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Voices of Indigenous Papuans: Gender, disability and social inclusion shaping malaria vulnerability

Lenny Ekawati

lekawati@oucru.org

Oxford University Clinical Research Unit Indonesia

Aria Satwiko

Oxford University Clinical Research Unit Indonesia

Karina Lestari

Oxford University Clinical Research Unit Indonesia

Herdiana Herdiana

World Health Organization

Ajib Diptyanusa

World Health Organization

Jessie Yunus

World Health Organization

Ermi Ndoen

United Nations Children's Fund

Mrunal Shetye

United Nations Children's Fund

Adhi Andrianto

Oxford University Clinical Research Unit

Yohanes Hermawan

PERDHAKI

Alfrida Abi

PERDHAKI

Prima Yosephine

Ministry of Health, Republic of Indonesia

Fadjar Silalahi

Arbovirus Working Team, Ministry of Health of the Republic of Indonesia

Helen Prameswari

National Malaria Programme, Ministry of Health of Indonesia

Dedy Supriyanto

National Malaria Programme, Ministry of Health of Indonesia

Hermawan Susanto

National Malaria Programme, Ministry of Health of Indonesia
Sri Fajariyani
National Malaria Programme, Ministry of Health of Indonesia
Marlina Flassy
Cendrawasih University
Hasmi Hasmi
Cendrawasih University
Novita Medyati
Cendrawasih University
Anushka Mangharam
Asia Pacific Leaders Malaria Alliance
Iqbal Elyazar
Oxford University Clinical Research Unit Indonesia https://orcid.org/0000-0003-3115-5059

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Abstract

Despite decades of control efforts, the island of New Guinea remains one of the world's last malaria frontiers. This island which spans Indonesian Papua and Papua New Guinea, is where ecological connectivity, human mobility and shared sociocultural networks sustain transmission beyond political boundaries. Indonesian Papua, which consists of six provinces, accounts for over 90% of national malaria cases, disproportionately affecting Indigenous Papuans (Orang Asli Papua, OAP). Using the Malaria Matchbox Tool, we examined how gender, disability and social exclusion shape malaria vulnerability and access to care among OAP communities. Malaria was widely normalised as a routine illness, with spiritual beliefs shaped care-seeking. Service access was constrained by remoteness, high transportation costs, commodities stockouts, administrative hurdles, and language barriers. Women bore caregiving responsibilities with limited decision-making authority, while persons with disabilities and elderly were largely overlooked. These findings highlight the need for GEDSI-informed community-based strategies to address barriers in underserved settings.

Introduction

Within Indonesia, approximately 80% of districts (412 of 514) are malaria-free. However, transmission remains highly concentrated in Papua[1], which accounts for more than 500,000 infections annually[2]. The burden falls predominantly on OAP communities[3], many of whom reside in remote forest and lowland ecologies that favour efficient *Anopheles* mosquito vectors[4]. Poverty, geographic isolation, weak transport networks, and limited access to healthcare delay timely diagnosis and treatment[5], while inadequate housing and sanitation increase human-vector contact[6]. For many OAP, health is inseparable from relationships with ancestral lands (*tanah ulayat*) and the spiritual life, yet formal health systems rarely reflect these realities[7]. Consequently, OAP communities remain among the most marginalized populations in the country, reflecting longstanding uneven development that has systematically limited Indigenous representation in planning and decision-making[8,9].

Results

Across three study sites in Indonesian Papua: Keerom, Yapen and Asmat, we recruited 108 participants, comprising 85 participants across 10 focus group discussions, 19 key informants and four in-depth case studies. Focus group participants were predominantly women, including caregivers, pregnant women, and community health workers. Key informant interviews included health officials, non-governmental organization (NGO) partners, and community leaders, while narrative case studies documented personal stories of malaria. Overall, women made up 69% of participants (75 of 108, including two pregnant women), aged 21-70 years (mean 40) with educational attainment ranging from no formal schooling to postgraduate level.

Normalisation of malaria and its everyday burden

Among OAP communities, malaria was widely perceived as a routine and almost unavoidable illness, often likened to spinach soup (*sayur bayam*) to reflect its normalization in daily life. While previously feared as deadly, especially for children, many now regard malaria as a recurring but manageable condition due to availability of medicines:

"Before, malaria could kill. Now we know it is not so dangerous because the medicine is always there." (MAR, F/35, community member, Yapen).

