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Ideational factors associated with appropriate care-seeking for fever among caregivers of children under five years of age: a multi-country analysis in sub-Saharan Africa

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Abstract

Background With an estimated 247 million cases and 619,000 deaths reported worldwide in 2021, malaria remains a major cause of morbidity and mortality. The World Health Organization (WHO) Africa region accounts for most cases and deaths. As children under the age of five are especially vulnerable to malaria, seeking care for a febrile child within 24 hours of the start of a fever at a facility or community health worker (i.e., appropriate care-seeking) is a foundational behaviour for reducing risk of malaria mortality. However, faced with a wide range of possible approaches and content that can be employed by social and behaviour change (SBC) programmes to improve care-seeking for fever, it can be challenging for decision-makers to focus efforts and resources on the most promising strategies. This study examines factors influencing appropriate care-seeking for fever among caregivers of children under five years of age in Côte d'Ivoire, the Democratic Republic of Congo, and Benin with the aim of informing SBC programmes on ways to focus efforts and resources.

Methods Data for this analysis was collected via Malaria Behaviour Surveys (MBS) conducted in Côte d'Ivoire, the Democratic Republic of Congo, and Benin. Participants in each country were selected using a multi-stage cluster random sampling approach to capture representative data at the sub-national level. Behavioural, demographic, and ideational data pertaining to malaria were collected using similar data collection tools in each country. Analyses were limited to female caregivers of children under five with fever in the past 14 days (723 in Côte d'Ivoire, 974 in the Democratic Republic of Congo, and 460 in Benin). Multivariate logistic regression models assessed the association between appropriate care-seeking for febrile children under five and ideational and sociodemographic independent variables.

Results Varying sociodemographic and ideational factors were significant in each country. The percentage of caregivers reporting appropriate care-seeking for children was 62% in Côte d'Ivoire, 41% in the Democratic Republic of Congo, and 53% in Benin. Child age, household poverty, geographic zone of residence, and exposure to malaria

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messages were significantly associated with appropriate care-seeking in one or two of the countries. Correct knowledge about optimal timing to seek care for a febrile child was positively associated with the behaviour in all three countries, as was interpersonal discussion about malaria. Other variables, including attitudes, perceived self-efficacy, the perception that the behaviour is normative among parents in the community, and the perception that health workers charge parents for malaria services, yielded a significant association in at least one country.

Conclusions Several variables were associated with appropriate care-seeking in the three countries, suggesting that specific factors can be leveraged for SBC programmes seeking to increase appropriate care-seeking. First, programmes that expand exposure to malaria-related messages are likely to reach people in need. The modalities needed to reach the needed population vary by country. Health communication emphasizing the need for prompt action after a child's fever onset (i.e. the same or next day) and that care should be sought directly at a health facility will address prevalent current knowledge gaps. Further, programmes may benefit to promote interpersonal discussion about malaria between spouses, families, and friends, particularly if the discussion is centred around the well-being of children in the community. Given the strong trends observed in these factors across three countries, they may also be relevant to other countries in francophone Africa. Finally, country-specific strategic directions are also recommended for factors that were significant in only one country.

Keywords Malaria, Care-seeking, Ideation, Fever, Children under-five, Côte d'Ivoire, Democratic Republic of the Congo, DRC, Benin

Background

Malaria care-seeking behaviour in sub-Saharan Africa

In 2022, there were 249 million malaria cases and 619,000 malaria deaths across 85 endemic countries and areas. The World Health Organization (WHO) Africa region accounts for 94% of global cases and 95% of deaths [1]. While malaria deaths in this region have been reduced by 44% over the past two decades, progress has stalled among some sub-Saharan African countries. Malaria deaths among children under five years of age reflect this global trend. The proportion of total malaria deaths occurring among children under five has been reduced from 87% in 2000 to 77% in 2020, though they remain the most vulnerable to the impacts of infection [2].

Appropriate care-seeking for fever (defined as seeking care within the same or next day at a health facility or through a trained health worker) is an important behaviour for reducing malaria mortality. Population surveys across sub-Saharan Africa indicate modest improvements in care-seeking for fever among children under-five years of age (from 65% in 2005 to 67% in 2019), with most caregivers seeking care from public health facilities [1].

