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Multilevel Analysis of Factors Associated with Treatment-Seeking Behaviors among Caregivers with Febrile Children in Malawi

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Abstract. Early diagnosis and treatment of childhood fever, an important sign of potentially serious infections such as malaria, is essential for controlling disease progression, and ultimately, preventing deaths. This study examined individual- and community-level factors associated with treatment-seeking behaviors and promptness in these behaviors among caregivers of febrile under-five children in Malawi. The 2015–2016 Malawi Demographic Health Survey was used to analyze a nationally representative sample of 4,133 under-five children who had fever within 2 weeks before the survey. A multilevel logistic regression model was used to examine the association between individual- and community-level factors and treatment-seeking behaviors. Approximately 67.3% of the caregivers reported seeking treatment for their febrile child, whereas only 46.3% reported promptly seeking treatment. Children from communities with moderate and high percentages of educated caregivers were more likely to be taken for treatment (adjusted odds ratio [aOR] = 1.26, 95% CI = 1.01–1.58 and aOR = 1.31, 95% CI = 1.02–1.70, respectively) than those from communities with a low percentage of educated caregivers. Children from communities with moderate and high percentages of caregivers complaining about the distance to a health facility were less likely to be taken for treatment (aOR = 0.74, 95% CI = 0.58–0.96 and aOR = 0.67, 95% CI = 0.51–0.88, respectively). At the individual level, having a cough in the last 2 weeks, region, religion, and having better health behaviors in other health dimensions were associated with fever treatment-seeking behaviors among Malawian caregivers. Programs aimed at improving treatment-seeking behaviors should consider these factors and the regional variations observed in this study.

INTRODUCTION

Childhood fever is one of the typical signs of illness in young children.[1] Fever is also said to be a common clinical sign of *Plasmodium falciparum* infection.[2–4] Evidence has shown that a large proportion of fever in malaria-endemic countries may be attributed to malaria.[5] For instance, a Tanzanian study reported that 71.4% of fever cases were attributable to malaria.[5] Therefore, in many malaria-endemic countries, malaria is suspected primarily on the basis of fever.[5–8] The WHO recommends early malaria diagnosis (within 24 hours of the onset of symptoms) to prevent progression from uncomplicated to severe malaria.[9] The use of childhood fever to diagnose malaria in under-five children has aided the early diagnosis and treatment of uncomplicated malaria, thereby reducing the effects of severe malaria.[10–12] In addition, childhood fever may underline other childhood illnesses such as viral or bacterial infections.[13] Therefore, to timely diagnose, offer prompt management, and provide appropriate care, caregivers with febrile children should seek care at health facilities.[5,14]

Despite the importance of fever as an early sign of malaria and other childhood illnesses, the WHO reported that only 34% of caregivers with febrile children in sub-Saharan Africa (SSA) had sought treatment from a health professional in 2016.[9] This low rate of care-seeking behavior is a concern because most SSA countries are malaria endemic. Previous studies have revealed that most malaria-related deaths occur at home, with no medical help sought in such cases.[10,15] Moreover, when the treatment is sought, it is mostly delayed.[10] When dealing with fever, mothers often believe that it may just be an ordinary fever, not thinking of potential malaria or other serious illnesses.[16] A lot of women resort to home-based treatments for fever, which may subsequently result in severe illnesses.[16] In Malawi, 49.9% and 59.0% of febrile children younger than 5 years were brought for treatment in 2012 and 2014, respectively.[17–21] Although treatment-seeking behaviors among Malawian caregivers have steadily increased, the rates are relatively lower than those reported in other SSA countries such as Zambia (77.0%) and Ethiopia (87.8%).[10,22] Enhancing the fever treatment-seeking behavior in Malawi is, therefore, imperative. In addition, in Malawi, rates of prompt treatment-seeking behavior have been relatively lower than those of general treatment-seeking behavior, without considering the promptness.[23,24] Understanding the factors that influence treatment-seeking behaviors, especially the promptness, of caregivers in Malawi is important. Discerning these factors would help public health programs seeking to improve early diagnosis of childhood illnesses, such as malaria, to formulate targeted interventions.

Several studies have demonstrated that socioeconomic factors such as region, residence, caregiver's age, listening to radio, and perceived barrier to seeking treatment were associated with treatment-seeking behaviors.[10,25] For instance, caregivers' exposure to the media was associated with increased likelihood of treatment-seeking behavior for their febrile children in Tanzania.[26] A west Ethiopian study reported higher odds of treatment-seeking behaviors among younger caregivers (< 30 years) than among older caregivers (≥ 30 years).[10] However, no association between caregiver's age and treatment-seeking behavior was observed in a Liberian study.[25] The inconsistencies in these two studies could be explained by the differences in methodological approaches. The Ethiopian study assessed age as a categorical variable, whereas the Liberian study assessed age as a continuous variable. In addition, the Liberian study considered community effects, whereas the Ethiopian study did not account for community effects.

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Community socioeconomic characteristics may help mold one's personality, attitudes, lifestyle, and health behaviors. Thus, understanding community effects is essential for designing effective programs in different communities that possess different characteristics. Few studies have examined community effects on treatment-seeking behaviors for childhood fever.[26] In addition, studies examining treatment-seeking behavior have been limited in assessing the promptness at which the treatment was sought.

Therefore, using nationally representative samples, this study examined the individual- and community-level factors that influence treatment-seeking behavior of caregivers and compared the individual- and community-level factors that influence general and prompt treatment-seeking behaviors for childhood fever in Malawi.

METHODS

Study design and data source. This was a cross-sectional study using secondary analysis of data conducted in Malawi. The 2015–2016 Malawi Demographic and Health Survey (MDHS) was used. Detailed methodology and sampling design used by the MDHS have been described elsewhere.[23] Moreover, sampling involved two stages. The first stage involved the selection of 850 clusters from the 2008 Malawi Housing Population Census (the sampling frame) and household listing. The second stage involved the selection of households from the household list by using equal probability sampling criteria. A total of 30 and 33 households were chosen per urban and rural clusters, respectively. A questionnaire was used to collect information from women of reproductive age (15–49 years). The questionnaire collected information on sociodemographics and childhood illnesses. Among 25,146 eligible women, 24,562 were successfully interviewed, indicating a 98% response rate. In this study, the children's record file (KR dataset) was used for analysis. The KR dataset contains information on children younger than 5 years whose mothers were interviewed.[27] Therefore, a caregiver was defined as a mother aged between 15 and 49 years with a child/children aged 5 years or younger, who had responded to the questionnaire during the survey. The study was restricted to caregivers of febrile under-five children (n = 4,133). The frequencies among this sample revealed that each caregiver included in the analysis had only one child. There was, thus, no repetition or multiple children from the same caregiver. The unit of analysis for this study was children younger than 5 years and their caregivers.

