



A Qualitative Investigation into Community Perceptions and Practices Surrounding Insecticide-Treated Net Use in Rural Zambia

Chabota Sinzala¹, Nilanjana Kumari^{2,3} and David Mulenga^{3*}

¹ The Copperbelt University (CBU), Jambo Drive, Riverside, Kitwe Zambia.

² The Copperbelt University (CBU), Jambo Drive, Riverside, Kitwe Zambia.

³ Michael Chilufya Sata School of Medicine, Copperbelt University (CBU), Ndola, Zambia.

*Email: chabotasinzala@gmail.com

ABSTRACT

Background: Insecticide-treated nets (ITNs) are a cornerstone of malaria prevention in sub-Saharan Africa. However, in rural Zambia, persistent malaria transmission despite widespread ITN distribution suggests that behavioral and sociocultural factors may undermine their consistent use.

Aim: This study investigates how community perceptions, cultural norms, and household practices influence ITN adherence in Manyama, a malaria-endemic rural settlement in Kalumbila District, Zambia.

Methods: A qualitative design was employed, involving 42 purposively selected participants from the Manyama community. Data were collected through in-depth interviews and focus group discussions with household heads, caregivers, and community health volunteers. Thematic analysis was conducted using an inductive approach to identify patterns in beliefs, behaviors, and contextual influences on ITN use.

Results: Five key themes emerged: (1) *malaria was widely understood as a seasonal illness, but familiarity often led to delayed prevention and normalized illness during the rainy season;* (2) *ITNs were trusted when new, but use declined due to heat, poor housing, and physical damage;* (3) *intra-household sleeping arrangements and caregiving roles shaped net access, often leaving adults, especially men unprotected;* (4) *mixed feelings toward government-distributed nets reflected both gratitude and skepticism about quality and intent;* and (5) *while prevention was seen as a shared and personal responsibility, nightly net use remained difficult to sustain without continued support.* These findings highlight the disconnect between national malaria messaging and the lived realities of rural households.

Conclusion: ITN non-adherence in Manyama is shaped by a complex interplay of behavioral, environmental, and sociocultural factors. Malaria prevention strategies must move beyond distribution metrics to engage communities in co-developing context-sensitive interventions that reflect local knowledge, priorities, and constraints.

Keywords: Insecticide-treated nets, malaria prevention, qualitative research, rural Zambia, behavioral health, community perceptions, sociocultural determinants.

Introduction

Malaria remains a persistent public health challenge in sub-Saharan Africa, accounting for more than 90 percent of global malaria-related deaths, with *Plasmodium falciparum* responsible for the most severe clinical outcomes (World Health Organization, 2023). In Zambia, despite notable progress in vector control and case management, the disease continues to impose a substantial burden, particularly in rural provinces such as North-Western. In this region, malaria transmission remains high due to a confluence of ecological vulnerability, limited health infrastructure, and behavioral factors (Ministry of Health, 2021).

Insecticide-treated nets are central to Zambia's malaria prevention strategy and are distributed through national campaigns, antenatal care programs, and community-based platforms. While ownership of these nets is widespread, consistent and proper use remains suboptimal. According to the Zambia Malaria Indicator Survey conducted in 2021, 83 percent of households owned at least one insecticide-treated net, yet only 56 percent of individuals reported sleeping under a net the previous night (National Malaria Elimination Centre, 2022). This gap between access and utilization underscores the importance of examining the behavioral and sociocultural dynamics that influence adherence.

The Zambia Malaria Behavior Survey conducted in 2024 further illustrated these challenges. While 86 percent of respondents reported owning a treated net, only 74 percent believed that most people in their community used nets consistently. Barriers to regular use included perceptions of heat and

discomfort, damaged nets, insufficient net supply, and sleeping arrangements that made net use impractical (Breakthrough ACTION and National Malaria Elimination Centre, 2025). Moreover, ideational factors such as perceived vulnerability to malaria, prevailing social norms, and levels of trust in government-distributed nets shaped adherence patterns.

Qualitative studies from Zambia and neighboring countries have enriched this understanding by highlighting the roles of gender, household power structures, and shifting seasonal risk perceptions in determining how insecticide-treated nets are used. In some communities, nets are repurposed for non-health-related functions such as fishing or agricultural tasks, reflecting competing livelihood demands and resource constraints (Jumbam et al., 2020; Mwangu et al., 2023). These findings suggest that insecticide-treated net use is not merely a technical behavior but a complex social practice embedded in local meaning systems.