Surveys such as Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) have consistently provided a representative description of health behaviours in sub-Saharan Africa, included those related to malaria. However, survey reports and secondary analyses of these datasets have rarely explored the relationship between psychosocial (social, emotional, and cognitive) variables and prompt care-seeking for young children with fever living in malaria-endemic areas. This is an emerging area of study, thus far revealing a mixed

picture: correct knowledge about malaria symptoms and effective prevention are often strongly, positively associated with appropriate care-seeking across several single-country studies [3–7]. Do et al. furthered the examination of psychosocial factors and appropriate care-seeking to incorporate community norms: This study concluded that caregivers in Nigeria and Madagascar who believed it was a community norm to seek care at a facility for children with fever experienced an increased likelihood to practice the behaviour themselves [8]. Several studies have found that a female caregivers' involvement regarding health care decisions are positively associated with care-seeking for febrile children [9–11], the Do et al. multi-country study found no such association [8], suggesting context-specific correlates with behaviour. Perceived severity toward malaria has been found to be significantly and positively associated with care-seeking in Nigeria and Ethiopia [6, 7, 12, 13]. Finally, studies from Mozambique, Liberia, and India found caregivers more likely to seek care promptly for their children if the caregiver was recently exposed to malaria-related messages [14–16]. However, exposure to malaria-related messages in other settings show mixed results [17, 18]. Given these mixed findings, it is important to examine a comprehensive range of psychosocial factors to better understand the similarities or differences in influencing care-seeking for febrile children across country contexts.

The Malaria Behaviour Survey

The Malaria Behaviour Survey (MBS) [19] is a cross-sectional, theory-informed, household survey to assess a very comprehensive range of ideational, sociodemographic, household, and other factors associated with

malaria-related behaviours. The survey uses a standardized methodology published elsewhere [19] to facilitate similar implementation across different contexts. The MBS has been conducted on an ongoing basis across countries in sub-Saharan Africa since 2018. It was designed to complement other routine national household surveys, such as the DHS and MIS.

Conceptual model of the MBS

The MBS is informed by the Ideation Model of Strategic Communication and Behaviour Change [20–22] (Fig. 1), which provides a framework for understanding psychosocial factors (termed ideational factors in the model), their associations with health behaviour, and their applications into public health programming. As a construct, ideation is comprised of three domains: cognitive, emotional, and social-interactive. Within each domain are factors that might influence one’s behaviour, including knowledge, attitudes, perceived risk, perceived norms, self-image, emotional response, empathy, self-efficacy, perceived social support, and interpersonal communication [22]. The ideation model is designed to incorporate aspects of multiple behaviour change theories, and

emphasizes that one’s decision to adopt or continue a behaviour could involve the interaction of cognitive, emotional, and social-interactive variables that cumulate to effect an individual’s likelihood to practice a behaviour.

Ideational variables are subject to influence by communication and other types of social and behaviour change activities suggesting that the model is appropriate for research to inform social and behaviour change programs [23]. Storey et al. have previously examined the application of the ideational model when considering malaria interventions, finding that the model could effectively identify unique variables associated with malaria prevention behaviour across multiple endemic settings [24]. With these considerations for informing malaria programming in mind, the present analysis of MBS data was structured around the ideation model.

Country selection and malaria context

Three francophone countries were selected based on commonalities described below in malaria-related indicators and epidemiology, malaria severity among children, recent trends in care-seeking behaviour, and national scale of the MBS. Investigating a comprehensive set of