Outcome variables. Two outcome variables were examined in this study. First, treatment seeking was defined as whether children with fever within 2 weeks before the survey were taken for any treatment to a health facility, a pharmacy, or a formal service provider (a formal service provider included health surveillance assistants but excluded traditional healers), and assessed as a binary variable (yes/no). The second outcome, prompt treatment-seeking behavior, was defined as whether children with fever within 2 weeks before the survey were taken for any treatment to a health facility, a pharmacy, or a formal service provider within the same or the next day after the onset of symptoms.[23,28–30] This was also assessed as a binary (yes/no) outcome.

Independent variables. In the present analysis, individual- and community-level factors were selected and considered based on their importance from the literature.[26,28,31–33] Key sociodemographics were further grouped to be examined at the community level.

Individual-level factors. Individual factors included the child's and caregiver's individual factors, namely, gender of the child (male or female) and age of the child in months (0–5, 6–11, 12–23, or ≥ 24), whether the child had cough in the last 2 weeks (yes or no),[28] whether the child had diarrhea in the past 2 weeks (yes or no),[28] the caregiver's age (15–24, 25–34, or ≥ 35 years), education (no formal education, or primary or secondary/postsecondary education), occupation status (unemployed or employed), parity (one, two, or three or more), religion (Catholics, Protestants, or Muslims and others), marital status (unmarried or married), and number of under-five children (one, two, or three or more). Three media outlets (newspapers, radio, and television) were used to measure caregivers' media exposure. Respondents who indicated either reading newspaper, listening to the radio, or watching television at least once a week were regarded as exposed to the media.[32] The variable was binary (yes or no). Other variables included region (northern, central, or southern), residence (urban or rural), and caregiver's perceived distance to a health facility (no problem or problem). The study further assessed caregivers' health behaviors. The number of antenatal care (ANC) visits during the last pregnancy was assessed as good (at least four) and poor (fewer than four),[34] the use of postnatal care services 2 months after delivery during the last pregnancy was assessed (yes/no), and the place of delivery was assessed as good (health facility) and poor (non-health facility).[23] Caregivers with all, two, and one/none of the behaviors were categorized as having good, medium, and poor health behaviors, respectively. Wealth was calculated using the principal component analysis by scoring household items and categorizing the calculated scores into quintiles from the poorest to the richest.[23] The present analysis categorized the upper 40% as rich, middle 20% as the middle, and lower 40% as poor.[35]

Community-level factors. In this analysis, a community was defined as a group of households sharing a common primary sampling unit/cluster within the dataset. Variables at the community level were constructed by aggregating them from individual-level factors. The community variables included community employment (proportion of caregivers in the community who were employed), community education (proportion of caregivers in the community with primary/post-primary education), community wealth (proportion of caregivers in the community who were rich), and community distance to a health facility (proportion of caregivers in the community who perceived the distance to a health facility as a problem). The continuous community-level variables were further categorized as low, moderate, and high using tertiles for easy interpretation of the results.[36–38] Furthermore, we linked the geographical covariates data for MDHS 2015–2016 to the children datasets to capture the community malaria prevalence. Malaria prevalence was defined as the average parasite rate of *P. falciparum* in children between the ages of 2 and 10 years in 2015.[39] Community malaria prevalence was categorized as low and high. Communities with malaria prevalence within and below the third quartile[40] of overall national communities' malaria prevalence (15.4%) were labeled as communities with low malaria prevalence, and those with malaria prevalence above the third quartile of overall national communities'

malaria prevalence were labeled as communities with high malaria prevalence.

Statistical analyses. *Descriptive statistics.* Using the "*svy*" command, the distributions of caregivers' characteristics according to general and prompt treatment-seeking behaviors were examined using chi-squared tests. The "*svy*" command considered the clustering and sample weights according to the survey design.

Modeling approaches. Fixed effects. A multilevel logistic regression analysis, using the "*xtmelogit*" command in Stata, was performed to assess the fixed effects of individual- and community-level factors. Four models were fitted in this two-level analysis in which caregivers (Level 1) were nested within their communities (Level 2). Model I was an unconditional model, which only included the outcomes "treatment seeking" and "prompt treatment seeking." The unconditional model assessed the community effects on the treatment-seeking behavior of the caregivers. Model II fitted the outcome and individual-level variables only, whereas Model III fitted the outcome and community-level variables only. Model IV fitted both the individual- and community-level variables. The fixed effects were reported as adjusted odds ratios (aORs) with their *P*-values and 95% CIs.

Measures of variation (random effects). Measures of variation were assessed using several indicators such as area variance (AV) and its 95% CI, the intraclass correlation coefficient (ICC), the median odds ratio (MOR), and the proportional change in variance.

Model fit testing. The goodness-of-fit of each model was assessed using the Akaike information criterion (AIC), with a lower value representing a closer model fit. The variance inflation factor (VIF) and tolerance were used to assess multicollinearity.[41] None of the variables displayed multicollinearity problems (all VIF < 10, tolerance > 0.1).

Interaction between sociodemographics and other key covariates were examined. As none of the interaction terms revealed significant findings (all *P*-value > 0.1),[42] they were excluded from the analysis. In addition, the MDHS asks questions to all women of reproductive age in a sampled household. As such, a single household may have more than one caregiver/child. In total, 100 children (2.4%) came from households with more than one child. A sensitivity analysis to select only one child per household from these households (through a random selection process) was thus conducted, and the results were fairly consistent. Therefore, the findings from the whole sample were reported in this study. All the analyses were performed using Stata version 15.0 (Stata Corp LP, College Station, TX).

Ethical considerations. All participants provided informed consent to the MDHS surveyors at the start of each individual interview. Ethical approval was obtained from the Malawi National Health Sciences Research Committee of the Malawi Ministry of Health before the survey. Approval to use the MDHS data was provided by the International Classification of Functioning, Disability, and Health under the Demographic Health Surveys (DHS) Program. These datasets are publicly available and can be accessed from the DHS Program on request.