Despite general awareness that mosquito bites cause malaria, alternative explanations such as sun exposure, overwork, or sorcery (*guna-guna*)persisted. These beliefs influenced health-seeking behaviours, with families often initiating treatment at home and delaying professional healthcare by one to two days. Common home remedies included boiled papaya leaves, bitter herbs, stinging nettle leaves, steaming with soursop or guava leaves, and antipyretics. In some areas, the Indigenous Papuan still applied traditional practices such as bloodletting (*iris-iris*) or smoke exposure (*mengasap*), particularly in Keerom and Asmat before seeking biomedical care and often delaying professional healthcare by one to two days.

Delays in care-seeking were strongly influenced by sociocultural norms, in which health was defined by the ability to continue daily activities rather than by symptoms. As one participant explained,

"People here are healthy if they can still go farming, fishing or foraging. They are sick only when they can no longer get up." (F/34, Keerom).

Families typically began with home or traditional care and turned to biomedical services only when symptoms worsened, resulting late presentation at health centres, particularly among adults. These norms were especially evident in remote settings. A CHW in Keerom explained,

"People still go to the farm even when they feel tired or pale. Only when they are unable to get up [from the bed], they think it's serious." (F/47, Keerom).

Preventive practices relied mainly on mosquito nets, though issues of comfort, coverage, repurposing and unclear messaging reduced effectiveness. Some households also burned coils or red lemongrass, or kept fires at night, as perceived mosquito repellents. Reports of drug shortages, staff absences, and language barrier further discouraged early use of formal health services, reinforcing reliance on traditional or home-based care.

Long travel distances and high transport costs further limited access. In Asmat, boat trips to clinics could take 4–5 hours and cost IDR 1-2 million (USD 60–120), making care inaccessible for many households living in remote and underserved areas. Non-functional subsidiary health posts, short operating hours in primary health centres and the absence of CHWs in some areas discouraged early diagnosis and prompt treatment.

A CHW in Keerom described supporting OAP communities by conducting home visits, lending her motorbike, and covering transport costs because the nearest primary health centre (PHC) was 10 kilometre away. She respected local healing practices while encouraging malaria testing and treatment. However, the closure of local health posts constrained her capacity and reduced community trust. Her experience illustrates that CHWs can synthesise indigenous knowledge with formal health systems, particularly when supported by adequate resources and functioning infrastructure.

Gendered burdens of malaria prevention and care

Household dynamics and traditional gender roles strongly influenced health-seeking behaviours, particularly in response to malaria-like symptoms. Women, often referred as housewives, shouldered dual responsibilities in both domestic and subsistence labour, such as farming, fishing and trading, essentially functioning as “working housewives” in local context. In many communities, women were expected to maintain household and productive duties even when unwell. This double burden constructed as a recurring theme in female FGDs:

“Even when I have a fever, I keep working. When my husband is sick, he rests.” (F/42, Yapen).

Within the households, women were typically the first to recognize illness symptoms in children or other family members. However, their ability to act was frequently constrained by male authority. Decisions regarding travel and medical expenditures typically required husband’s approval, which sometimes causing critical delays:

“I notice when my child has a fever, but to go to the primary health centre, I must ask my husband. If we have no money for transport, sometimes we cancel the visit.” (F/45, Asmat).

Case narratives illustrated how gendered and financial constrains operated in practice.

While travelling to the forest to collect agarwood, both husband (43) and wife (45) developed malaria-like symptoms. Without access to formal care, they relied on antipyretics brought from home, while their young daughter assumed caregiving responsibilities. Financial hardship delayed her access to treatment until her husband borrowed money. When her daughter later developed a severe fever, the mother again became the primary caregiver, despite still recovering herself. Her story highlights how women often move between the roles of patient, caregiver, and decision maker, while navigating limited autonomy, financial strain, and geographic isolation.

A 24-year-old mother recognised malaria symptoms in her eight-month infant daughter but waited for two days before seeking care due to transport costs. A round-trip motorcycle taxi cost IDR 80,000 (USD 4.8), a substantial expense for her household. With no alternative, she walked 21 minutes carrying her baby and accompanying her four-year-old daughter. The infant was diagnosed with *Plasmodium falciparum* malaria and recovered after treatment. Although the encounter strengthened her trust in formal care, the case reveals the physical strain, emotional burden, financial hardship and limited male support that women often endure.

At the same time, gender roles varied across communities. While some areas maintained traditional male-led decision-making, others showed more collaborative patterns. A pregnant women (33) in Keerom described receiving greater support from her husband for prompt treatment. Similarly, a male informant (35) in Yapen reported sharing caregiving responsibilities, reflecting more collaborative norms in certain settings.