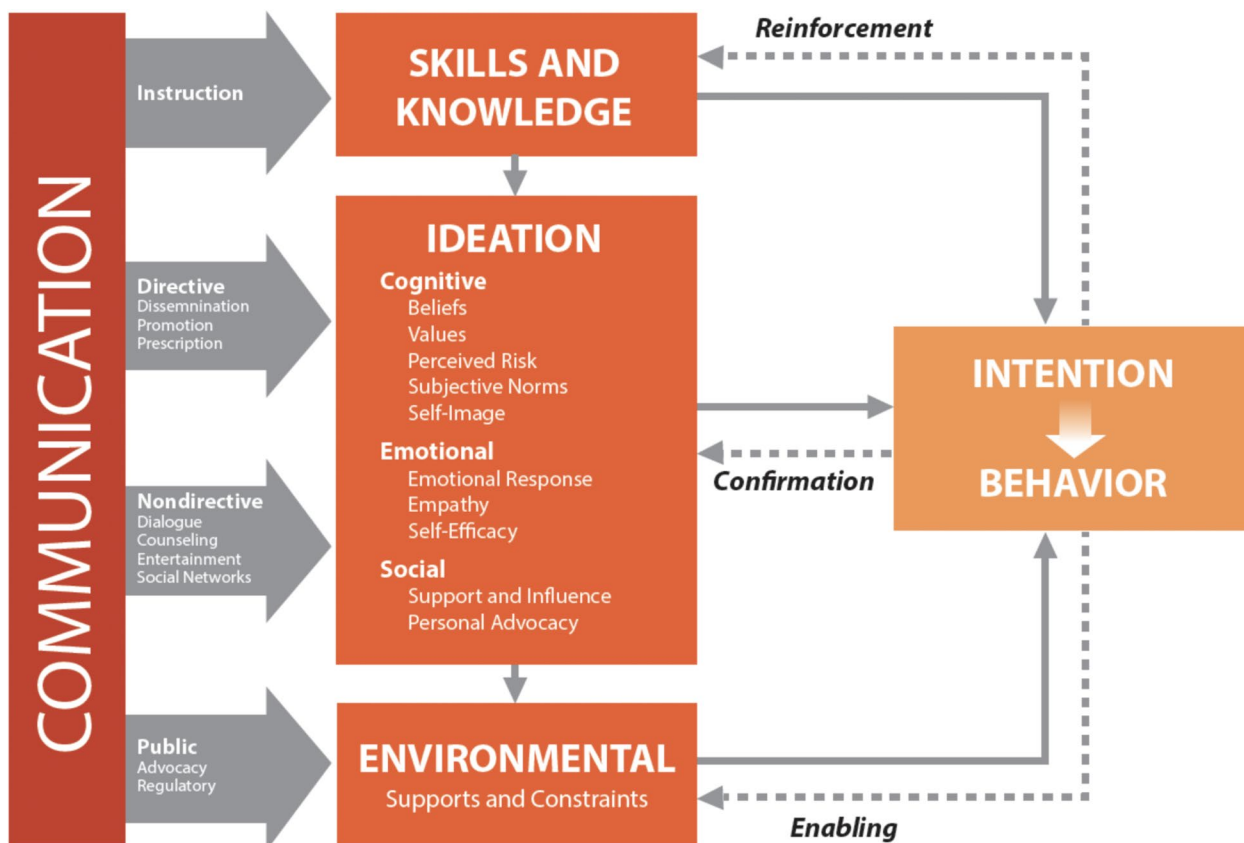


Figure 1: Ideation Model of Strategic Communication and Behaviour Change

behavioural factors in these three settings can provide information on both the similarities and context-specific differences and nuances that may inform broader malaria SBC programming across settings. To address this opportunity, this article presents results from national MBSs conducted in Côte d'Ivoire in 2018 [25], the Democratic Republic of the Congo (DRC) in 2021 [26], and Benin in 2021 [27].

Malaria is a leading cause of morbidity and mortality in Benin, Côte d'Ivoire, and DRC [1]. Malaria case incidence among the general population is high and comparable in each of these countries, with rates of 150 [28], 190 [29], and 206 [30] cases per 1,000 in Benin, Côte d'Ivoire, and DRC, respectively. According to national surveys (DHS, MIS and/or the Malaria Indicator Cluster Survey), children 6–59 months tested positive for malaria by microscopy at similar rates in each country, with 37% in Benin between 2017 and 2018 [31] and Côte d'Ivoire in 2016 [32], and 31% in DRC in 2017–2018 [33]. All three countries have adopted the WHO recommendation to ensure free malaria testing and treatment for children under five years old in the public sector, and artemisinin-combination therapy is the recommended first-line treatment. Regarding trends in care-seeking for children, the most recent DHS and MIS data suggest that, in all three of these countries, fewer than one-half of the proportion of febrile children were taken to a facility for care with no substantial increase from prior surveys [1].