In Manyama, a high-transmission rural settlement located in Kalumbila District, malaria prevention is mediated by a web of cultural beliefs, practical constraints, and everyday routines. Although previous research has demonstrated the epidemiological benefits of insecticide-treated net adherence in this area (Sinzala, Mulenga, and Kumari, n.d.), limited evidence exists on the behavioral drivers behind usage patterns. Understanding how households perceive, prioritize, and negotiate the use of mosquito nets in their domestic environments is essential for improving intervention strategies.

Objectives of the Study

This study set out to examine the behavioral, cultural, and contextual factors influencing insecticide-treated net use in the Manyama community of Kalumbila District. It explored how residents perceive malaria risk and seasonality, how household dynamics and social roles shape patterns of net usage, and how people interpret both the quality and intent of government-distributed nets. By grounding the inquiry in everyday experiences, the study offers context-specific insights to inform more responsive and sustainable malaria prevention strategies in rural Zambia.

Methods

Research Paradigm

This study was grounded in an interpretivist paradigm, which views reality as socially constructed and context-dependent. Knowledge within this framework is co-produced through interaction, emphasizing the participants' subjective experiences and meanings. This approach was well-suited to the aim of understanding how residents in a malaria-endemic community perceive, interpret, and negotiate the use of insecticide-treated nets. The study prioritized narrative depth, cultural insight, and social context over quantifiable measurement.

Study Design

A qualitative, phenomenological design was adopted to explore the lived experiences of ITN use among households in the Manyama community. The design emphasized understanding real-world health behavior as experienced and narrated by participants, rather than testing predetermined hypotheses. Unstructured interviews, participatory focus group discussions, and embedded observation were employed to ensure methodological triangulation and contextual richness.

Study Setting

The study was conducted in Manyama, a rural settlement within Kalumbila District, North-Western Province of Zambia. Characterized by seasonal rainfall, subsistence agriculture, and moderate population density, Manyama is considered a malaria-endemic area. The community is serviced by Shilenda Rural Health Centre and several community health volunteers who assist with malaria prevention education. **Table 1.0** provides a summary of the key environmental and demographic features of the study setting.

Table 1.0: Key Characteristics of the Manyama Study Setting

Characteristic	Description
Geographic Location	Manyama, Kalumbila District, North-Western Province, Zambia
Estimated Population	Approximately 3,800 residents
Malaria Risk Classification	High transmission, particularly during the rainy season (November–April)
Main Economic Activities	Subsistence farming, small-scale trading, informal labor
Primary Health Facility	Shilenda Rural Health Centre
Community Health Infrastructure	Community Health Volunteers (CHVs), Neighborhood Health Committees (NHCs)
Languages Spoken	Bemba, Kikaonde, with limited English fluency
Common Vector Control Tools	Insecticide-treated nets (ITNs), with intermittent indoor residual spraying
Environmental Risk Factors	Seasonal stagnant water, poor drainage, variable housing ventilation

Participant Selection and Sampling

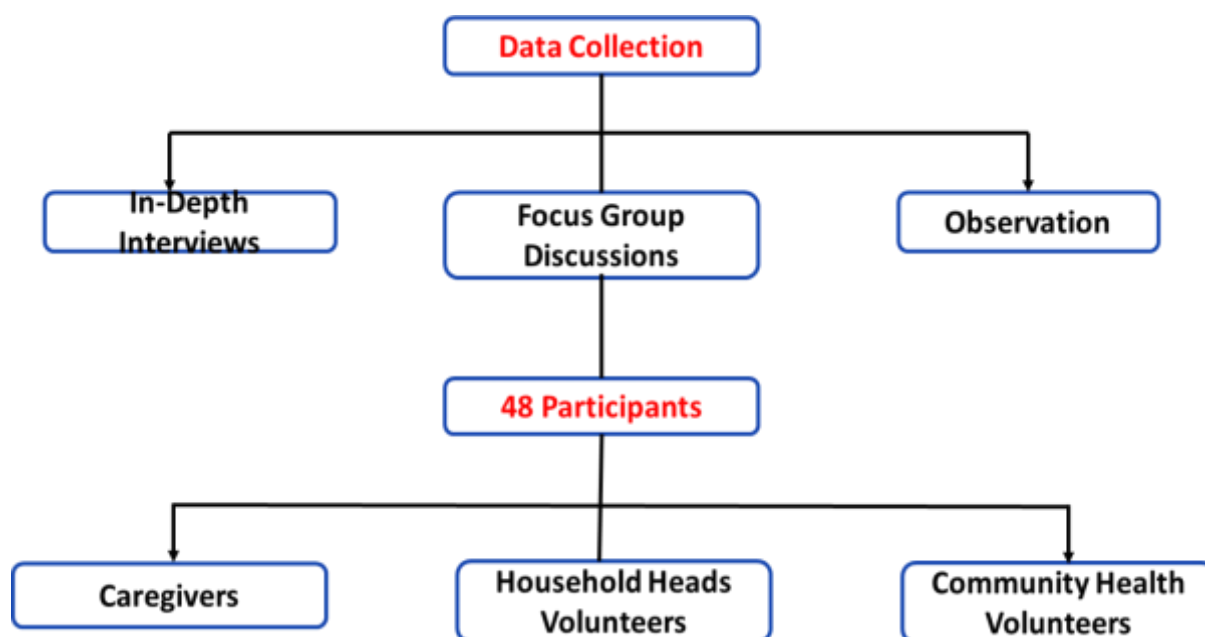
Forty-eight participants were recruited through purposive and maximum variation sampling to capture diverse perspectives across age, gender, occupation, and community roles. Eligibility criteria included being 18 years or older, a resident of Manyama for a minimum of 12 months, and willingness

