the district; possible under-identification of early pregnancy; direct barriers were not entered into the adjusted model; cluster sampling was not clearly accounted for; qualitative saturation, reflexivity and exact FGD sample were not reported. The authors acknowledged that previous-night use may not reflect long-term use.
Berkessa et al. 2016 – Household ITN use and non-use – Ethiopia	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Cross-sectional design; household use was self-reported without observation; inconsistent behavioural definitions and denominators; only 20 households provided direct non-use reasons; no clear adjustment for clustered multistage sampling; restricted generalisability because all sampled households had previously received free ITNs. The authors acknowledged possible overestimation from self-report.
Berthe et al. 2014 – Continued and seasonal net use – Senegal	Mixed methods	MM AT + JBI	Some concerns	JBI qualitative checklist and JBI analytical cross-sectional checklist, with MMAT integration principles: Some concerns. Small purposive net-owning sample; possible social-desirability bias because some respondents mistook researchers for campaign distributors; no representative sampling; limited quantitative analysis; unclear participant attrition across phases; ITN/LLIN terminology was inconsistent; reflexivity and saturation were not reported.
Biadgilign et al. 2015 – ITN retreatment and non-retreatment – Ethiopia	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern. Unclear retreatment denominator; self-reported behaviour; cross-sectional design; no adjusted analysis of actual retreatment determinants; very small number of retreaters; inconsistent classification of LLINs and retreatable ITNs; numerical reporting errors.
Binka & Adongo 1997	Mixed methods	JBI	Some concerns	JBI analytical cross-sectional checklist + JBI qualitative checklist; Some concerns 1. Cross-sectional design cannot establish causation 2. Self-reported data subject to social desirability bias 3. Side effects likely underreported due to cultural reluctance to complain about free items 4. FGDs not systematically linked to quantitative findings 5. Study conducted in 1997; may not reflect current context (pre-LLIN era, different distribution mechanisms) 6. Free distribution may have influenced reported acceptance and willingness

Brooks et al. 2017	Mixed methods	JBI	Some concerns	JBI analytical cross-sectional checklist + JBI qualitative checklist; Some concerns 1. Cross-sectional design cannot establish causation 2. Self-reported data subject to social desirability bias (selling nets is prohibited, likely underreported) 3. Single IDP camp limits generalisability to other settings 4. HRP2-based RDT may overestimate malaria prevalence (persistent antigen up to 4 weeks) 5. No microscopy/PCR for confirmation due to resource limitations 6. Wealth index specific to IDP context, not comparable to other setting
Chivasa et al. 2026	Retrospective observational	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns: 1. Retrospective design restricts causal inference 2. Self-reported LLIN use subject to recall/social desirability bias 3. 11% of cases excluded due to incomplete data (potential non-random bias) 4. Very few LLIN users (n=51) limiting statistical power 5. Multivariate logistic regression found no significant predictors 6. Random Forest model failed to correctly classify any positive LLIN use (sensitivity=0%) 7. SMOTE applied but model performance
Cho et al. 2024 – LLIN use – Cameroon	Cross-sectional quantitative	Unclear/not recorded	Unclear	LLIN ownership and installation on all beds were statistically connected to actual previous-night and regular use, although unclear regression coding prevents firm interpretation of the direction and magnitude of the associations Cross-sectional design; self-reported use; social-desirability and recall bias; inaccessible areas excluded; some convenience sampling; ownership not physically verified; unclear model-selection process; effect-direction ambiguity; inconsistent denominator for household-head previous-night use
Chukwuocha et al. 2010 – ITN use in pregnancy – Nigeria	Qualitative	JBI	High concern	JBI qualitative checklist: High concern Unclear recruitment strategy; no saturation assessment; no detailed qualitative-analysis procedure; no reflexivity or researcher positioning; treated and untreated nets not clearly distinguishable; use timeframe absent; questionnaire component not reported; limited separation of users and non-users
Clark et al. 2016 – Targeted LLIN distribution and use – Uganda	Intervention/programme evaluation	ROBINS-I	High concern	ROBINS-I: High concern No concurrent comparison group; repeated cross-sectional individual samples; self-reported ownership and use; possible reporting and recall bias; small population; unavailable supplementary files; no measured reasons for net attrition; seasonal differences between use surveys
Creach et al. 2016	Retrospective observational	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns 1. Self-reported compliance may overestimate actual compliance 2. Retrospective design 3. Military population may not be generalisable to civilian settings 4. Missing values for alcohol consumption (12%) 5. Single mission/operational context 6. Outcome dichotomization may lose detail 7. Unmeasured confounders possible 8. Social desirability bias in reporting 9. TIC and nights worked not significant in multivariate model
Dambach et al. 2018	Qualitative	JBI	Some concerns	JBI qualitative checklist; Some concerns 1. Convenience sampling for FGDs may introduce selection bias 2. Snowball sampling for key informants may bias toward positive views 3. Social desirability bias likely (participants may give positive responses to please researchers/workers connected to health research centre) 4. Language barriers (French/Dioula translation) 5. Limited demographic details of participants 6. Saturation not explicitly reported 7. Single health district limits genera
Darko et al. 2019 – LLIN use among pregnant women – Ghana	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Facility-based sample of ANC attendees; exclusion of pregnant women not attending selected clinics; cross-sectional design; self-reported previous-night use; no validation or observation of use; barrier-question methods and frequencies absent; no adjustment for confounding in the utilisation analysis; numerical and direction-of-effect inconsistencies in regression tables
Zegers de Beyl et al. 2018 – Continuous ITN distribution – Ghana	Intervention/programme evaluation	ROBINS-I	High concern	ROBINS-I: High concern No concurrent comparison region; separate baseline and endline samples; seasonal differences between surveys; reliance on self-report; recall and source misclassification; eligibility error for school classes; calculated rather than observed counterfactuals; possible unmeasured changes between survey periods