Invisible in surveillance: disability, stigma and structural barriers

One of the most striking findings was the systemic invisibility of persons with disabilities within malaria programme. Health records in Keerom, Yapen and Asmat were aggregated without disability data, reflecting limitations in the national health information system and preventing assessment of service reach or outcomes among this group. **Although disability was included in the GEDSI framework, no participants with disabilities were directly interviewed. Insights presented here relied on accounts from CHWs, community leaders, and secondary documentation. As one CHW noted,**

"It is difficult for those with disabilities to join activities or meetings, and they are rarely involved in health programmes." (F/26, Keerom).

Disability was often viewed through a lens of physical ability or perceived usefulness. Individuals unable to contribute to household or subsistence labour were sometimes seen as burdens and deprioritised for care or information. This view contrasts with the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), which define disability as the result of social and environmental barriers rather than individual impairments.

The perception of unequal treatment reflects ongoing stigma and social exclusion of person with disabilities. As one community leader mentioned:

They are still seen as 'second-class people' and that affects how they are treated." (M/51, Yapen).

During an FGD with CHWs in Yapen, they reported some enlightenment but acknowledge that discrimination remained a concern.

The barriers were both structural and social. Health facilities often lacked ramps and accessible toilets. CHWs reported limited training to support individuals with sensory or cognitive impairments. Malaria information was typically delivered verbally or through written materials in Bahasa Indonesia. This approach, however, effectively excluded those who were deaf, blind, or had limited literacy, or primarily spoke local tribal languages rather than formal Indonesian.

Older adults: respected but underserved

Among older adults, exclusion often arose from assumptions about declining physical capacity. Elderly community members, particularly those living alone or managing chronic illness, reported difficulty accessing health centres. As one of community health worker in Asmat shared:

“Older people who feel week or helpless often stop attending integrated service posts. Without support or someone to accompany them, they are left behind.” (F/35, Asmat).

A participant in Yapen (F/39) observed that older adults with limited mobility or social connections were often unintentionally excluded from village meeting or health talks, reducing access to information and services. When unwell, some preferred home-based care or traditional remedies rather than formal treatment.

Across sites, participants observed that older people rarely voiced their health needs. This reluctance was often linked to cultural humility or the perception that health services are primarily intended for younger and more economically productive community members. A CHW in Keerom mentioned:

“Some older adults decline care because they think money should be reserved for children or household needs.” (F/33, Keerom).

These challenges were deeply linked to prevailing community beliefs about productivity and independence. While respected for past contributions, older adults who were no longer able to farm, fish, forage, or provide care were less visible in community life and frequently overlooked in health outreach efforts.

Effectiveness, equity gaps and the role of CHWs in malaria services

Core malaria interventions, including case detection, treatment and distribution of long-lasting insecticidal nets (LLINs) were implemented in all sites. However, community feedback revealed persistent gaps in coverage and inclusivity. Pregnant women, persons with disabilities, elderly, and remote OAP households, particularly those without formal identity cards or health insurance were frequently missed. As one CHW added,

“People living far from the village, in the forest or along the riverbanks, are often left out when we distribute nets or hold outreach activities.” (F/47, Keerom).

Structural equities, such as long distances to health facilities, poverty, poor infrastructure, and limited staffing, continued to hinder malaria service delivery across Papua. Many subsidiary health posts were reported to be inactive, with some repurposed for housing because assigned staff were reluctant to remain stationed in remote areas. Communities expressed frustration,

“The health post is there, but no one stays. If HCWs come regularly, people would n’t feel neglected.” (M/45, Keerom).

FGDs with women highlighted that adequate housing and safety are essential to retain frontline workers, especially as many are women. Without secure accommodation and supportive working conditions, retaining health personnel in remote posts becomes challenging, further limiting access to timely malaria care.

While CHWs played a central role in bridging hard-to-reach communities to the formal health system, sometimes their effectiveness was limited by irregular supplies, lack of transportation, and delayed incentives. Stockouts of diagnostic kits and medicines weakened community trust. As one CHW explained,

"Sometimes there are no tests or medicines, so we tell people to wait, take antipyretic or go to PHC, if they can afford it." (F/34, Asmat).

When public facilities lacked supplies, patients were referred to private clinics, where testing and treatment cost IDR 200,000-300,000 (USD 12-18), imposing additional financial burdens.