These sub-optimal rates of care-seeking underline the importance of understanding factors associated with this behaviour. Given some of the above-mentioned contextual commonalities across Benin, Côte d'Ivoire, and DRC, similar trends in care seeking factors may be expected, although not presumed. This article presents one of few multi-country analyses of ideational variables related to malaria care-seeking behaviour; it compares MBS results from three countries with the objective of assessing trends and differences in ideational factors related to care seeking for febrile children. While previous studies in each of the three countries included in this analysis have examined ideational variables in the context of malaria, these are most often knowledge, and in some cases attitudes. The authors hypothesize that given similarities in malaria epidemiology and severity in children, a comprehensive examination of malaria-related ideation may reveal similar ideational factors influencing care-seeking behaviour.

Methods

The data analyzed were derived from MBS conducted in Côte d'Ivoire (2018), DRC (2021), and Benin (2021). The MBS is a household survey informed by the ideation model. It is designed to assess ideational,

sociodemographic, household, and other factors associated with malaria-related behaviours using a standardized methodology. The MBS was first piloted in Côte d'Ivoire, after which some improvements were made to the questionnaire for use in Benin and DRC. However, all of the constructs included in this analysis were measured across all three surveys with the same or only minor differences between the questions used to measure them.

Sampling

A cross-sectional survey, representative at the zonal level (i.e., groups of regions/provinces) was conducted in each country using a multi-stage stratified random sampling approach. Required sample size for each zone in each country were calculated based on relevant and recent key malaria behavioural indicators, including the percentage of women of reproductive age sleeping under bed nets, the percentage of children with fever in the past two weeks, and the percentage of women of reproductive age with positive attitudes towards bed nets.

A complete list of enumeration areas (EAs, also called "clusters") obtained from a country's National Statistics Institute (or similar institution) served as the sampling frame. EAs were first stratified into urban and rural strata. From each stratum in each country, a specific number of EAs were selected with probability proportional to size such that EAs with larger population sizes were more likely to be selected.

Following cluster selection, field workers conducted a listing of all the households in each cluster and randomly selected a fixed number of eligible households (20 or 21) using a random number generator. Households where at least one woman aged 15–49 years resided were eligible to participate in the survey. In each selected household, a household representative, as well as all women between ages 15–49 years who agreed to participate were surveyed. Additionally, the male spouse/partner of an eligible woman was selected to participate in every third household. During the survey, women who reported having a child under the age of five years were asked a series of questions related to care-seeking for children with fever in the two weeks prior to the survey. The analyses in this manuscript are based on these data. Table 1 presents the final sample size in each country.

Data collection

Data collection took place during or shortly following the rainy season in each country. This timing is relevant because it signals the height of the malaria transmission season. Fever cases among children (and thus care-seeking related to this fever) are most likely to be relevant to malaria during this period. Specifically, data were collected in Côte d'Ivoire from September to November

Table 1 Sample size, Malaria Behaviour Survey

Country	Households (total)	Women (total)	Women with febrile child aged less than five years old
Côte d'Ivoire (2018)	5969	6479	813
DRC (2021)	4998	6027	972
Benin (2021)	3862	4181	460

2018, in DRC from March through April 2021, and in Benin from November through December 2021. Data were collected using structured questionnaires loaded on tablets programmed using ODK or similar software. During field worker training in each country, enumerators tested sampling procedures and administration of the questionnaire. Fieldworker reflections and construct validation analyses with pilot data were used to finalize the questionnaire. During data collection, data were randomly cross-checked for accuracy, completeness, and quality using multiple strategies. For example, prior to leaving a cluster in DRC, 10% of households were randomly re-visited by quality control agents, who asked three to five questions to verify household eligibility and accuracy of the data collected. Analysis was conducted using Stata version 16.0 (StataCorp, LLC; College Station, TX) [34].