de Beyl et al. 2017	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns 1. No baseline conducted (counterfactual estimated by excluding community-distributed ITNs) 2. Cross-sectional design cannot establish causation 3. Self-reported ITN use and reasons subject to recall/social desirability bias 4. Single district pilot (9 months) limits generalisability 5. Insufficient duration to assess long-term sustainability 6. SBCC exposure not adjusted for potential confounders 7. No cost-effectiveness analysis 8. Wealth quint
Deressa et al. 2011 – ITN ownership and use – Ethiopia	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist: Moderate concern Cross-sectional design; previous-night use self-reported; survey conducted outside the principal malaria-transmission season; purposive selection of high-malaria-burden zones; unspecified nature of ITN-use problems; possible residual confounding; household-level outcome combined with individual respondent knowledge; potential collinearity between number of nets owned and number hung
Diabate et al. 2014	Cross-sectional quantitative	JBI	Some concerns	BI analytical cross-sectional checklist; Some concerns 1. Cross-sectional design cannot establish causation 2. 37.5% of ITNs not observed; possible overestimation of hanging/physical condition 3. Education variable excluded due to missing values 4. No baseline data before campaign 5. Self-reported child illness subject to recall bias 6. Single health district limits generalisability 7. Household size cut-off (≤6/>6) may not capture all dynamics 8. Agricultural land ownership as proxy for exposure may
Diallo et al. 2021 – LLIN and IPTp-SP uptake – Guinea	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Cross-sectional design; hospital-based sample; vaginal deliveries only; exclusion of home births and one natural region; self-reported behaviour; composite outcome combining two behaviours; heterogeneous partial-outcome category; no adjusted effect estimates; insufficient CART reporting; apparent outcome or category coding inconsistencies
Diallo et al. 2026 – LLIN use – Guinea	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Cross-sectional design; self-reported one-night outcome; no LLIN ownership or access variable; possible reverse causation; complete-case analysis; route-based household selection; no clearly reported survey-weighted or cluster-adjusted regression; AIC stepwise variable selection; substantial differences between estimates in Tables 3 and 4; supplementary diagnostics unavailable
Diawara et al. 2022	Intervention/programme evaluation	JBI	Some concerns	JBI analytical cross-sectional checklist; Some concerns 1. Non-randomized design limits causal inference for clinical outcomes 2. No statistical analysis of reasons for missing SMC (descriptive only) 3. Adverse events self-reported; may be under/over-reported 4. Single intervention district limits generalisability 5. No baseline coverage data before intervention 6. Study focused on clinical effectiveness; behavioural determinants reported descriptively 7. No analysis of behavioural determinants in adj
Diengou et al. 2020 – IPTp-SP uptake – Cameroon	Cross-sectional quantitative	JBI	High concern	JBI analytical cross-sectional checklist: High concern Facility-based selection; exclusion of women in early pregnancy and those not using ANC; self-reported uptake; cross-sectional measurement; no adjustment for confounding; no effect estimate; possible reverse causation; composite knowledge score with limited validation; unclear sampling implementation; provider-level factors not linked to individual uptake; several numerical and narrative inconsistencies
Doku et al. 2016	Mixed methods	JBI	Some concerns	JBI analytical cross-sectional checklist + JBI qualitative checklist; Some concerns: Cross-sectional design cannot establish causation; self-reported data subject to recall and social desirability bias; single metropolis (Tamale) limits generalisability; no adjusted statistical analysis (descriptive only); 2011 data may not reflect current context; small sample size for pregnant women (n=184); no multivariate analysis to control for confounders 1. Cross-sectional design cannot establish causation 2. Self-reported data subject to recall and social desirability bias 3. Single metropolis (Tamale) limits generalisability 4. Data collected in 2011; may not reflect current context 5. Small sample size for pregnant women (n=184) 6. No adjusted statistical analysis (descriptive only) 7. No multivariate analysis to control for confounders 8. No quantitative association between barriers and dropo