However, stakeholders viewed potential in a more integrated public-private mix (PPM) model to narrow service gaps. Regarding frequent shortages of malaria diagnostics and medicines, an NGO representative reflected,

"How can we effectively combat mosquitoes and parasites when the necessary weapons [tests and treatment] are not available on the battlefield?" (M/30, Asmat).

Here, a stronger cross-sector approach is needed to maintain malaria care. Better coordination between health services, and local government could reduce costs and improve access, especially for vulnerable groups. As one community member strongly expressed,

"We need reliable medicines, health workers who stay in the village, and health posts that function close to home." (M/67, Keerom).

Discussion

This study offers a unique insight into the experiences of OAP communities with malaria care in the context of broader structural inequities. By using the GEDSI framework, the findings extend beyond conventional health systems perspectives and illustrate how gender, disability, remoteness, and Indigenous status, overlap to produce experiences of marginalisation. Although these issues are common in Indonesia, they are also reflected among Indigenous and marginalised populations globally, highlighting the need for equity-driven approaches to malaria elimination.

The normalisation of malaria in daily lives of OAP communities was frequently described metaphorically as a routine and manageable illness. Similar perceptions have been documented in other high-burden settings, including Uganda[10], Kenya[11], Burkina Faso[12] and eastern Indonesia[13]. Such perceptions contribute to delays care-seeking, reliance on self-treatment, and limited community ownership of elimination efforts. Our findings show that many households continue to use traditional remedies and postpone seeking care at health centres, due to cost, distance or the belief that illness is only serious when one is unable to work[14].

Financial and geographic barriers can create a cycle of vulnerability. The findings indicate that long travel distances and high transport costs often delay malaria testing and treatment. Postponed treatment may worsen illness, reduce the ability to work, and lead to income loss. In rural Kenya, malaria costs are regressive, meaning poorer households spend a larger share of limited income and often borrow or sell assets for treatment[15]. Repeated out-of-pocket payments and productivity losses reinforce poverty traps[16], while income shocks constrain broader economic development[17]. Within gendered household structures, where male authority is often stronger in rural settings[18], malaria can destabilise both health and livelihoods when men are the main breadwinners, further limiting timely care-seeking[15].

Among OAP communities, health is often understood functionally, defined by the ability to fulfil social and subsistence roles on ancestral lands (*tanah ulayat*)[7]. This perspective reflects a holistic Indigenous worldview in which illness is recognised not merely by symptoms but when it disrupts daily functioning and core identities[19]. Reliance on traditional practices over allopathic care highlights a deeper need for ontological security and cultural safety[20]. When health services remain culturally detached, interventions may be perceived as imposed rather than supportive. Advancing beyond cultural competence towards *cultural safety[14], through critical reflection on power imbalances and marginalisation*[9] may be essential to foster trust and engagement in malaria elimination efforts.

Gendered roles in malaria management reflect broader patterns in global health. In this study, OAP women were frequently responsible for identifying symptoms and initiating care for children and relatives, yet many reported needing permissions from male partners before seeking treatment. Limited autonomy and dependence on male approval contributed to delays, particularly in rural, patrilineal communities[21]. These findings are consistent with evidence from other settings. In Kenya, women were actively involved with malaria care but had limited control over household decisions and restricted access to information and resources[11]. In Mozambique, women's limited power over health-related decisions was shaped by gender norms that placed men in charge on health decisions and finance[22]. Similarly, in Tanzania, mothers often led care-seeking[23], while fathers tended to delay action until illness became more severe[24].

However, despite these structural limitations, some encouraging observations were also found in this study. In some Papuan households, for example in Keerom and Yapen, men were reported to play more supportive roles, particularly during pregnancy. These examples of shared responsibility indicate that gender norms are not set in the stone and can change through appropriate interventions. This aligns with other evidence which shows that involving men in malaria outreach and decision-making improves care-seeking practices and reduces the caregiving burden on women[25]. Promoting joint decision-making and positioning men as active partners rather than passive participants in health may help rebalance household dynamics and improve malaria outcomes for all family members[22].

Disability and social exclusion remain key gaps in malaria programming. No participants self-identified as persons with disabilities, reflecting broader exclusion. Evidence from Tanzania found that

inaccessible facilities, unaffordable transport, and stigma delay care-seeking[26]. No Information, Education and Communication (IEC) materials in Braille or adapted formats were identified during facility observations. Although Indonesia has ratified the United Nation Convention on the Rights of Persons with Disabilities (UNCRPD) and enacted disabilities legislation[27], implementation remains limited, and disability-specific data are largely absent from routine health systems. This gap reflects global challenges in achieving equity in surveillance and service delivery[28].