Data analysis

Most of the ideational variables used for this analysis were calculated based on a series of questions comprising statements to which the respondent agreed or disagreed. For example, a respondent was determined to have favorable attitudes toward care-seeking if their responses to nine attitudinal statements produced a net positive score. For each statement, an expression of a favorable attitude received a score of 1, expression of a negative attitude received a score of -1, and those who stated that they did not know or were unsure received a score of 0. Scores from all questions related to a given ideational construct were summed to produce a total score, which is then split at 0 to denote absence (0 or less) or presence (>0) of the positive ideational characteristic. Descriptions of the survey questionnaire items used to measure the ideational variables in this analysis are available in Additional File 1. Most of the ideational variables are adapted from the 2017 Roll Back Malaria (RBM) Social and Behaviour Change Communication Indicator Reference Guide [35].

The primary outcome variable for this analysis was appropriate care-seeking for children under five years old with a fever. Appropriate care-seeking is defined as the child being taken to a health facility or community health worker the same or next day after fever onset.

Independent variables included sociodemographic, household, and ideational variables.

A bivariate logistic regression test was conducted as a first step to examine possible associations between the primary outcome with all possible factors. These included respondent and household sociodemographic characteristics, the respondents' ideational characteristics, and the respondent's reported exposure to malaria prevention and treatment messages. Any bivariate factors that were associated with the outcome at $p < 0.2$ or stronger were retained in subsequent multivariate models (see Table 2). Following bivariate analysis, multivariate logistic regressions were run, which included interaction terms to account for plausible correlation among covariates. A final multivariate model across all countries was then created, which included any significant interaction between covariates in previous models.

Ethical approval and informed consent

Ethical approval for each survey was obtained from the Johns Hopkins Bloomberg School of Public Health Institutional Review Board, as well as the authorities in each respective country prior to data collection: the National Ethics and Research Committee in Côte d'Ivoire, the University of Kinshasa School of Public Health Ethics Committee in DRC, and the National Committee for Health Research and Ethics, the National Institute of Statistics, and the Directorate of Research of the Ministry of Health in Benin. Trained interviewers obtained informed consent from all participants prior to the interview.

Results

Sample characteristics

Within the Côte d'Ivoire sample of female caregivers who had a child under five with fever in the prior two weeks, 74% were under the age of 35 (Table 3). The majority of this sample lived in urban settings (58.9%), were married (78.5%), and had achieved at least a primary education (56.5%). A little more than one-half (54%) of the women were Christian, while about 39% were Muslim. About three-quarters (76%) of the sample were regular television viewers, 30% regularly listened to the radio, and 61% reported exposure to messages on malaria from any source in the previous 6 months.

Table 2 Definition of independent variables included in multivariate models

Variable	Definition
Sociodemographic variables	
Age group of child with fever	Defined as 0–11 months, 12–35 months, and 36–59 months
Caregiver's age category	Defined as 15–24 years, 25–34 years, 35–44 years, and 45–49 years
Caregiver's level of education	Defined as less than primary, primary, and secondary education or higher
Caregiver marital status	Defined as married/in-union or not
More than one child under five resides in household	Based on household member listing
Household variables	
Household poverty level	Derived wealth quintiles from household asset ownership and dichotomized into two groups: the lowest two wealth quintiles and the three upper wealth quintiles
Type of place of residence	Defined as urban versus rural residence
Geographic region/zone of residence	Defined as study regions in Benin, study zones in Côte d'Ivoire, and DRC
Ideational variables	
Perception of severity of malaria	Based on four items that assessed the perceived severity of malaria. The scores for all items were combined, and the total score split at 0 to denote perceived versus non-perceived severity
Perception of susceptibility to malaria	Based on four items that assessed the extent to which the respondents perceived themselves to be at risk for malaria. The scores for all items were combined, and the total score split at 0 to denote perceived versus non-perceived susceptibility
Correct knowledge of appropriate care-seeking timing	Defined as knowledge that the best time to seek care for a child's fever is the same or next day after onset
Descriptive norm of appropriate care-seeking	Defined as the perception that one-half or more of parents in the community seek care for their febrile children on the same/next day after onset
Perception that health workers treat patients with respect	Defined as agree/disagree on two questions regarding the perception that health workers respect patients
Perception that health facility workers charge parents to treat malaria in children	Defined as agree/disagree on a single item question
Favorable attitudes toward care-seeking for fever	Based on nine items that assessed a participant's beliefs and feelings towards seeking care for fever and the treatment provided. The scores for all items were combined, and the total score split at 0 to denote favorable versus non-favorable attitudes
Perceived self-efficacy to seek care and treatment for child with fever	Based on six items which assessed the degree to which a participant felt able to take specific actions related to appropriate care-seeking. The scores for all items were combined, and the total score split at 0 to denote perceived versus non-perceived self-efficacy
Interpersonal communication about malaria	Defined as discussion of malaria with others, including spouse, friends, and family in the past 6 months
Exposure to malaria-related messages	Exposure to malaria messages from the media and community sources, including recognition of the most recent malaria-related campaign logo and successful completion of the campaign slogan