Dun-Dery et al. 2022 – ITN use among pregnant women – Ghana	Mixed methods	MMAT	Some concerns	MMAT mixed-methods appraisal: Moderate concern Facility-based selection; third-trimester ANC attendees only; self-reported one-night outcome; unexplained reduction from 710 to 664 participants; purposive selection of the urban district; no reported adjustment for facility clustering or sampling weights; qualitative saturation and researcher reflexivity not reported; possible reverse causation between ANC exposure, knowledge and use
Dun-Dery et al. 2021 – IPTp-SP uptake – Ghana	Mixed methods	MMAT	Some concerns	MMAT mixed-methods appraisal: Moderate concern Facility-based selection; inclusion only from 25 weeks' gestation; purposive selection of the urban district; incomplete national representativeness; self-reported components of uptake; no clear adjustment for clustering by facility; qualitative saturation and reflexivity not reported; contradictory interpretation of first-ANC timing; major error in reporting three-dose coverage
Ekholuenetale et al. 2026 – PMC acceptability and receipt – Nigeria	Qualitative	JBI	High concern	JBI qualitative checklist: High concern for behavioural-determinant synthesis Clinic-based recruitment; probable exclusion of caregivers who had disengaged or refused immunisation; intervention and control perspectives not always separated; no quantified uptake or refusal; no verification of individual receipt or schedule completion; many hypothetical acceptability statements; early evaluation after only three months; possible social-desirability bias; translation-related loss of meaning
Ernst et al. 2016	Mixed methods	JBI	Some concerns	JBI analytical cross-sectional checklist; overall judgement: Some concerns 1) Self-reported use (social desirability bias); 2) Rare outcome of non-use limited multivariable modelling; 3) Generalisability limited to two study sites; 4) No information on housing construction or other malaria risk factors; 5) Household definition differed from KMIS, affecting comparability
Esimai & Aluko 2014	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection Self-reported responses not verified; cross-sectional design prevents causal inference; single LGA limits generalisability; limited to 195 participants
Eteng et al. 2014	Mixed methods	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection Cross-sectional design prevents causality; limited economic status information; study not designed to assess campaign effectiveness; no before-after comparison; self-reported use
Exavery et al. 2014	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Low (probability proportionate to size sampling). Outcome measurement: Some concerns (self-reported dose receipt, recall bias up to 2 years). Determinant measurement: Low (counseling, ANC timing directly asked). Confounding: Some concerns (limited variables: gravity, rural/urban, religion, SES not included). Missing data: Not reported. External validity: Some concerns (s Recall bias (2-year recall period); cross-sectional design prevents causality; limited variables (gravity, rural/urban, religion, SES not available); no causal inferences
Ezire et al. 2015	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Low (multistage cluster sampling across 18 states). Outcome measurement: Some concerns (self-reported previous-night use, social desirability). Determinant measurement: Some concerns (self-reported confidence/knowledge, not observed). Confounding: Some concerns (limited adjustment variables). Missing data: Not reported. External validity: Some concerns (18 of 36 states, Self-reported confidence/knowledge not observed; cross-sectional design prevents causality; SARHS primary objective not net use; state-level differences not fully accounted for; no observation of actual hanging/use
Faye 2012	Mixed methods	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Low (nationally representative stratified two-stage sampling). Outcome measurement: Some concerns (self-reported previous-night use, social desirability). Determinant measurement: Low (direct participant-reported reasons and observation). Confounding: Some concerns (descriptive analysis only; no adjusted associations). Missing data: Not reported. External validity: High Descriptive analysis only (no adjusted statistical associations); reliance on self-reported reasons; cross-sectional design prevents causality; lack of multivariate analysis