RESULTS

Descriptive statistics. A total of 4,133 caregivers with febrile children (Level 1) living in 850 communities (Level 2) were analyzed. Overall, 67.3% (2,781) caregivers reported taking their febrile children for treatment. However, only 46.3% (1,914) caregivers reported to have promptly sought treatment. The distribution of characteristics of children's caregivers according to whether they sought treatment for their febrile child and according to whether they promptly sought treatment for their febrile child is displayed in Table 1. Seeking treatment was positively associated with the child's age (≥ 24 months), child experiencing cough in the last 2 weeks, child having no diarrhea in the last 2 weeks, having less child, residing in the central or southern region, being a rural dweller, having good health behavior practices, and living in a community with a moderate percentage of rich caregivers (all $P < 0.05$). The other characteristics were not significantly different. Caregivers with elder children (aged ≥ 24 months), a child who had cough in the last 2 weeks, a child without diarrhea in the last 2 weeks, secondary/postsecondary education, less child, and good health behavior practices and from communities with moderate and high percentages of educated caregivers were positively associated with prompt fever treatment-seeking behavior (all $P < 0.05$). Living in a community with a moderate or high percentage of caregivers complaining about the distance to a health facility was associated with lower rates of prompt treatment-seeking behavior ($P < 0.05$).

Modeling approaches. *Fixed effects.* Table 2 reveals the fixed effects of individual- and community-level factors on fever treatment-seeking behavior among caregivers. In Model IV, febrile children aged 6–11, 12–23, and ≥ 24 months were more likely to be taken for treatment than those younger than 6 months (aOR = 1.50, 95% CI = 1.11–2.03; aOR = 1.49, 95% CI = 1.14–1.96; and aOR = 1.92, 95% CI = 1.48–2.49, respectively). Children who had a cough within 2 weeks of the survey were more likely to be brought for treatment (aOR = 2.12, 95% CI = 1.82–2.47) than those who had no cough. Model IV further revealed that children who had diarrhea within 2 weeks before the survey, and whose caregivers had three or more children and belonged to the Muslims and other religious groups were less likely to be taken for treatment (aOR = 0.80, 95% CI = 0.68–0.93; aOR = 0.69, 95% CI = 0.51–0.92; and aOR = 0.70, 95% CI = 0.57–0.86, respectively), compared with their respective reference groups. Children from the central and southern regions (aOR = 1.95, 95% CI = 1.46–2.61 and aOR = 1.67, 95% CI = 1.27–2.20, respectively) were more likely to be taken for treatment than those from the northern region. Caregivers with moderate and good health behaviors were more likely to seek treatment for their febrile children than those with poor health behaviors (aOR = 1.53, 95% CI = 1.21–1.93 and aOR = 1.81, 95% CI = 1.41–2.32, respectively). Children living in communities with a high prevalence of malaria were more likely to be taken for treatment than those living in communities with a low prevalence of malaria (aOR = 1.26, 95% CI = 1.01–1.59). Children from communities with moderate and high percentages of educated caregivers were more likely to be taken for treatment (aOR = 1.26, 95% CI = 1.01–1.58 and aOR = 1.31, 95% CI = 1.02–1.70, respectively) than those from communities with low education. Children from communities with moderate and high percentages of caregivers perceiving the distance to a health facility as a problem were less likely to be taken for treatment (aOR = 0.74, 95% CI = 0.58–0.96 and aOR = 0.67, 95% CI = 0.51–0.88, respectively)

TABLE 1

Bivariate analysis of individual- and community-level factors associated with fever treatment-seeking behaviors