to provide informed consent. Recruitment focused not only on primary caregivers and household heads, but also youth, community health actors, and elders. **Table 2.0** outlines the participant categories, number of individuals per group, data collection methods, and languages used, while **Figure 2** gives an overview of data collection procedures and participant composition in the Manyama study.

Table 2.0: Participant Categories and Data Collection Methods

Participant Group	Number of Participants	Data Collection Method	Primary Language Used
Household Caregivers	18	In-depth interviews	Bemba, Kikaonde
Male Heads of Household	9	In-depth interviews	Bemba
Youth (ages 18–24)	8	Focus group discussions	Bemba, English
Community Health Volunteers (CHVs)	6	Key informant interviews	English, Bemba
Local Leaders (e.g., headpersons)	4	Key informant interviews	English
Non-participant Households	8	Participant observation only	N/A

Figure 2. Overview of data collection procedures and participant composition in the Manyama study.



The figure summarizes qualitative data collection activities conducted in the Manyama community, including in-depth interviews, focus group discussions, and household observations. A total of 48 participants were engaged through purposive sampling, comprising caregivers, household heads, community health volunteers, and local leaders. This structure reflects the study's effort to capture diverse perspectives across social roles relevant to insecticide-treated net adherence.

Data Collection Procedures

In-Depth Interviews

Twenty-seven unstructured interviews were conducted using broad narrative prompts to elicit participants' perceptions and experiences of malaria prevention and ITN use. Interviews were conducted in Bemba or Kikaonde, depending on participant preference, and lasted 40–60 minutes each. Conversations explored familiarity with ITNs, cultural beliefs, household allocation, perceived effectiveness, and situational constraints. All interviews were audio-recorded with consent and later transcribed verbatim.

Focus Group Discussions

Four participatory focus groups were held, comprising 5–7 participants each. Sessions involved storytelling, community sketch mapping, and free discussion. Participants explored collective practices, intergenerational views on net use, and household sleeping dynamics. Separate groups were held for women, youth, and mixed adult groups to encourage open participation. Discussion guides were loosely structured to allow emergent themes to surface organically.

Participant Observation

Researchers conducted embedded household observation in eight homes. These sessions occurred during evening hours and involved noting net condition, deployment routines, household sleeping spaces, and informal interactions. Standardized observation checklists were used in conjunction with field notes. Researchers adopted a non-intrusive stance, integrating themselves with evening activities and noting environmental cues, non-verbal behaviors, and household decision dynamics.

Data Analysis

Qualitative data were analyzed thematically following Braun and Clarke's six-phase process: data familiarization, initial coding, theme development, theme review, theme definition, and report generation. Transcripts, field notes, and observational checklists were read multiple times. Manual and NVivo-based coding were used iteratively. Codes were developed both inductively from participant language and deductively based on the research questions. In Vivo codes preserved culturally resonant phrasing (e.g., "nets are too hot to sleep under"). Codes were grouped into candidate themes, reviewed across datasets, and finalized through collaborative team discussions.

Researcher Reflexivity and Positionality

The research team comprised Zambian scholars with backgrounds in public health and malaria control, none of whom held institutional roles in Kalumbila District. Reflexive journals were maintained by all researchers to document field decisions, personal assumptions, and emotional responses. These reflections were reviewed during analysis to enhance transparency and minimize interpretive bias.