Fernandez Montoya et al. 2023	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Low (population-based surveys, census coverage). Outcome measurement: Some concerns (self-reported previous-night use, social desirability). Determinant measurement: Low (direct questions on reasons for non-use). Confounding: Some concerns (descriptive analysis, limited adjustment). Missing data: Some concerns (MDA surveys covered 77-90% of population; best/worst-case sc MDA surveys represented 77.7-89.6% of population (best/worst-case scenarios used); attrition rates evaluated retrospectively may be underestimated (nets from ANC/EPI not counted); reasons for net loss and low season non-use not fully explored; surveys not specifically designed for LLIN indicators
Finlay et al. 2017	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Low concern. Selection: Low (three-stage cluster, PPS, random household selection). Outcome measurement: Some concerns (self-reported previous-night use, not verified by observation). Determinant measurement: Low (standard questionnaire, direct questions). Confounding: Low (multivariable adjustment). Missing data: Low (98.8% response). External validity: Some concerns (sub-national: East Coast on Self-reported use not verified by observation; cross-sectional design prevents causality; recall bias for campaign indicators (6-month recall); sub-national (East Coast only) not nationally representative; longitudinal use not assessed
Fokam et al. 2017	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Some concerns (7 of 17 health areas randomly selected; urban focus). Outcome measurement: Some concerns (self-reported previous-night use). Determinant measurement: Some concerns (environmental suitability subjectively categorised). Confounding: Some concerns (limited multivariable adjustment). Missing data: Not reported. External validity: Some concerns (single urban di Cross-sectional design prevents causality; self-reported use not verified; single health district in Cameroon limits generalisability; subjective categorisation of environmental suitability
Forty et al. 2021 – ITN ownership/utilization – Malawi	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist. Overall judgement: Some concerns. Cross-sectional design limits causal interpretation; self-reported ITN use may introduce social desirability bias; behavioural outcome based on previous-night use rather than sustained us
Fru et al. 2021	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Some concerns (4 of 8 health areas selected; urban focus). Outcome measurement: Some concerns (self-reported previous-night use, social desirability). Determinant measurement: Low (direct questions on reasons). Confounding: Some concerns (limited multivariable adjustment). Missing data: Not reported. External validity: Some concerns (single health district). Cross-sectional design prevents causality; self-reported use not verified; recall bias; single district in Cameroon limits generalisability
Fuge et al. 2015 – ITN utilization – Ethiopia	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist. Overall judgement: Some concerns. Cross-sectional design; self-reported practices; small number of ITN owners limited determinant analysis
Garcia-Basteiro et al. 2011	Cross-sectional quantitative	JBI	Some concerns	JBI analytical cross-sectional checklist; overall: Some concerns. Selection: Low (sentinel sites cover 95% of houses). Outcome measurement: Some concerns (self-reported previous-night use, recall bias). Determinant measurement: Some concerns (knowledge questions subject to social desirability). Confounding: Low (multivariable adjustment). Missing data: Some concerns (missing data excluded, not detailed). External validity: Some concerns (Bioko Is Cross-sectional design prevents causality; reverse causality likely (e.g., sickness and ownership); PCA not validated for this setting; possible geographical bias in SES; recall bias

Supplementary Table S9. Protocol and data-quality decisions.

Issue	Decision applied	Reporting implication

Eligibility amendment	Mandatory determinant–behaviour linkage, intervention boundaries and no-date-limit rule finalised before searches on 15–16 July 2026	Applied consistently to all records; no post-screening re-screening
Protocol documentation	Versions 3.0 and 3.1 dated 24 July 2026 documented the pre-search decisions and executed sources	Reported as documentation timing, not timing of eligibility implementation
Date limits	No date limit in searches or screening	Five pre-2010 studies retained
Extraction-row QA	One Bediako-metadata row duplicated Baume extraction data and was removed	Baume counted once; not an additional PRISMA exclusion
Mixed-methods appraisal	Explicit MMAT records available for seven of 14 mixed-methods studies	Remaining studies interpreted using component-specific JBI appraisal; limitation disclosed
Certainty assessment	GRADE and GRADE-CERQual not performed	Narrative confidence interpretation only
Meta-analysis	No candidate group met the comparability threshold	SWiM-informed synthesis used

Supplementary Table S10. Included-study bibliography

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Supplementary Table S11. PRISMA 2020 reporting checklist.

Item	Topic	Location
1	Title identifies a systematic review	Title page
2	Structured summary	Abstract
3–4	Rationale and objectives	Introduction
5	Eligibility criteria	Methods 2.3
6–7	Information sources and search strategies	Methods 2.4; Supplement S1
8	Selection process	Methods 2.5

9–10	Data collection and data items	Methods 2.6
11	Risk-of-bias assessment	Methods 2.7; Results 3.9; Supplement S8
12–13	Effect measures and synthesis methods	Methods 2.8–2.10; Supplements S4–S6
14	Reporting-bias assessment	Methods 2.10; Results 3.10
15	Certainty assessment	Not formally performed; Methods 2.10 and Limitations
16	Study selection	Results 3.1; Figure 1; Supplement S2
17–18	Study characteristics and risk of bias	Results 3.2 and 3.9; Supplements S3 and S8
19–20	Individual study results and syntheses	Results 3.3–3.8; Supplements S4–S7
21–22	Reporting biases and certainty	Results 3.10
23	Discussion	Discussion
24	Registration and protocol	Methods 2.2; End matter; Supplement S9
25–27	Support, competing interests and data availability	End matter