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ASSOCIATION OF COMMUNITY-BASED HEALTH EDUCATION PROGRAMME WITH MALARIA PREVENTION IN BAUCHI, NIGERIA

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Abstract

Malaria prevention is a cornerstone of public health in Nigeria. Yet, gender-based disparities often undermine the effectiveness of health education initiatives. This study assessed the association of community-based health education (CBHE) with malaria prevention in Bauchi, Nigeria, with a specific focus on gender differences in awareness and participation. A cross-sectional study was conducted among 138 residents (63.8% male, 36.2% female) in two wards in Bauchi LGA. Data were collected via a structured questionnaire and analysed using descriptive statistics and Chi-Square tests with SPSS version 27.0. The results revealed a high overall knowledge about malaria transmission (97.8%). However, a stark gender gap emerged: a statistically significant association was found between gender and awareness about CBHE programmes ($\chi^2 = 15.456$, df = 1, $p < 0.001$), with men being overwhelmingly more aware than women. This disparity limits women's access to vital health information, despite their central role in household health management and childcare. While ITN ownership was high (71.7%), consistent use was suboptimal (48.6%), and awareness about CBHE did not show a statistically significant association with ITN use ($p = 0.095$). This paper argues that gender inequality in health education is a critical barrier to achieving health equity and advancing women's health rights. To be effective, malaria prevention strategies must be intentionally gender-transformative, ensuring that women are not just passive recipients but active participants in health education.

Keywords: *Gender and Health, Health Equity, Malaria Prevention, Community-Based Health Education, Women's Rights, Nigeria*

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INTRODUCTION

Malaria remains a profound public health challenge in Nigeria, contributing significantly to morbidity and mortality, particularly among vulnerable populations such as pregnant women and children under five. Nigeria accounts for approximately 27% of global malaria cases and 23% of global malaria deaths, making it the country with the highest malaria burden worldwide (World Health Organisation [WHO], 2023). Effective malaria prevention strategies, including insecticide-treated nets (ITNs), indoor residual spraying (IRS), intermittent preventive treatment in pregnancy (IPTp), and seasonal malaria chemoprevention (SMC), are essential for reducing the disease burden. Central to the success of these interventions is community-based health education (CBHE), which aims to improve health literacy, foster behaviour change, and empower communities to adopt sustainable preventive practices (Onyinyechi et al., 2023).

However, the effectiveness of health education is often mediated by socio-demographic factors, notably gender. In many regions of Nigeria, particularly the North-East, socio-cultural norms and gender-based decision-making structures significantly influence access to health information and resources. Women, despite their primary roles as caregivers and household health managers,

frequently face structural and cultural barriers that limit their autonomy and participation in community programmes (Ghahremani et al., 2019; Firdaus et al., 2025). In Northern Nigeria, only 34% of women participate in household health decisions, compared to higher rates in southern households (Jombo et al., 2010). This gender disparity in access to health education has far-reaching consequences for malaria prevention, as women are the primary implementers of household-level preventive measures such as ITN use and care-seeking for febrile children.

Bauchi State, located in North-East Nigeria, is a malaria-endemic region with perennial transmission and seasonal peaks during the rainy season. The state is predominantly populated by the Hausa and Fulani ethnic groups, with farming, petty trading, and the civil service as the major occupations. Community-based health education and malaria prevention programmes are routinely implemented through local health facilities and community mobilisation activities supported by the State Ministry of Health and development partners. This study investigates the association between CBHE programmes and malaria prevention in Bauchi Local Government Area, with a specific focus on gender disparities in awareness and participation and their implications for health equity and women's health rights.

METHODOLOGY

A descriptive cross-sectional study design was employed to assess the effectiveness of CBHE programmes in preventing Malaria among residents of Bauchi Local Government Area, Bauchi State, North-East Nigeria. The study population comprised adult residents aged 18 years and above who had lived in the selected wards for at least 1 year before the study. Individuals who were mentally incapacitated or unwilling to give consent were excluded.