Ethical Considerations

Ethical clearance was granted by The Copperbelt University Biomedical Research Ethics Committee. All participants provided written informed consent prior to data collection. For participants with limited literacy, the consent form was read aloud in their preferred language. Confidentiality was maintained by assigning unique identifiers to transcripts and field materials, which were securely stored in password-protected digital folders. The community was consulted before, during, and after the study to ensure reciprocal engagement and relevance of findings.

Results

A total of 48 participants contributed to the dataset through in-depth interviews, focus group discussions, and embedded observation. Thematic analysis revealed five interrelated themes that reflect the sociocultural dynamics shaping ITN use in the Manyama community. These themes represent shared meanings, household decision-making patterns, and behavioral drivers or barriers to consistent net use. Quotes are presented using anonymized identifiers, with participant role and setting noted.

Objective 1: To explore community understanding of malaria risk, causes, and seasonal patterns

Theme 1: Malaria is expected during the rainy season

Participants commonly described malaria as something that "comes with the rains." This pattern was widely accepted, with many households timing illness, clinic visits, and even net use based on weather patterns. Some stored malaria treatment at home in anticipation of outbreaks.

"When the rain starts, the mosquitoes start. We already know that time means malaria." Female caregiver, Interview 04

Despite understanding the cause, many saw malaria as part of rural life not necessarily something avoidable. Households adjusted to malaria season as they would a farming cycle.

Theme 2: Familiarity leading to relaxed prevention

Because malaria was so common, some participants admitted they did not always take it seriously unless symptoms were severe. This normalization contributed to delays in prevention or care-seeking.

"Malaria is everywhere here. If one child gets it, we watch and wait. We try herbs first before the clinic." Male participant, FGD 01

This cultural familiarity diluted perceived threat, even as people acknowledged that malaria could kill. **Table 3.0** provides a summary of these themes, subthemes, and illustrative participant quotes.

Table 3.0: Key Themes, Subthemes, and Illustrative Quotes from Thematic Analysis

Major Theme	Subtheme	Example Participant Quote
Perceptions of Malaria Severity	Seasonal spikes during rainfall	<i>"When the rains come, the mosquitoes come with them."</i>
Community Trust in ITNs	Confidence in protective value	<i>"We sleep better when we use them—less sickness."</i>
Barriers to ITN Use	Physical discomfort and damage	<i>"The net tore after a few months, and we stopped using it."</i>
Household Decision-Making	Prioritization by age and gender	<i>"Children use the net first; there's not enough for all."</i>
Mistrust in Net Distribution	Concerns over net quality	<i>"These new nets are too thin—they don't work like before."</i>
Alternative Preventive Behaviors	Herbal remedies and repellents	<i>"Sometimes we burn leaves at night to chase mosquitoes."</i>

Objective 2: To understand social and behavioral factors shaping ITN use within households**Theme 1: Nets are trusted when new and complete**

Most households believed that ITNs help prevent malaria especially when received recently and hung properly. Many linked reduced illness to sleeping under a net.

"When you use the net properly, you avoid malaria. The mosquitoes do not disturb the children." Community health worker, Interview 18

Trust was personal and experience-based. When a net performed well, people maintained the behavior.

Theme 2: Net use declines with damage, discomfort, and poor housing

As nets aged, participants cited holes, sagging fabric, and chemical fading as reasons for disuse. In several homes, nets were tied with string or stones, and some were abandoned after tearing.

"After a few months, our net had holes. We put it away and started using fire to chase mosquitoes." Youth, FGD 03

Heat was a consistent barrier. During warm nights, people often removed the net entirely, prioritizing comfort over protection.

"It is too hot under the net. Sometimes I just sleep without it because the sweat keeps me awake." Female participant, Interview 12

Households lacking rafters or solid walls struggled to hang nets securely. This was especially true in informal or temporary shelters.