CHWs are vital to extending malaria services in remote Papua, particularly for households facing long distance and high transport costs to primary health care facilities. As trusted local actors, they bridge marginalised households and formal services, especially for women and children[29]. However, inconsistent logistics, delayed incentives, and weak institutional integration limit their effectiveness and may undermine community trust[29]. Leveraging village funds (*Dana Desa*)to support CHWs incentives and formal recognition could reduce indirect costs by bringing testing and treatment closer to communities. In geographically isolated settings, this proximity function is central to equitable universal health coverage[30].

A GEDSI approach in Papua requires targeted training in gender-sensitive care, disability inclusion, and stigma reduction. Such capacity-building would better equip CHWs to serve women, persons with disabilities and OAP communities who often experience layered barriers to care. In Papua, where distance, and poor infrastructure already pose major barriers, malaria testing, treatment, and prevention must be physically and socially accessible. In geographically isolated settings, mobile outreach, community-based testing, and flexible service hours may strengthen access. Rural health posts should incorporate basic accessibility features, like ramps, alongside home-based outreach for people with mobility impairments or those who are unable to travel. Health information should also be made accessible for people with hearing, visual, or cognitive impairments, using visual aids, simplified language, and support from family caregivers[30]. Collaboration with Disabled Persons' Organisations (DPOs), faith-based networks and village leaders may also enhance inclusion in malaria services. Integrating disability-disaggregated indicators into health information systems is essential to monitor equitable access[30].

Based on our findings, operationalising GEDSI in malaria programming requires targeted steps, including recruiting CHWs from marginalised groups, strengthening supply chains in remote posts, delivering culturally and linguistically appropriate health education. At provincial and national levels, sustained investment in remote infrastructure, CHW incentives, and accessible IEC materials is essential to address the barriers identified in this study and align programmes with community priorities.

Finally, this study underscores the need to align malaria elimination in Papua with social justice. When targets mainly prioritise biomedical indicators, such as incidence, or test positivity, they may overlook disparities in access and lived experiences among OAP communities. Indigenous health encompasses cultural and social well-being[20]. Without applying GEDSI principles, elimination efforts risk excluding

those already marginalised. Locally grounded, culturally safe strategies that recognise Indigenous identities are essential to ensure that no community is left behind[14].

In conclusion, malaria elimination in Papua is both a health and equity issue, with OAP experiencing barriers affected by gender, disability, remoteness, and cultural identity. Eliminating malaria requires targeted actions, including support CHWs in remote areas, improve outreach to vulnerable groups, ensure culturally accessible health education, and maintain reliable malaria supplies. National surveillance should disaggregate data by ethnicity, gender, age, and disability to guide equitable responses, with appropriate safeguards to protect confidentiality and prevent discrimination. Embedding GEDSI into routine programming is essential to ensure no one is left behind in Indonesia's malaria elimination efforts.

Methods

Study design and setting

This qualitative study adopt the Malaria Matchbox Tool developed by the Global Fund (GF) and the Roll Back Malaria (RBM) Partnership[31], integrated with a gender equality, disability and social inclusion (GEDSI) perspective. By combining these frameworks, the study explored structural barriers and inequities affecting malaria service delivery among OAP, highlighting how social factors and marginalised identities from access to care.

Three districts in Papua (Keerom, Yapen, Asmat) were purposively selected due to their high malaria burden. These sites also encompassed seven customary territories (Fig 1) and represent a cross section of the broader population across Papua. Keerom, in the Mamta region, is home to highland and border communities. Although connected by road to Jayapura, the provincial capital, many rural areas remain hard to reach, with limited infrastructure and under-resourced health services, posing major challenges for timely malaria diagnosis and treatment. Yapen, in the Saireri region, is mainly inhabited by coastal and island communities. In remote islands, malaria services are often delayed because healthcare depends on air and sea transport. Weather conditions, long travel distances and high travel costs make access even harder. Asmat, in South Papua's Anim Ha region, is marked by lowland swamps and wide river systems. Its dispersed riverine communities rely on boats and small aircraft for transport, making healthcare delivery and sustained malaria services especially challenging (Fig 2).

Ethical approval

Ethical approval was obtained from the Faculty of Medicine, Universitas Indonesia. All participants provided informed consent in accessible language formats. Confidentiality, anonymity and the right to withdraw were assured.