Variable	Sought treatment for fever			Promptly sought treatment		
	No (n = 1,352), n (%)	Yes (n = 2,781), n (%)	P-value*	No (n = 2,219), n (%)	Yes (n = 1,914), n (%)	P-value*
Individual-level factors						
Gender of child			0.210			0.889
Male	659 (31.7)	1,423 (68.3)		1,120 (53.8)	962 (46.2)	
Female	693 (33.8)	1,358 (66.2)		1,099 (53.6)	952 (46.4)	
Child's age (months)			**0.004**			**0.038**
< 6	152 (38.2)	246 (61.8)		220 (55.3)	178 (46.2)	
6 to < 12	211 (36.8)	363 (63.2)		332 (57.8)	242 (42.2)	
12 to < 24	390 (34.6)	736 (65.4)		630 (56.0)	496 (44.0)	
≥ 24	599 (29.4)	1,436 (70.6)		1,037 (51.0)	998 (49.0)	
Child had cough			**< 0.001**			**< 0.001**
No	887 (39.4)	1,632 (60.6)		1,982 (57.0)	967 (43.0)	
Yes	465 (24.7)	1,419 (75.3)		937 (49.7)	947 (50.3)	
Child had diarrhea			**0.039**			**0.027**
No	810 (31.2)	1,788 (68.8)		1,354 (50.1)	1,244 (47.9)	
Yes	542 (35.3)	933 (64.7)		865 (56.4)	670 (43.6)	
Caregiver's age (years)			0.162			0.664
15–24	481 (30.7)	1,086 (69.3)		827 (52.8)	740 (47.2)	
25–34	611 (33.6)	1,207 (66.4)		993 (54.6)	825 (45.4)	
≥ 35	260 (34.8)	488 (65.2)		399 (53.3)	349 (46.7)	
Education			0.277			**0.005**
No formal education	189 (36.8)	325 (63.2)		309 (60.2)	204 (39.8)	
Primary	900 (31.9)	1,922 (68.1)		1,523 (54.0)	1,298 (46.0)	
Secondary/postsecondary	263 (33.0)	534 (77.0)		387 (48.4)	412 (51.6)	
Occupation			0.056			0.837
Unemployed	441 (35.3)	808 (64.7)		667 (53.4)	582 (46.6)	
Employed	911 (31.6)	1,973 (68.4)		1,552 (53.8)	1,332 (46.2)	
Parity			**0.019**			**0.030**
One	301 (29.8)	708 (70.2)		519 (51.4)	490 (48.6)	
Two	251 (29.9)	588 (70.1)		422 (50.3)	417 (49.7)	
Three+	800 (35.0)	1,485 (65.0)		1,278 (55.9)	1,007 (44.1)	
Religion			0.085			0.052
Catholics	240 (30.8)	539 (69.2)		401 (51.5)	378 (48.5)	
Protestants	245 (29.3)	591 (70.7)		418 (50.0)	418 (50.0)	
Muslims and others	867 (34.4)	1,651 (65.6)		1,400 (55.6)	1,118 (44.4)	
Marital status			0.788			0.840
Unmarried	235 (33.3)	471 (66.7)		382 (54.1)	324 (45.9)	
Married	1,117 (32.6)	2,310 (67.4)		1,837 (53.6)	1,590 (46.4)	
Number of under-five children			0.946			0.956
One	796 (32.5)	1,652 (67.5)		1,312 (53.6)	1,136 (46.4)	
Two	464 (32.8)	949 (67.2)		758 (53.6)	655 (46.4)	
Three+	92 (33.8)	180 (66.2)		149 (54.8)	123 (45.2)	
Media exposure			0.863			0.951
No	863 (32.6)	1,783 (67.4)		1,419 (53.6)	1,227 (46.4)	
Yes	489 (32.9)	998 (67.1)		780 (48.8)	787 (51.2)	
Health behavior			**< 0.001**			**< 0.001**
Poor	208 (44.1)	264 (55.9)		305 (64.6)	167 (35.4)	
Moderate	682 (33.3)	1,367 (66.7)		1,114 (54.4)	935 (45.6)	
Good	462 (28.7)	1,150 (71.3)		800 (49.6)	812 (50.4)	
Distance to a health facility			0.691			0.743
No problem	527 (33.2)	1,060 (66.8)		846 (53.3)	741 (46.7)	
Problem	825 (32.4)	1,721 (67.6)		1,373 (53.9)	1,173 (46.1)	
Region			**0.018**			0.219
Northern	183 (41.0)	263 (51.0)		262 (58.8)	184 (41.2)	
Central	577 (31.8)	1,239 (68.2)		960 (52.9)	856 (47.1)	
Southern	592 (31.6)	1,279 (68.4)		997 (53.3)	874 (46.7)	
Residence			**0.003**			0.958
Urban	188 (41.2)	268 (58.8)		244 (53.6)	211 (46.4)	
Rural	1,164 (31.7)	2,513 (68.3)		1,975 (53.7)	1,703 (46.3)	
Wealth			0.318			0.618
Poor	629 (31.8)	1,352 (68.2)		1,075 (54.3)	906 (45.7)	
Middle	269 (31.7)	580 (68.3)		643 (62.5)	386 (37.5)	
Rich	454 (34.8)	849 (65.2)		681 (52.3)	622 (47.7)	
Gender of head of household			0.113			0.805
Male	1,019 (33.6)	2,015 (66.4)		1,624 (53.5)	1,410 (46.5)	
Female	333 (30.3)	766 (69.7)		595 (54.1)	504 (45.9)	
Community-level factors						
Community malaria prevalence			0.694			0.475
Low	991 (32.5)	2,059 (67.5)		1,623 (53.2)	1,427 (46.8)	
High	361 (33.3)	722 (66.7)		596 (55.0)	487 (45.0)	

(continued)

TABLE 1
Continued

Variable	Sought treatment for fever			Promptly sought treatment		
	No (n = 1,352), n (%)	Yes (n = 2,781), n (%)	P-value*	No (n = 2,219), n (%)	Yes (n = 1,914), n (%)	P-value*
Community employment			0.094			0.194
Low	455 (35.9)	811 (64.1)		699 (55.2)	568 (44.8)	
Moderate	355 (30.3)	817 (69.7)		595 (50.8)	577 (49.2)	
High	542 (32.0)	1,153 (68.0)		925 (54.6)	769 (45.4)	
Community education			0.092			**0.011**
Low	578 (35.3)	1,060 (64.7)		943 (57.5)	696 (42.5)	
Moderate	389 (30.0)	906 (70.0)		667 (51.5)	628 (48.5)	
High	385 (32.1)	815 (67.9)		609 (50.8)	590 (49.2)	
Community wealth			**0.001**			0.129
Low	574 (33.2)	1,155 (66.8)		965 (55.8)	764 (44.2)	
Moderate	398 (28.1)	1,018 (71.9)		722 (51.0)	694 (58.8)	
High	380 (38.5)	608 (61.5)		532 (53.8)	456 (46.2)	
Community distance to a health facility			0.333			**0.024**
Low	315 (32.2)	662 (67.8)		476 (48.7)	502 (51.3)	
Moderate	467 (31.0)	1,038 (79.0)		817 (54.3)	688 (45.7)	
High	570 (34.5)	1,081 (65.5)		926 (56.1)	724 (43.9)	

Bold = significant ($P < 0.05$).
* Pearson's χ^2 test.

than those from communities with a low percentage of caregivers perceiving the distance to a health facility as a problem.

The fixed effects of individual- and community-level factors influencing prompt treatment-seeking behaviors are displayed in Table 3. In Model IV, children who had diarrhea within 2 weeks before the survey and whose caregivers belonged to the Muslim and other religious groups had reduced odds of being promptly taken for treatment (aOR = 0.85, 95% CI = 0.74–0.98 and aOR = 0.78, 95% CI = 0.65–0.93, respectively), compared with those who had no diarrhea and whose caregivers belonged to the Catholic group, respectively. Children who had a cough within 2 weeks before the survey and from the central and southern regions were more likely to be promptly taken for treatment (aOR = 1.24, 95% CI = 1.08–1.42; aOR = 1.70, 95% CI = 1.30–2.21; and aOR = 1.48, 95% CI = 1.15–1.90, respectively) than their respective reference groups. Caregivers with moderate and good health behaviors were more likely to promptly seek treatment for their febrile children than those with poor health behaviors (aOR = 1.56, 95% CI = 1.24–1.96 and aOR = 1.83, 95% CI = 1.44–2.32, respectively). The community-level factors revealed that children from communities with moderate and high percentages of educated caregivers had increased odds of being promptly taken for treatment (aOR = 1.26, 95% CI = 1.03–1.55 and aOR = 1.27, 95% CI = 1.01–1.59, respectively) compared with those from communities with a low percentage of educated caregivers. However, children from communities with moderate and high percentages of caregivers complaining about the distance to a health facility were less likely to be promptly taken for treatment (aOR = 0.69, 95% CI = 0.55–0.86 and aOR = 0.65, 95% CI = 0.51–0.84, respectively) than those from communities with a low percentage of caregivers complaining about the distance to a health facility.