Theme 3: Household sleeping spaces shape who uses nets

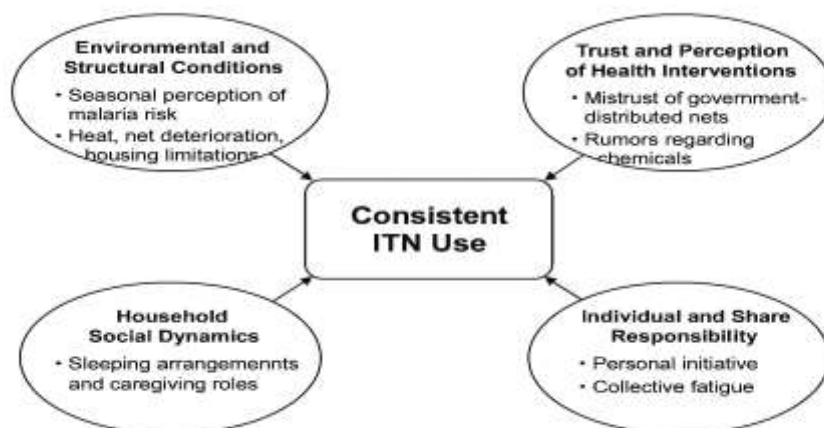
Children and babies were almost always prioritized for net use. In households with only one or two nets, adults were often left unprotected during sleep, especially men.

"If only one net is there, the children sleep under it. We grown-ups just manage on our own." Male household head, Interview 07

Sleeping space arrangements also affected net use. Many families rotated nets between members or shared beds where not everyone was fully covered.

Observation notes confirmed that nets were often moved nightly and that decisions about use were shaped by illness, age, and space.

Figure 1 shows a conceptual framework illustrating the behavioral, environmental, and sociocultural influences on consistent insecticide-treated net (ITN) use in Manyama, Kalumbila District, Zambia.



The framework positions ITN adherence at the center and identifies five interacting thematic domains that influence nightly use: (1) perceived seasonality and normalization of malaria; (2) environmental discomfort, including heat and deteriorating nets; (3) household sleeping arrangements and caregiving dynamics; (4) trust and skepticism toward government-distributed nets; and (5) personal and collective responsibility for malaria prevention. These domains operate at structural, social, and individual levels, reflecting the complex interplay of contextual factors shaping adherence behavior.

Objective 3: To assess community attitudes toward government-distributed ITNs and malaria messaging

Theme 1: Gratitude mixed with mistrust

While many appreciated receiving free nets, others expressed doubts about their quality. Rumors about “weaker chemicals,” old stock, or foreign intentions surfaced in every focus group.

“These nets they give now are different. They tear quickly and mosquitoes still pass through.” Local leader, Interview 20

“Some say the government uses the nets to bring sickness. I don’t know, but they are not like before.” Youth, FGD 02

This mistrust coexisted with the belief that nets still had value—just not equal value for all.

Theme 2: Prevention seen as both personal and shared responsibility

Despite rumors, several participants emphasized that malaria prevention begins at home. Some were frustrated that others ignored available nets out of laziness or neglect.

“Malaria is from mosquitoes, not from government. You are given a net, use it. Do not wait for someone to remind you.” Elder male, Interview 23

This theme showed that while structural challenges exist, many residents take ownership of their health decisions. However, sustaining prevention behaviors over months without reinforcement remains difficult for most.

Discussion

This study examined how behavioral, cultural, and contextual factors shape the use of insecticide-treated nets (ITNs) in Manyama, a rural Zambian community with sustained malaria transmission. The findings reveal that while awareness of malaria and its seasonal patterns was high, consistent ITN use was challenged by structural barriers, sleeping arrangements, and mixed perceptions of government-distributed nets. Together, these insights illuminate how ITN use is not simply a matter of access but a socially negotiated practice influenced by everyday household dynamics.

Participants widely recognized malaria as a predictable occurrence during the rainy season, yet this familiarity often led to passive prevention strategies and delayed care-seeking. Similar to other studies conducted in rural African settings, such normalization of risk has been linked to reduced urgency around preventive behavior, particularly when symptoms are seen as manageable within the home (Barrow et al., 2025). In Manyama, malaria was viewed less as a health emergency and more as a seasonal inevitability, contributing to reactive rather than proactive use of ITNs.