A multi-stage sampling technique was utilised. In the first stage, two wards with ongoing community-based malaria education programmes were purposively selected from Bauchi LGA based on programme presence and accessibility. In the second stage, a comprehensive household listing was conducted with assistance from community health workers and local leaders. In the third stage, systematic random sampling was used to select households, with the sampling interval determined by dividing the total number of listed households by the required sample size. In the fourth stage, one eligible adult per household was randomly selected for interview. A total of 138 valid responses were obtained and analysed.

Data were collected between 17th October and 1st November 2025 using a structured, interviewer-administered questionnaire adapted from the Roll Back Malaria and WHO malaria communication frameworks. The instrument covered demographic information, knowledge and awareness of malaria transmission and prevention, participation in CBHE, use of malaria preventive measures (ITNs, IRS, IPTp, SMC), and barriers and facilitators influencing participation. Data were analysed using SPSS version 27.0. Descriptive statistics (frequencies and percentages) were used to summarise the data, and Chi-square tests were conducted to determine associations between demographic variables and CBHE effectiveness, with statistical significance set at $p \leq 0.05$. Ethical approval was obtained from the Bauchi State Ministry of Health (Protocol: NHREC/TR/BAU-HREC/28/8/2023), and written informed consent was secured from all participants.

RESULTS

The demographic profile of the 138 respondents is presented in Table 1. The sample comprised predominantly males (63.8%) compared to females (36.2%). The majority were young adults aged 18–28 years (60.1%), and half were married (50.0%). Educationally, 45.7% had completed secondary school, and 44.2% had tertiary education. The majority identified as Muslim (76.1%).

Table 1: Demographic Characteristics of Respondents (N = 138)

Variable	Category	Frequency (n)	Percentage (%)
Sex	Female	50	36.2
	Male	88	63.8
Age (years)	18–28	83	60.1

Variable	Category	Frequency (n)	Percentage (%)
	29–38	23	16.7
	39–48	16	11.6
	49–58	11	8.0
	59–68	5	3.6
Marital Status	Married	69	50.0
	Single	67	48.6
	Divorced	2	1.4
Education	No formal education	4	2.9
	Primary	10	7.2
	Secondary	63	45.7
	Tertiary	61	44.2
Religion	Christianity	33	23.9
	Islam	105	76.1

Knowledge about Malaria was exceptionally high among respondents. Almost all (97.8%) had heard of Malaria, 92.8% correctly identified a protozoan organism as the causative agent, and 97.8% recognised infected mosquito bites as the mode of transmission. Symptom recognition was strong, with fever (97.0%) and headache (86.9%) being the most frequently identified symptoms, followed by diarrhoea (32.6%) and chills (32.6%). More than half (53.6%) reported being the primary decision-makers for health-related issues in their households. Regarding CBHE, 61.6% of respondents were aware of community-based health education programmes on malaria prevention in their area.

Table 2: Knowledge About Malaria CBHE

Variable	Response	Frequency (n)	Percentage (%)
Have you heard about Malaria?	Yes	135	97.8
	No	3	2.2
What is the cause of Malaria?	Protozoan	128	92.8
	Virus	6	4.3
	Bacteria	3	2.2
	Fungi	1	0.7
How is Malaria transmitted?	Infected mosquito bites	135	97.8
	Contaminated water	2	1.4
	Person to person contact	1	0.7
Aware about CBHE on Malaria?	Yes	85	61.6
	No	53	38.4

A critical finding emerged from the bivariate analysis regarding gender and knowledge. While there was no significant difference between gender in general malaria knowledge—including having heard about Malaria ($\chi^2 = 1.742$, $p = 0.187$), knowledge about the cause ($\chi^2 = 2.384$, $p = 0.497$), and knowledge of the mode of transmission ($\chi^2 = 0.733$, $p = 0.693$)—a highly statistically significant association was found between gender and knowledge about CBHE programmes ($\chi^2 = 15.456$, $df = 1$, $p < 0.001$). Among females, only 20 out of 50 (40.0%) were aware of CBHE programmes, compared to 65 out of 88 (73.9%) males. This stark disparity indicates that males were significantly more likely than females to be aware of and exposed to community-based malaria education interventions.