Participant recruitment and sampling

Community entry was coordinated with the District Health Offices (DHOs), which provided support letters and introduced the research team to local stakeholders. In each district, the team met with village heads (*Kepala Kampung*), customary leaders (*Ondoafi* or equivalents), and frontline health workers. We explained the study objectives, gained community consent, and identified suitable villages and participants. These early meetings helped build trust and ensured culturally respected collaboration.

Villages were purposively selected based on high malaria burden, accessibility, cultural diversity, and the presence of priority groups, such as women and youth, people with disabilities, and remote households. Participants were recruited through purposive and snowball sampling, guided by community leaders and health staff. Eligible individuals were adults aged 18 years and above, self-identified as OAP, and had lived in the area for at least 12 months. Those unable to provide informed consent were excluded. Recruitment aimed to capture diverse perspectives across gender, age, caregiving role, disability status and social background.

Data collection

Data collection was conducted between June and July 2025. Field activities were supported by local gatekeepers, including Sub-Recipient (SR), Sub-Sub-Recipient (SSR) staff of *Persatuan Karya Dharma Kesehatan Indonesia* (PERDHAKI) and malaria programme managers from the Primary Health Centre (PHC).

Multiple qualitative methods were used, including focus group discussions (FGDs), and key informant interviews (KIIs) with community members, healthcare workers (HCWs), community health workers (CHWs), traditional leaders, and non-governmental organisation (NGO) staff. Narrative case studies captured personal experiences with malaria. Facility observations and document reviews assessed infrastructure and inclusion.

A series of FGDs capturing everyday community perspectives were conducted across the three districts, with groups stratified by gender, age, and social role, including caregivers, women, and CHWs (Fig 3). Key informant interviews (KIIs) targeted individuals with specialised knowledge of health systems or community structures. This included malaria programme coordinators, PHC heads, NGO representatives, village officials, and customary leaders.

To explore the more personal dimensions of malaria, six narrative case studies were conducted with individuals who had encountered malaria directly, either as patients or caregivers. These stories provided deeper insight into care-seeking decisions and treatment pathways. In addition, facility and community observations were conducted using structured checklists to assess the availability, accessibility, and inclusiveness of malaria services within both health facilities and community settings.

All sessions took place in familiar community spaces, such as homes, village halls, or PHCs, recommended by local contacts. Conducted in Papuan Malay language, each session was facilitated by

a lead interviewer and note-taker, recorded with consent and transcribed. Discussion guides focused on cultural beliefs, gender roles, health service gaps and social inclusion barriers.

Data collection continued until thematic saturation was reached, or when no new themes constructed from additional data collection. The field team conducted debriefs and applied rapid preliminary coding to monitor saturation in real-time. In challenging-to-reach villages and underrepresented groups, such as persons with disabilities, targeted recruitment was extended to ensure adequate representation and analytical depth.

Declarations

Data analysis

Data were analysed using thematic analysis[32], guided by a GEDSI lens to examine differences in access, exposure, and inclusion across gender, age, disability and location, and to explore how identity and social roles influenced care-seeking and household decision-making.

The codebook combined deductive codes informed by the Malaria Matchbox Tool, reflecting key equity dimensions, with inductive codes that constructed from the field data. Two researchers independently coded a subset of transcripts using NVivo 12. Differences were discussed and resolved through team discussion, and the refined codebook was applied to the full dataset.

To enhance credibility, triangulation was conducted across FGDs, KIIs, case studies, policy reviews and facility observations using the WHO's Service Availability and Readiness Assessment (SARA) tool[33] and Indonesia's e-SISMAL system. Preliminary findings were shared with local stakeholders to validate interpretations and ensure they reflected community realities.

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Authors' Contributions

LLE, IE, HH, AD, JOY, AM, and HDP conceived and designed the study. LLE, AAS, KDL, and AAA collected, validated, and interpreted the data. LLE, AAS, HH, AD, and JOY were involved in data analysis and interpretation. LLE, AAS, and IE drafted the manuscript. All authors critically reviewed the manuscript for important intellectual content and read and approved the final version.

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Tables

Table 1. Characteristics of the participants

Characteristics	Study Sites		
	Keerom	Yapen	Asmat
Number of participants	47	25	36
Focus Group Discussions			
Female community member	11	8	14
Male community member	12	6	6
Community health worker	18	4	6
Key Informant Interview			
District Malaria Program Manager	1	1	1
Healthcare worker	2	2	3
Community health worker	1	0	0
Community leader	1	1	3
NGO representative	0	2	1
Narrative Case Study			
Caretaker of malaria patient	1	1	2
Women	35	15	25
Mean of age, range (year)	39 (21-70)	39 (23-65)	43 (21-63)
Educational background			
Never attending school	1	0	5
Elementary	5	1	9
Junior school	11	7	13
Senior school	27	10	5
Diploma and Bachelor	3	5	4
Master and Doctoral	0	2	0

Table 2. Summary of key themes, community perspectives and regional variations in malaria-related health-seeking behaviours and barriers among Indigenous people in Papua.