Measures of variation (random effects). Table 2 further presents the random effects of communities on treatment-seeking behaviors. Results from Model I revealed that a significant variation was observed in treatment-seeking behaviors across the communities (AV = 0.39, 95% CI = 0.26–0.59). The variation decreased but remained significant even after adjusting for individual- and community-level factors in Model IV (AV = 0.34, 95% CI = 0.22–0.54). The ICC in Model I demonstrated that 10.6% of the total variation was due to unobserved community effects; after adjustments in Model IV, 9.4% of the total variation was due to unobserved community characteristics. Model IV further revealed that the MOR showing the effects of community heterogeneity was 1.75. The individual- and community-level factors in the analysis explained 12.8% of the total variation in treatment-seeking behavior. Last, the AIC showed that Model IV was a better model (i.e., lower AIC than of other models). Similar results were observed for prompt treatment-seeking behaviors (Table 3).

DISCUSSION

This is the first population-based study that examined both individual- and community-level factors associated with fever treatment-seeking behaviors in Malawi. The results demonstrated that treatment-seeking behavior of caregivers with febrile children aged 5 years and younger is influenced by socioeconomic and health-related factors operating at both individual and community levels in Malawi. Although few studies have examined fever treatment-seeking behaviors in Malawi,[43,44] the present study results revealed significant community effects and compared general and prompt fever treatment-seeking behaviors. Specifically, febrile children living in communities with high malaria prevalence and from communities with moderate and high percentages of educated caregivers were more likely to be taken for treatment than those living in communities with low malaria prevalence and a low percentage of educated caregivers, respectively. Caregivers with febrile children from the central and southern regions exhibited higher odds of seeking treatment than their northern region counterparts.

The prevalence of treatment-seeking behavior among caregivers with febrile children was 67.3%. However, only 46.3% promptly sought treatment. A study in Liberia reported that 98.5% of caregivers with children having fever in the last 2 weeks had sought treatment.[25] The higher prevalence could be attributed to the fact that the Liberian study

TABLE 2
Measures of association between individual- and community-level factors and fever treatment-seeking behavior

Variable	Model I		Model II		Model III		Model IV	
	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value
Individual-level factor								
Gender of child								
Male	–	–	1.00		–	–	1.00	
Female	–	–	0.93 (0.81–1.08)	0.393	–	–	0.93 (0.81–1.08)	0.360
Child's age (months)								
< 6	–	–	1.00		–	–	1.00	–
6 to < 12	–	–	**1.49 (1.10–2.02)**	**0.010**	–	–	**1.50 (1.11–2.03)**	**0.008**
12 to < 24	–	–	**1.49 (1.13–1.95)**	**0.004**	–	–	**1.49 (1.14–1.96)**	**0.004**
≥ 24	–	–	**1.92 (1.36–2.29)**	**< 0.001**	–	–	**1.92 (1.48–2.49)**	**< 0.001**
Child had cough								
No	–	–	1.00		–	–	1.00	
Yes	–	–	**2.14 (1.83–2.50)**	**< 0.001**	–	–	**2.12 (1.82–2.47)**	**< 0.001**
Child had diarrhea								
No	–	–	1.00		–	–	1.00	
Yes	–	–	**0.79 (0.67–0.93)**	**0.004**	–	–	**0.80 (0.68–0.93)**	**0.005**
Caregiver's age (years)								
15–24	–	–	1.00		–	–	1.00	
25–34	–	–	1.06 (0.84–1.35)	0.627	–	–	1.05 (0.82–1.33)	0.700
≥ 35	–	–	0.97 (0.72–1.31)	0.845	–	–	0.97 (0.72–1.31)	0.835
Education								
No formal education	–	–	1.00		–	–	1.00	
Primary	–	–	1.16 (0.91–1.47)	0.223	–	–	1.05 (0.82–1.34)	0.697
Secondary/ post-secondary	–	–	0.96 (0.71–1.30)	0.795	–	–	0.87 (0.64–1.18)	0.368
Employment								
Unemployed	–	–	1.00		–	–	1.00	
Employed	–	–	1.16 (0.98–1.37)	0.079	–	–	1.12 (0.94–1.33)	0.214
Parity								
One	–	–	1.00		–	–	1.00	
Two	–	–	0.80 (0.63–1.03)	0.087	–	–	0.81 (0.63–1.04)	0.099
Three+	–	–	**0.68 (0.51–0.92)**	**0.011**	–	–	**0.69 (0.51–0.92)**	**0.013**
Religion								
Catholics	–	–	1.00		–	–	1.00	
Protestants	–	–	0.90 (0.70–1.15)	0.379	–	–	0.89 (0.69–1.14)	0.347
Muslims and others	–	–	**0.70 (0.57–0.85)**	**< 0.001**	–	–	**0.70 (0.57–0.86)**	**0.001**
Marital status								
Unmarried	–	–	1.00		–	–	1.00	
Married	–	–	1.10 (0.88–1.38)	0.416	–	–	1.11 (0.88–1.39)	0.383
Number of under-five children								
One	–	–	1.00		–	–	1.00	
Two	–	–	1.19 (0.99–1.42)	0.053	–	–	1.20 (1.00–1.43)	0.077
Three+	–	–	1.29 (0.94–1.76)	0.112	–	–	1.32 (0.97–1.82)	0.078
Media exposure								
No	–	–	1.00		–	–	1.00	
Yes	–	–	1.09 (0.93–1.29)	0.293	–	–	1.10 (0.93–1.29)	0.263
Health behavior								
Poor	–	–	1.00		–	–	1.00	
Moderate	–	–	**1.53 (1.21–1.93)**	**< 0.001**	–	–	**1.53 (1.21–1.93)**	**< 0.001**
Good	–	–	**1.87 (1.46–2.40)**	**< 0.001**	–	–	**1.81 (1.41–2.32)**	**< 0.001**
Distance to a health facility								
Problem	–	–	1.00		–	–	1.00	
No problem	–	–	1.09 (0.93–1.28)	0.290	–	–	0.99 (0.83–1.18)	0.945
Region								
Northern	–	–	1.00		–	–	1.00	
Central	–	–	**1.78 (1.37–2.30)**	**< 0.001**	–	–	**1.95 (1.46–2.61)**	**< 0.001**
Southern	–	–	**1.77 (1.38–2.26)**	**< 0.001**	–	–	**1.67 (1.27–2.20)**	**< 0.001**
Residence								
Urban	–	–	1.00		–	–	1.00	
Rural	–	–	0.98 (0.74–1.28)	0.871	–	–	1.04 (0.75–1.44)	0.803
Wealth								
Poor			1.00				1.00	
Middle	–	–	0.99 (0.81–1.21)	0.919	–	–	0.96 (0.79–1.18)	0.731
Rich	–	–	0.98 (0.81–1.21)	0.952	–	–	0.98 (0.80–1.22)	0.876
Gender of head of household								
Male	–	–	1.00		–	–	1.00	
Female	–	–	1.06 (0.87–1.30)	0.558	–	–	1.06 (0.87–1.30)	0.552