Similarly, in DRC, most caregivers who had a child under five with fever in the prior two weeks were under 35 years old (68.9%) and lived in urban settings (57.2%). About 59% of women had attained some secondary education or higher. The majority (71%) of the women were Christian, while 20% were Muslim. About 40% of the women were in the 25–34-year-old age group, while 31% were in the 35–49-year-old age group. About 62% watched television regularly, while 31% listened to the radio regularly. About one-third (31%) of Congolese

women reported exposure to malaria-related messages in the last six weeks.

As with the other two countries, in Benin, the majority (77%) of caregivers who had a child under five with fever in the prior two weeks were under 35, but 55% lived in rural settings. Just under half of the sample (49%) had not completed a primary education, 62% of the sample was Christian, and 24% were Muslim. As for media habits, Benin had the lowest prevalence of weekly television use (28%) but the highest prevalence of weekly

Table 3 Caregiver sociodemographic characteristics and exposure to malaria messages

	Côte d'Ivoire (n = 813)	DRC (n = 972)	Benin (n = 460)
Sociodemographic Characteristics	%		
Household wealth			
Lower two wealth quintiles	40.2	43.5	34.4
Upper three wealth quintiles	59.8	56.5	65.6
Place of residence			
Rural	41.1	42.8	55.4
Urban	58.9	57.2	44.7
Geographic zone/region			
Nord	14.9	—	—
Centre	29.7	—	—
Sud Forestier	31.1	—	—
Abidjan	24.3	—	—
Nord	—	21.2	—
Ouest	—	46.8	—
Kasai	—	11.6	—
Grand Est	—	20.3	—
North	—	—	38.7
Central	—	—	23.2
South	—	—	38.1
Age category in years			
15–24	29.7	29.1	25.2
25–34	44.4	39.9	51.4
35–49	25.9	31.0	23.4
Age of the child sick with fever, in months			
0–11	17.7	25.6	87.9
12–35	49.9	38.8	9.9
36–59	32.4	35.6	2.1
Level of formal education			
Less than primary school	43.5	8.1	49.2
Primary school complete	30.8	33.3	26.8
Secondary or higher	25.7	58.6	24.0
Religion			
Christian	54.3	71.3	61.5
Muslim	39.2	20.0	23.9
Other	6.5	38.4	14.6
Media exposure and recall			
Watch TV at least once per week	75.9	62.4	28.0
Listens to the radio at least once per week	29.9	30.7	43.3
Exposed to messages on malaria from any source in previous six months	60.6	32.8	31.3

radio listenership (43%) amongst the three countries. Only one-third of the sample (31%) reported exposure to a message about malaria in the six months prior to the survey.

Prevalence of appropriate care-seeking

Cases of fever in children under five years old in the two weeks before the survey numbered 813 in Côte

d'Ivoire, 972 in DRC, and 460 in Benin. About one-fifth of these febrile children were under 12 months of age in both Côte d'Ivoire (18%) and DRC (22%), whereas the majority (88%) were under 12 months of age in Benin. Larger proportions of febrile children were between 12 and 35 months old in Côte d'Ivoire (48%) and DRC (40%), with 10% in Benin. Finally, just over one-third of the sample were within the range of 36–59 months of

age in Côte d'Ivoire (34%) and DRC (38%), and only 2% in Benin.