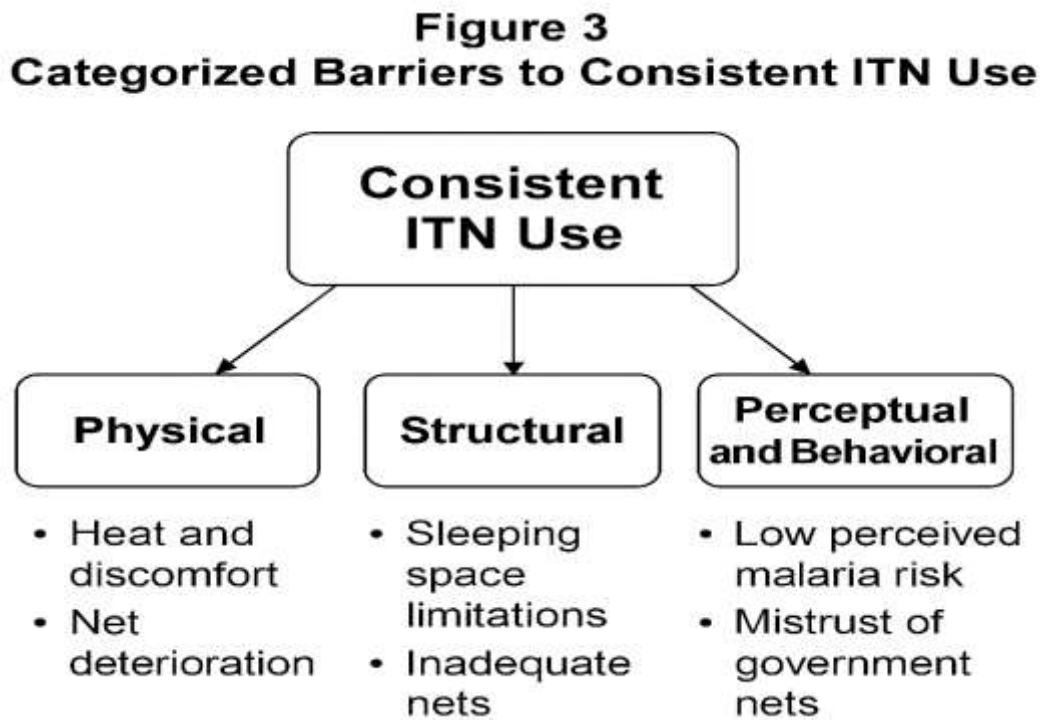
Trust in ITNs emerged clearly, especially when nets were newly distributed and intact. However, discomfort during warm nights, poor housing infrastructure, and net deterioration frequently disrupted usage. These findings mirror prior research indicating that net condition, local climate, and spatial constraints remain persistent barriers to adherence (Gryseels et al., 2019; Pulford et al., 2011). Notably, households adapted their practices in rational ways prioritizing children, rotating net use, or seeking alternative mosquito control methods. Such strategies highlight the pragmatic responses of households navigating imperfect conditions.

Sleeping arrangements and caregiving roles played a critical role in net allocation. Children and infants were consistently prioritized, while adult men, who often slept separately or near doorways, were least likely to use nets. This pattern reflects broader gendered norms in net use, as documented in studies from Malawi, Ghana, and Tanzania (Baume & Marin, 2007; Ricotta et al., 2019). In Manyama, these arrangements were not openly contested but silently reinforced, suggesting that ITN campaigns must attend to intra-household negotiation as well as household-level access.

Perceptions of government-distributed nets were nuanced. While many participants expressed gratitude for free distributions, others questioned net quality and voiced mistrust—sometimes rooted in rumors about chemical potency or political intent. Such skepticism has been observed elsewhere in Zambia and beyond, where health interventions are received through the lens of past experiences, rumor circulation, and institutional trust (Harris, 2021). Yet, several participants emphasized that prevention also requires individual effort, pointing to both agency and fatigue in maintaining long-term preventive behaviors.

Taken together, these findings suggest that improving ITN adherence requires more than distribution or education campaigns. Structural interventions must be coupled with behavioral strategies that account for heat, sleeping space, gendered caregiving patterns, and local trust dynamics. Messaging that acknowledges daily constraints while affirming community knowledge and responsibility may be more effective than generalized health promotion.

While the study offers nuanced insights into real-world net use, it is limited by its geographic focus on a single community and its reliance on self-reported behaviors. However, triangulation through interviews, group discussions, and observation strengthens the credibility of the findings and allows for a grounded understanding of behavior in context.

Figure 3. Categorized barriers to consistent insecticide-treated net (ITN) use in the Manyama community.

The figure presents participant-identified barriers to nightly ITN adherence, organized by type. Environmental and physical barriers include high nighttime temperatures and deteriorating or insufficient nets. Structural barriers encompass cramped or open-air sleeping arrangements and inadequate household space. Perceptual and behavioral barriers reflect mistrust of government-distributed nets, normalization of seasonal malaria, and prevention fatigue. These challenges emerged across diverse participant groups and illustrate the multifaceted constraints on net usage in real-world settings.

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