(continued)

TABLE 2
Continued

Variable	Model I		Model II		Model III		Model IV	
	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value
Community-level factors								
Community malaria prevalence								
Low	–	–	–	–	1.00		1.00	
High	–	–	–	–	1.20 (0.99–1.45)	0.053	**1.26 (1.01–1.59)**	**0.048**
Community employment								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	**1.31 (1.06–1.61)**	**0.012**	1.21 (0.97–1.50)	0.090
High	–	–	–	–	**1.25 (1.02–1.54)**	**0.032**	1.05 (0.82–1.32)	0.693
Community education								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	**1.34 (1.08–1.66)**	**0.007**	**1.26 (1.01–1.58)**	**0.045**
High	–	–	–	–	**1.29 (1.03–1.64)**	**0.026**	**1.31 (1.02–1.70)**	**0.037**
Community wealth								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	1.21 (0.98–1.49)	0.072	1.24 (0.99–1.54)	0.053
High	–	–	–	–	**0.75 (0.58–0.97)**	**0.027**	0.80 (0.59–1.09)	0.162
Community distance to a health facility								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	**0.77 (0.61–0.96)**	**0.022**	**0.74 (0.58–0.96)**	**0.021**
High	–	–	–	–	**0.65 (0.51–0.83)**	**< 0.001**	**0.67 (0.51–0.88)**	**0.005**
Measures of variation								
Random effects								
Variance (95% CI)	**0.39 (0.26–0.59)**	**< 0.001**	**0.37 (0.24–0.58)**	**< 0.001**	**0.32 (0.20–0.51)**	**< 0.001**	**0.34 (0.22–0.54)**	**< 0.001**
ICC (%)	10.6		10.1		8.9		9.4	
PCV	Ref		5.1		18.0		12.8	
MOR	1.81		1.79		1.72		1.75	
Model fit								
AIC	4,921.7		4,773.5		4,895.9		4,760.8	

AIC = Akaike information criterion; aOR = adjusted odds ratio; ICC = intraclass correlation coefficient; MOR = median odds ratio; PVC = proportional change in variance.
Bold = significant ($P < 0.05$).
Model I: unconditional model with random intercepts and no predictors.
Model II: adjusted for individual-level factors only: gender of the child and child's age; caregiver's age, education, employment, parity, religion, and marital status; number of under-five children of the caregiver; and caregiver's exposure to media, region, residence, wealth, perception about the distance to a health facility, and health behavior.
Model III: adjusted for community-level factors: community employment, community education, community wealth, and community distance to a health facility.
Model IV: controlled for both individual- and community-level factors in Models II and III.

was conducted following a social and behavior change campaign, and probably, most women had just been exposed to malaria-related messages. In terms of prompt treatment-seeking behavior, a similar lower rate of 42% was observed in a longitudinal study in Zambia.[22] Previous studies have reported that home-based fever treatment practice may be among the reasons for delayed treatment-seeking behaviors.[16,29] The lower prevalence of timely treatment-seeking behaviors highlights the importance of formulating strategies to improve caregivers' ability to recognize and seek appropriate care for fever.

Regional variation in terms of seeking treatment and promptness in seeking treatment was observed in Malawi. Similarly, in Liberia, regional differences were observed in treatment-seeking behaviors.[25] A study in four rural and urban health centers in Malawi revealed that 25% of all fevers in children were malaria related.[45] The Malawi National Malaria Control Programme policy then recommends prompt parasitological confirmation among fever cases before treatment commences.[21] As a result, febrile case management is integrated with malaria programs in Malawi.[17] A higher prevalence of malaria has been reported in the southern and central regions of Malawi than in the northern region.[46] Subsequently, malaria programs, messages, and efforts may be more concentrated in these high-prevalence regions, making the people in these regions more aware of how they should act when their children have fever. Febrile children whose caregivers belonged to the Muslim and other religious groups were less likely to be taken for treatment and promptly taken for treatment. Religious beliefs have been associated with the use of health services.[47–49] In Ghana, religious beliefs are associated with adherence to medication.[50] Therefore, qualitative studies are necessary for Malawi to understand different religious beliefs and their influence on treatment-seeking behaviors.

A higher parity was associated with reduced odds of seeking treatment for febrile children. This may be because caregivers with more children may have more responsibility to appropriately take care of their children than those with fewer children.[10,51] In addition, multiparous caregivers are more likely to be older and may believe that they have the necessary skills based on their previous experiences to take care of the children.[30] Surprisingly, children older than 6 months were more likely to be brought in for treatment than those younger than 6 months. Most previous studies have reported that caregivers with infants are more likely to seek treatment than those with older children.[28] The present study results are consistent with those of an Indian study, where prevalence of treatment seeking for younger children was lower than those for older children.[52] Younger children may experience frequent illnesses, most of which get resolved on their own.[52] Nevertheless, future studies should explore further about

TABLE 3

Measures of association between individual- and community-level factors and promptness in fever treatment-seeking behavior