The prevalence of appropriate care-seeking behaviour varied across countries and by caregiver and child sociodemographic characteristics. The proportion of caregivers that reported appropriate care-seeking for their febrile child was higher in Côte d'Ivoire (62%) than either Benin (53%) or DRC (41%). This indicator varied by zone of residence in all countries (Table 4). Care-seeking behaviour also varied by the age of the febrile child in all three countries. In DRC, about one-half (49%) of caregivers of infants (under 12 months old) practiced appropriate care-seeking, while 43% of caregivers of children aged 12–35 months sought appropriate care, and only 32% of caregivers of children aged 36–59 months did so. A similar pattern was found in Côte d'Ivoire, where 71% of caregivers of febrile infants

reported appropriate care-seeking, compared to 62% for children 12–35 months old, and 58% for children aged 36–59 months. In Benin, 69% of caregivers of febrile children 12–35 months old reported appropriate care-seeking, which is a higher rate than caregivers of infants (51%) and children 36–59 months old (34%).

Sociodemographic factors associated with appropriate care-seeking

Results of the multivariate model are displayed in Table 5. In the DRC and Côte d'Ivoire models, a negative association was found between the child's age category and appropriate care-seeking: Congolese children aged 36–59 months experienced 42% reduced odds (adjusted odds ratio [aOR]=0.58, $p < 0.01$) of having appropriate care sought for them when compared to children under 12 months old (i.e., infants). A similar pattern is prevalent

Table 4 Percentage of female caregivers who practiced appropriate care-seeking, by sociodemographic variables

Variable	Côte d'Ivoire (n=813)		DRC (n=972)	Benin (n=460)
	Percent (95% Confidence Interval [CI])			
Study Zone				
Nord	58.7 (48.8, 68.0)		—	—
Centre	62.7 (55.7, 69.3)		—	—
Sud Forrester	55.4 (49.1, 61.5)		—	—
Abidjan	72.3 (63.5, 79.7)		—	—
Nord	—		50.1 (41.4, 58.8)	—
Ouest	—		40.8 (31.4, 50.2)	—
Kasaï	—	39.8 (34.0, 45.5)	—	—
Grand Est	—	30.8 (23.2, 38.4)	—	—
North	—	—	62.5 (53.0, 71.2)	—
Central	—	—	52.0 (42.1, 61.6)	—
Southern	—	—	45.0 (35.9, 54.5)	—
Sick child's age in months				
< 12 months	71.0 (61.3, 79.0)	48.7 (39.2, 58.2)	51.2 (45.2, 57.2)	
12–35 months	62.0 (50.8, 64.2)	42.8 (35.9, 49.7)	69.2 (50.7, 83.1)	
36–59 months	57.6 (58.3, 65.9)	32.4 (26.2, 38.6)	33.9 (11.6, 66.8)	
Household poverty status				
Non-poor	70.3 (63.6, 76.2)	41.8 (35.5, 48.1)	56.2 (49.1, 63.0)	
Poor	56.7 (52.3, 61.1)	37.7 (30.6, 44.8)	45.2 (36.1, 54.5)	
Type of residence				
Rural	57.7 (52.5, 62.6)	42.5 (35.5, 49.5)	52.7 (45.5, 59.7)	
Urban	65.3 (59.8, 70.5)	39.2 (31.7, 46.8)	52.5 (43.5, 61.3)	
Caregiver's age group in years				
15–24 years	61.9 (53.5, 69.7)	44.6 (36.7, 52.7)	42 (31.4, 53.4)	
25–34 years	64.5 (59.1, 69.5)	37.4 (31.6, 43.3)	59.7 (51.9, 67.1)	
35–49 years	58.6 (50.7, 66.1)	41.0 (31.2, 50.7)	46 (35.6, 56.8)	
Exposure to malaria messages				
Yes	66.1 (61.2, 70.7)	43.6 (36.6, 50.8)	58.3 (49.5, 58.2)	
No	58.6 (53.6, 63.7)	36.7 (30.5, 43.4)	48.7 (41.4, 56.1)	
All respondents	62.2 (57.1, 67.4)	40.6 (35.5, 46.0)	52.6 (47.0, 58.2)	

Table 5 Multivariate analysis of sociodemographic and ideational factors and association with appropriate care-seeking for febrile children under five years old