Table 3: Association Between Gender and Knowledge about Malaria CBHE

Variable	Response	Female (n)	Male (n)	χ^2	P-value
Have you heard about Malaria?	Yes	50	85	1.742	0.187
	No	0	3		
What is the cause of Malaria?	Protozoan	48	80	2.384	0.497
	Virus	2	4		
How is Malaria transmitted?	Mosquito bites	49	86	0.733	0.693
	Other	1	2		
Aware of CBHE on Malaria?	Yes	20	65	15.456	<0.001*
	No	30	23		

Note. *Statistically significant at $p \leq 0.05$.

Educational level did not show a significant association with malaria knowledge or CBHE awareness. There was no significant relationship between education and prior awareness of Malaria ($\chi^2 = 0.763$, $p = 0.858$), knowledge of the cause ($\chi^2 = 16.039$, $p = 0.066$), mode of transmission ($\chi^2 = 3.871$, $p = 0.694$), or awareness of CBHE programmes ($\chi^2 = 2.621$, $p = 0.454$). These findings suggest that CBHE programmes have been effective in disseminating core malaria knowledge across all educational groups (Table 4)

Table 4: Association Between Education Level and Knowledge about Malaria CBHE

		Highest education level						
		No formal education	Primary	Secondary	Tertiary	χ^2	df	P value
Have you heard about Malaria	No	0	0	1	2	0.763	3	0.858
	Yes	4	10	62	59			
What is the cause of Malaria	Bacteria	0	0	3	0	16.039	9	0.066
	Fungi	0	0	0	1			
	Protozoan	3	8	58	59			
	Virus	1	2	2	1			
How is Malaria transmitted	Contaminated water	0	0	0	2	3.871	6	0.694
	Infected Mosquito bites	4	10	63	58			
	Person-to-person contact	0	0	0	1			
Are you aware of any community-based health education on Malaria	No	3	4	22	24	2.621	3	0.454
	Yes	1	6	41	37			

The CBHE on the uptake of preventive measures was mixed. ITN ownership was high at 71.7%, but consistent nightly use was only 48.6%, with 31.2% never using their nets and 20.3% using them occasionally. Reasons for inconsistent use included forgetfulness (11.3%), heat (5.1%), allergies (3.6%), and personal beliefs (3.1%). Indoor residual spraying (IRS) coverage was low, with only 29.0% reporting their houses were sprayed in the last 12 months, primarily due to unavailability of services (36.2%), lack of awareness (23.2%), fear of chemicals (13.0%), and community refusal (2.9%). Awareness of preventive therapies was poor: 58.0% were unaware of IPTp, and 68.1% were unaware of SMC. Among pregnant respondents, only 17.4% reported using IPTp (Table 5).

Table 5: Frequency and Percentage of CBHE Malaria Preventive Measures

Questions	Responses	Frequency	Percentage (%)
Do you have ITN?	No	39	28.3
	Yes	99	71.7
How often do you use it?	Every night	67	48.6
	Never	43	31.2
	Occasionally	28	20.3
If not every night, why	Allergies	5	3.6
	Beliefs	4	3.1
	Forgetfulness	16	11.3
	Heat	7	5.1
Was your house spray in 12 months?	No	98	71
	Yes	40	29
If not why		34	24.6
	Fear of chemicals	18	13
	Not available	50	36.2
	Not aware	32	23.2
	Refused	4	2.9
Are you aware of IPTP?	No	80	58
	Yes	58	42
Are you aware of SMC?	No	94	68.1
	Yes	44	31.9
If pregnant, did you use IPTP?		49	35.5
	No	65	47.1
	Yes	24	17.4