Variable	Model I		Model II		Model III		Model IV	
	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value	aOR (95% CI)	*P*-value
Individual-level factor								
Gender of the child								
Male	–	–	1.00		–	–	1.00	
Female	–	–	0.98 (0.86–1.12)	0.735	–	–	0.98 (0.85–1.11)	0.713
Child's age (months)								
< 6	–	–	1.00		–	–	1.00	
6 to < 12	–	–	1.03 (0.78–1.37)	0.822	–	–	1.04 (0.78–1.38)	0.792
12 to < 24	–	–	0.99 (0.77–1.28)	0.953	–	–	0.99 (0.77–1.29)	0.997
≥ 24	–	–	1.25 (0.98–1.60)	0.068	–	–	1.25 (0.98–1.60)	0.069
Child had cough								
No	–	–	1.00		–	–	1.00	
Yes	–	–	**1.25 (1.09–1.44)**	**0.001**	–	–	**1.24 (1.08–1.42)**	**0.002**
Child had diarrhea								
No	–	–	1.00		–	–	1.00	
Yes	–	–	**0.85 (0.73–0.98)**	**0.026**	–	–	**0.85 (0.74–0.98)**	**0.030**
Caregiver's age (years)								
15–24	–	–	1.00		–	–	1.00	
25–34	–	–	1.02 (0.82–1.27)	0.843	–	–	1.01 (0.81–1.25)	0.946
≥ 35	–	–	1.09 (0.83–1.44)	0.537	–	–	1.09 (0.82–1.43)	0.558
Education								
No formal education	–	–	1.00		–	–	1.00	
Primary	–	–	1.19 (0.95–1.49)	0.123	–	–	1.09 (0.87–1.38)	0.443
Secondary/ postsecondary	–	–	1.30 (0.98–1.72)	0.070	–	–	1.18 (0.89–1.57)	0.256
Employment								
Unemployed	–	–	1.00		–	–	1.00	
Employed	–	–	0.94 (0.81–1.09)	0.434	–	–	0.95 (0.81–1.11)	0.499
Parity								
One	–	–	1.00		–	–	1.00	
Two	–	–	0.95 (0.76–1.18)	0.636	–	–	0.95 (0.76–1.19)	0.654
Three+	–	–	0.85 (0.65–1.10)	0.218	–	–	0.85 (0.65–1.11)	0.234
Religion								
Catholics	–	–	1.00		–	–	1.00	
Protestants	–	–	0.97 (0.78–1.20)	0.775	–	–	0.96 (0.77–1.19)	0.698
Muslims and others	–	–	**0.78 (0.65–0.93)**	**0.006**	–	–	**0.78 (0.65–0.93)**	**0.007**
Marital status								
Unmarried	–	–	1.00		–	–	1.00	
Married	–	–	0.89 (0.73–1.10)	0.284	–	–	0.89 (0.73–1.10)	0.278
Number of under-five children								
One	–	–	1.00		–	–	1.00	
Two	–	–	1.15 (0.98–1.35)	0.090	–	–	1.16 (0.98–1.36)	0.076
Three+	–	–	1.24 (0.93–1.65)	0.145	–	–	1.26 (0.95–1.69)	0.109
Media exposure								
No	–	–	1.00		–	–	1.00	
Yes	–	–	0.95 (0.82–1.11)	0.536	–	–	0.96 (0.82–1.11)	0.551
Health behavior								
Poor	–	–	1.00		–	–	1.00	
Moderate	–	–	**1.56 (1.24–1.96)**	**< 0.001**	–	–	**1.56 (1.24–1.96)**	**< 0.001**
Good	–	–	**1.85 (1.46–2.35)**	**< 0.001**	–	–	**1.83 (1.44–2.32)**	**< 0.001**
Distance to a health facility								
Problem	–	–	1.00		–	–	1.00	
No problem	–	–	1.06 (0.92–1.22)	0.440	–	–	0.95 (0.81–1.12)	0.555
Region								
Northern	–	–	1.00		–	–	1.00	
Central	–	–	**1.49 (1.17–1.89)**	**0.001**	–	–	**1.70 (1.30–2.21)**	**< 0.001**
Southern	–	–	**1.47 (1.17–1.84)**	**0.001**	–	–	**1.48 (1.15–1.90)**	**0.002**
Residence								
Urban	–	–	1.00		–	–	1.00	
Rural	–	–	0.85 (0.66–1.09)	0.190	–	–	1.01 (0.75–1.35)	0.960
Wealth								
Poor	–	–	1.00		–	–	1.00	
Middle	–	–	1.01 (0.84–1.21)	0.920	–	–	0.98 (0.81–1.18)	0.820
Rich	–	–	1.14 (0.95–1.37)	0.152	–	–	1.11 (0.91–1.34)	0.295
Gender of head of household								
Male	–	–	1.00		–	–	1.00	
Female	–	–	0.87 (0.73–1.04)	0.134	–	–	0.87 (0.73–1.04)	0.134

(continued)

TABLE 3
Continued

Variable	Model I aOR (95% CI)	Model I *P*-value	Model II aOR (95% CI)	Model II *P*-value	Model III aOR (95% CI)	Model III *P*-value	Model IV aOR (95% CI)	Model IV *P*-value
Community-level factors								
Community malaria prevalence								
Low	–	–	–	–	1.00		1.00	
High	–	–	–	–	1.11 (0.93–1.32)	0.259	1.17 (0.95–1.45)	0.142
Community employment								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	1.11 (0.92–1.35)	0.281	1.08 (0.88–1.31)	0.475
High	–	–	–	–	1.00 (0.82–1.21)	0.996	0.91 (0.73–1.13)	0.387
Community education								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	**1.33 (1.09–1.61)**	**0.006**	**1.26 (1.03–1.55)**	**0.025**
High	–	–	–	–	**1.25 (1.01–1.55)**	**0.041**	**1.27 (1.01–1.59)**	**0.045**
Community wealth								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	1.14 (0.94–1.37)	0.190	1.13 (0.93–1.38)	0.219
High	–	–	–	–	0.91 (0.72–1.16)	0.455	0.89 (0.67–1.18)	0.429
Community distance to a health facility								
Low	–	–	–	–	1.00		1.00	
Moderate	–	–	–	–	**0.69 (0.56–0.85)**	**< 0.001**	**0.69 (0.55–0.86)**	**0.001**
High	–	–	–	–	**0.64 (0.51–0.79)**	**< 0.001**	**0.65 (0.51–0.84)**	**0.001**
Measures of variation								
Random effects								
Variance (95% CI)	**0.36 (0.25–0.53)**	**< 0.001**	**0.33 (0.22–0.49)**	**< 0.001**	**0.31 (0.20–0.47)**	**< 0.001**	**0.29 (0.19–0.46)**	**< 0.001**
ICC (%)	9.9		9.1		8.6		8.1	
PCV	Ref		8.3		13.9		19.4	
MOR	1.77		1.73		1.70		1.68	
Model fit								
AIC	5,565.7		5,524.9		5,545.6		5,515.0	