Major Theme	Subthemes	Verbatim Quotes (Evidence)	Prevalence & Regional Nuance
Socio-Cultural Construction of Health & Care-Seeking	**Functional Health (Pragmatism)**	“Healthy means being able to work, go to the forest, or sea. If I can still walk, I am not yet sick.” (FGD Men, Yapen)	**High (All Sites):** Health is defined by productivity; illness recognized only when physical function fails.
	Normalisation of Malaria	“Malaria is like ‘spinach soup’ (*sayur bayam*), it’s there every day, and we are used to it.” (FGD Men, Keerom)	**High (Keerom & Yapen):** Malaria perceived as routine, reducing urgency for early diagnosis and treatment.
	Alternative Beliefs & Transition to Biomedical Understanding	“We used to believe it was caused by sorcery (*Suanggi*), but now we know it's mosquitoes.” (Head of Puskesmas, Asmat)	**Moderate (Asmat):** Shift toward biomedical explanations, though traditional beliefs persist, especially among elders.
	Traditional Remedies as First Response	“We boil papaya leaves before going to the clinic.” / “We use bloodletting (*iris-iris*) to release dirty blood or sitting nearby fire (*mengasap*) to keep warming.” (IDI NGO, Asmat)	**High (Asmat & Keerom):** Traditional treatments are still commonly used before seeking formal health services.
	Gender Norms in Health Response	“Even when I have a fever, I continue working in the fields.” (FGD Women, Yapen)	**High (All Sites):** Women delay care due to caregiving and productive responsibilities.
Structural Barriers & Health System Gaps	**Geographic & Financial Exclusion**	“Renting a boat is millions of rupiah. If we have no money, we just walk or stay home.” (IDI NGO, Asmat)	**Critical (Asmat):** Geography and transport costs are the primary barriers. **Moderate (Keerom):** Night travel and security concerns.
	Delayed Care Due to Cost and Transport	“If there is no money, people just stay at home and wait.” (FGD, Keerom)	**High (All Sites):** Financial constraints commonly delay or prevent care-seeking.
	Stockouts and Distrust	“The problem arises when we diagnose someone as positive [malaria], but the medicine is unavailable. As a result, people become discouraged from returning, thinking, “What’s the point of going if there’s no	**High (All Sites):** Stockouts of RDTs and antimalarials undermine confidence in public facilities.

		treatment available?"" (IDI Health Worker, Keerom)	
	Language and Health Messaging Gaps	"We don't always understand the explanation… Some people use nets for drying crops." (FGD, Yapen)	**High (Yapen & Asmat):** Language and literacy barriers limit understanding and correct use of malaria interventions.

Major Theme	Subthemes	Verbatim Quotes (Evidence)	Prevalence & Regional Nuance
GEDSI & Vulnerable Groups	**Gendered Burden of Care**	"Mothers are stronger; even with fever, they cook. Fathers tend to be pampered when sick." (FGD Women, Yapen)	**High (All Sites):** Women carry caregiving and household health responsibilities, often neglecting their own recovery.
	Male Support Emerging (Limited)	"When my wife is sick, I help with the children and make sure she gets to the clinic." (FGD Men, Yapen)	**Low–Moderate (Yapen):** Isolated examples of shared caregiving, not yet normative.
	Exclusion of Persons with Disabilities & Elderly	"There are no specific programs for the disabled; they just stay home and rely on family." (FGD CHW, Yapen)	**Very High (All Sites):** Systematic invisibility; no proactive outreach or accessible transport.
	CHWs fragility	"We really hope for a formal decree (*Surat Keputusan*) that clearly recognises our roles as CHW. At the moment, even obtaining one from the village head is difficult. We want our status as the 'extended arm' of health services to be formally acknowledged and respected." *(FGD, Keerom)*	**Moderate (Keerom/Asmat):** This highlight shows that the lack of legal recognition (SK) is a systemic barrier to the sustainability of the Kader program.