Chi-square analysis revealed that awareness about CBHE did not significantly influence ITN ownership ($\chi^2 = 1.380$, $p = 0.240$), frequency of ITN use ($\chi^2 = 4.707$, $p = 0.095$), IRS utilisation ($\chi^2 = 3.201$, $p = 0.074$), awareness of IPTp ($\chi^2 = 0.204$, $p = 0.651$), or awareness of SMC ($\chi^2 = 2.373$, $p = 0.123$). These results indicate that whilst CBHE may improve general awareness, it has not yet translated into statistically significant behavioural differences regarding the uptake and consistent use of malaria preventive strategies in this population (Table 6).

Table 6: Association Between CBHE Awareness and Use of Malaria Preventive Measures

Variable	Not Aware (n)	Aware (n)	χ^2	P-value
Own ITN: Yes	35	64	1.380	0.240
Own ITN: No	18	21		
ITN use: Every night	27	40	4.707	0.095

Variable	Not Aware (n)	Aware (n)	χ^2	P-value
ITN use: Never	20	23		
ITN use: Occasionally	6	22		
House sprayed: Yes	20	20	3.201	0.074
House sprayed: No	33	65		
Aware of IPTp: Yes	21	37	0.204	0.651
Aware of IPTp: No	32	48		
Aware of SMC: Yes	21	23	2.373	0.123
Aware of SMC: No	32	62		

Note. None of the associations was statistically significant at $p \leq 0.05$.

Regarding participation barriers, 47.1% of respondents had never attended a CBHE session. Among participants, personal interest (26.1%) and health concerns (21.0%) were the key motivators. The primary barriers to participation were lack of access to education programmes (38.4%), poor service delivery (18.8%), illiteracy (10.1%), misinformation (8.7%), personal beliefs (8.0%), and poverty (4.3%). Despite these barriers, 96.4% of those who attended understood the malaria prevention messages, and 47.8% felt the education significantly helped their household prevent Malaria. Notably, 53.6% believed that all demographic groups—men, women, adolescents, children, and the elderly—should receive malaria education, and 53.6% rated current malaria education efforts as 'very effective' (Table 7).

Table 7: Barriers and Facilitators to Community-Based Health Education on Malaria

Questions	Responses	Frequency	Percentage
Have you attended a health education session before?	No	65	47.1
	Yes	73	52.9
What motivates you	Health concerns	29	21
	I have not attended before	59	42.8
	Incentives	10	7.2
	Personal interest	36	26.1
	Religious leaders	4	2.9
Have you missed a session before?	No	14	10.1
	Yes	124	89.9
What prevents you from participating in malaria prevention	Participated	16	11.6
	Beliefs	11	8
	Illiteracy	14	10.1
	Misinformation	12	8.7
	No access	53	38.4
	Poor services	26	18.8

Questions	Responses	Frequency	Percentage
	Poverty	6	4.3
Do you understand malaria messages?	No	5	3.6
	Yes	133	96.4
Who decides health matters in your household?	Parent/Guardian and Spouse	41	29.7
	Parent/Guardian	20	14.5
	Self	60	43.5
	Spouse	17	12.3
Who needs malaria education most	Adolescents	4	2.9
	All of the above	74	53.6
	Children	14	10.1
	Elderly	9	6.5
	Men	10	7.2
	Women	27	19.6
Has CBHE helped your household prevent Malaria	Not at all	52	37.7
	Somewhat	20	14.5
	Yes, significantly	66	47.8
How effective is this current malaria education	Moderate	40	29
	Not effective	13	9.4
	Not sure	11	8
	Very effective	74	53.6

DISCUSSION

The study demonstrates that whilst general knowledge of Malaria is remarkably high in Bauchi, significant gaps remain in translating this knowledge into consistent preventive practices. The high rates of disease recognition (97.8%), accurate identification of the causative agent (92.8%), and correct knowledge of the mode of transmission (97.8%) align with national survey findings and global expectations in endemic settings, where repeated exposure, public health campaigns, and household experiences contribute to high disease recognition (Isiko et al., 2024; Greenwood et al., 2005). The high proportion of accurate responses suggests that CBHE programmes have been successful in transmitting biomedical explanations of malaria transmission, surpassing regional averages in which misconceptions about heat exposure, dirty environments, or spiritual causation persist (Agyemang-Badu et al., 2023).