AIC = Akaike information criterion; aOR = adjusted odds ratio; ICC = intraclass correlation coefficient; MOR = median odds ratio; PVC = proportional change in variance.
Bold = significant ($P < 0.05$).
Model I: unconditional model with random intercepts and no predictors.
Model II: adjusted for individual-level factors only: gender of the child and child's age; caregiver's age, education, employment, parity, religion, and marital status; number of under-five children of the caregiver; and caregiver's exposure to media, region, residence, wealth, perception about the distance to a health facility, and health behavior.
Model III: adjusted for community-level factors: community employment, community education, community wealth, and community distance to a health facility.
Model IV: controlled for both individual- and community-level factors in Models II and III.

the association between a child's age and fever treatment-seeking behaviors in Malawi.

Children who were reported to have had a cough in the last 2 weeks were more likely to be brought for fever treatment than those who had no cough. Children with cough may produce other symptoms such as difficult breathing[53] which may drive caregivers to seek care. Febrile children who had diarrhea in the last 2 weeks were less likely to be brought for treatment than those who had no diarrhea. Women are mostly taught on how to manage diarrhea cases at home using oral rehydration therapy (ORT).[54] A 2016 study in southern Malawi revealed that a higher proportion (68%) of women with children with diarrhea reported administering ORT at home, whereas 14% gave the children other fluids and only 13% visited a health facility.[55] In addition, women may regard diarrhea as a minor ailment[56] which can be easily managed at home without incurring further costs by visiting health facilities. Prior health service utilization was associated with increased odds of both treatment-seeking behaviors. This may indicate that caregivers with a history of more health service utilization probably possess better health behaviors, including seeking treatment for their febrile younger ones. In India, women who had fewer ANC visits were less likely to seek treatment for their sick children.[52]

Community characteristics have been reported to shape and influence different health outcomes.[57] Individuals living in the same communities are exposed to a common set of social climate that may influence decision-making and health behaviors.[58] Living in communities with high prevalence of malaria was associated with increased odds of treatment-seeking behavior for febrile children among caregivers. Because of high malaria prevalence, caregivers may be more likely to regard every fever case to be malaria related and, thus, rush to seek treatment at a health facility. In addition, women in these communities are more likely to have more information about malaria, as malaria health education programs may focus their efforts in these areas compared with low-prevalence areas. In Uganda, the odds of seeking treatment increased when caregivers had knowledge about malaria.[59] The finding that caregivers from communities with moderate and high percentages of educated caregivers were more likely to seek treatment and promptly seek treatment emphasizes the importance of women education and is similar to the results reported in Tanzania and Ethiopia.[26,60,61] Educated caregivers are more likely to comprehend health-care messages.[62,63] A study in Britain revealed that education may also enhance demand for services.[64] Women who are educated are also more likely to have access to information than women without formal education.[65] Once a community has a high percentage of these women, they are more likely to influence the decisions of fellow women by sharing their knowledge with others within the community,

in this case, about fever and appropriate treatment seeking.[66] Women's education is a form of empowerment that subsequently helps women to make independent decisions, and this has been reported to influence the uptake of health services, which might ultimately include appropriate treatment-seeking behaviors.[32,64,67]

The analysis revealed that the perceived distance to a health facility at an individual level was not significantly associated with treatment-seeking behaviors. This is in contrast to the results of studies conducted in Mozambique, Liberia, and Thailand–Myanmar border.[68–70] The disparities observed in this study and previous literature could be explained by how the information on distance to a health facility was captured. The present study collected information on caregivers' perception on the distance to the nearest health facility, which may vary because of caregivers' context, history, and beliefs. The Mozambican study measured distance according to the time (in hours) taken from households to reach the nearest health facility.[68] However, at the community level, children from communities with moderate and high percentages of caregivers who perceived the distance to a health facility as a problem were less likely to be taken for treatment and less likely to be promptly taken for treatment. Another Liberian study speculated that unmeasured community effects on treatment-seeking behaviors from their study could be due to the distance to a health facility.[25] Although individual-level factors may be stronger predictors of health outcomes than community-level factors, the study results indicated that improving community access to health facilities is of paramount importance.[71] However, the results in the present study should be interpreted with caution as perceived but not actual distance to a health facility was assessed.

This study used nationally representative samples, and, therefore, results could be generalized to all Malawian caregivers. In addition, although the information on the history of fever was based on recall, the 2-week recall period could help reduce recall bias. However, this study had some limitations, too. First, as a cross-sectional study, causal inferences could not be drawn. Second, the use of clusters or administratively defined boundaries could yield information bias for those caregivers from unfitted administrative communities. Third, self-reports on whether treatment was sought are prone to social desirability bias. Caregivers may attempt to present that they take good care of their children by, among others, seeking treatment whenever their children have fever. Non-differential misclassification may have biased the association toward the null. Fourth, the study was not able to examine the influence of caregivers' knowledge, perceptions, and attitudes on different childhood illnesses that provoke fever such as malaria, which may play a role in influencing whether one seeks treatment and could help explain the significant unmeasured community effects observed in this study.

CONCLUSION

The study revealed that 67.3% of the caregivers reported seeking treatment for their febrile child, whereas 46.3% reported promptly seeking treatment. Therefore, in Malawi, improving prompt treatment-seeking behavior should be emphasized. In an effort to improve the management of childhood illnesses, including the life-threatening disease of malaria, public health practitioners should consider that a low community education level, evident regional variations, and perceived community distance to health facilities may derail treatment-seeking behaviors. Programs that consider both individual and community characteristics may prove vital to effect improved behaviors. Hence, the results form a basis for future programs to conduct proper profiling of communities when implementing programs focusing on febrile case management. In addition, messages on treatment-seeking behaviors for febrile children should focus more on multiparous women. Future studies should explore other institution-based factors, such as availability of skilled personnel and drugs, which may influence treatment-seeking behaviors of caregivers.

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