Figures

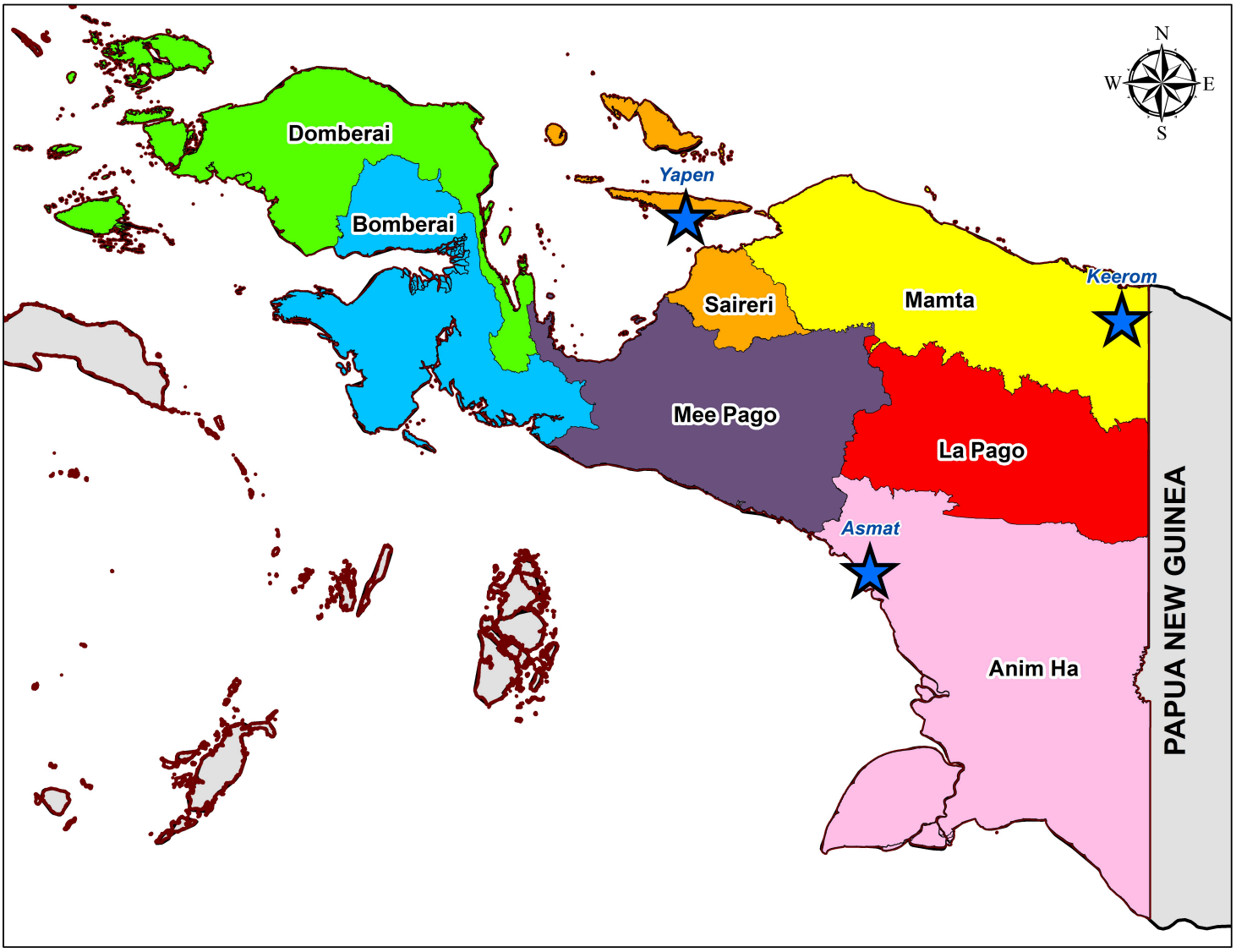


Figure 1

Map illustrating the selected assessment sites, Yapen, Asmat and Keerom, across Papua Island (marked with blue stars) among the seven indigenous cultural regions of Papua: Saireri, Mamta, La Pago, Mee Pago, Anim Ha, Domberai and Bomberai. Source: Regional Development Planning Agency (BAPPEDA), Papua Province (2017)



Figure 2

Riverine setting in Asmat showing reliance on boats to access health services. In many parts of Asmat, communities depend on river transport, Reaching the nearest primary health centre can take several hours by boat, which may delay timely care-seeking. Photo courtesy: Aria A. Satwiko.



Figure 3

Focus group discussion with OAP women in Asmat Regency. Community members shared perspectives on malaria, caregiving roles, and challenges in accessing health services in remote riverine settings. Photo courtesy: Karina D. Lestari.