However, the stark gender disparity in awareness about CBHE programmes is the most critical finding of this study. The highly significant association between gender and CBHE awareness ($\chi^2 = 15.456$, $p < 0.001$), with only 40.0% of females being aware compared to 73.9% of males, reveals profound structural and socio-cultural barriers to women's access to health education. In Northern Nigeria, gender norms often restrict women's mobility and participation in public forums.

Consequently, women, who are typically the primary caregivers and decision-makers for child health, are systematically excluded from vital health education. This finding aligns with evidence from other African settings, where women—despite being primary caregivers—face greater structural barriers to accessing community programmes (Ghahremani et al., 2019; Asale et al., 2019). This exclusion not only limits women's ability to protect themselves and their families but also fundamentally undermines broader health equity goals.

The disconnect between awareness and behaviour change is another significant finding. Despite high ITN ownership (71.7%), consistent nightly use was only 48.6%, and uptake of interventions such as IRS (29.0%), IPTp (17.4%), and SMC awareness (31.9%) was alarmingly low. The lack of statistical association between CBHE awareness and the use of these preventive measures suggests that current educational models may be informative but are not sufficiently persuasive or enabling to overcome practical barriers such as discomfort, service unavailability, or entrenched beliefs. Similar patterns have been observed in other settings where health education increases awareness but struggles to overcome entrenched behaviours, socio-cultural norms, or infrastructural barriers (Awasthi et al., 2024; Bardosh et al., 2023).

The barriers to participation further illuminate the challenges. Nearly half (47.1%) of respondents had never attended a CBHE session, with lack of access (38.4%) and poor service delivery (18.8%) being the primary obstacles. These barriers are consistent with findings from community engagement models in Ethiopia, Ghana, and Haiti, where access constraints, mistrust, and low health literacy limit participation in and adherence to malaria prevention strategies (Asale et al., 2019; Agyemang-Badu et al., 2023). Notably, the finding that educational level was not significantly associated with malaria knowledge or CBHE awareness suggests that the programmes have been effective in reaching diverse educational groups when access is available, reinforcing the WHO's (2023) inclusive education principles.

CONCLUSION

Community-based health education in Bauchi has effectively imparted fundamental knowledge about Malaria to the population. However, it has not translated into sustained behavioural change or equitable programme reach. The significant gender gap in CBHE awareness is a major impediment to effective malaria control and health equity. Women, who bear the greatest burden of Malaria's consequences through pregnancy complications and childcare responsibilities, are the least likely to be reached by current educational interventions. This paradox demands urgent policy attention. Malaria prevention strategies must evolve from merely informative models to gender-transformative approaches that actively dismantle the structural barriers preventing women's participation in health education.

RECOMMENDATIONS

First, malaria health education programmes must adopt gender-transformative approaches, specifically designing interventions to reach women through female peer educators, home-based visits, and integration into maternal and child health services at antenatal clinics. Second, behaviour change communication strategies must move beyond basic awareness to address practical and socio-cultural barriers to the use of interventions, including discomfort with ITNs, fear of chemicals, and misinformation. Third, the accessibility of CBHE programmes must be expanded, particularly in underserved areas, through the training of additional community health volunteers and the use of mobile platforms and local-language radio broadcasts. Fourth, the delivery of preventive services such as IRS, IPTp, and SMC must be strengthened through improved logistics, consistent drug supply, and integration into routine health services. Fifth, future research should employ mixed-methods designs to explore the qualitative dimensions of gender barriers and develop context-specific, culturally grounded interventions for malaria prevention in Northern Nigeria.

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