Adjusted Odds Ratio (95% CI)			
	Côte d'Ivoire (n = 813)	DRC (n = 972)	Benin (n = 460)
Age of the sick child in months (RC [†] = 0–11 months)			
12–35 months	0.63* (0.40–0.99)	0.78 (0.54–1.13)	1.84 (0.84–4.01)
36–59 months	0.54** (0.33–0.87)	0.58** (0.40–0.85)	0.45 (0.13–1.76)
Caregiver's age in years (RC = 15–24 years)			
25–34 years	1.035 (0.72–1.50)	0.97 (0.69–1.35)	1.95* (1.10–3.45)
35–49 years	0.81 (0.53–1.23)	0.77 (0.53–1.13)	1.37 (0.74–2.57)
Caregiver's education level (RC = none)			
Primary school complete	0.83 (0.58–1.20)	0.88 (0.55–1.40)	0.91 (0.52–1.59)
Secondary school or higher	0.74 (0.49–1.11)	0.72 (0.44–1.16)	1.06 (0.59–1.89)
Caregiver has more than one child with fever	0.667 (0.42–1.07)	0.75 (0.51–1.11)	—
Caregiver is married	1.07 (0.73–1.58)	0.79 (0.53–1.19)	0.45 (0.16–1.27)
Caregiver exposed to malaria messages	1.45* (1.05–2.00)	1.35* (1.00–1.81)	0.93 (0.57–1.51)
Lives in poor household	0.61* (0.409–0.89)	0.79 (0.57–1.09)	0.51* (0.31–0.84)
Urban Residence	1.04 (0.73–1.49)	0.80 (0.58–1.10)	0.90 (0.55–1.47)
Geographic Zone (RC = North)			
Centre	1.42 (0.91–2.23)	—	—
Sud Forrester	0.99(0.63–1.54)	—	—
Abidjan	1.18 (0.65–2.11)	—	—
Geographic Zone (RC = Nord)			
Ouest	—	0.78 (0.50–1.22)	—
Kasai	—	0.59** (0.41–0.87)	—
Grand Est	—	0.70 (0.44–1.11)	—
Geographic Zone (RC = North)			
Central	—	—	0.96 (0.535–1.720)
South	—	—	0.69 (0.388–1.227)
Perceived severity of malaria	0.88 (0.64–1.20)	1.02 (0.76–1.38)	0.79 (0.50–1.25)
Perceived susceptibility to malaria	0.87 (0.58–1.32)	0.93 (0.67–1.29)	0.70 (0.37–1.33)
Knew the recommended timing of care-seeking for a febrile child	2.28** (1.35–3.85)	3.33*** (2.49–4.45)	10.74*** (4.54–25.44)
Discussed malaria with others	1.46* (1.06–2.00)	2.03*** (1.51–2.74)	1.94* (1.15–3.29)
Perceived that facility-based health workers make parents pay for child's care	0.88 (0.61–1.27)	0.67* (0.45–0.99)	0.79 (0.50–1.26)
Descriptive norm about appropriate care-seeking	1.71** (1.20–2.44)	1.13 (0.83–1.54)	2.57* (1.62–4.08)
Belief that health workers treat their patients with respect	0.74 (0.48–1.13)	1.60 (0.99–2.59)	1.76 (0.90–3.44)
Positive attitudes towards appropriate care-seeking	1.51* (1.09–2.08)	1.14 (0.84–1.54)	1.23 (0.77–1.95)
Perceived self-efficacy for actions related to appropriate care-seeking	1.31 (0.88–1.97)	1.31 (0.96–1.79)	2.38* (1.37–4.12)
Log likelihood	– 496.06	– 575.02	– 250.87
Pseudo-R-squared	0.085	0.121	0.213
Hosmer–Lemeshow test (10 groups)	0.75	0.72	0.15

*: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, †RC: reference category

in Côte d'Ivoire, where children 36–59 months experienced 46% reduced odds (aOR = 0.54, $p < 0.01$) compared to infants. No significant relationship between the age of child and likelihood of appropriate care-seeking behaviour was found in the Benin multivariate model.

Caregivers living in a poor household (belonging to the two lowest wealth quintiles) experienced reduced odds

of practicing appropriate care-seeking in Côte d'Ivoire (aOR = 0.61, $p < 0.05$) and Benin (aOR = 0.51, $p < 0.05$), but not DRC, compared to households in the upper three wealth quintiles. However, DRC results show that geographic zone as defined for the study is associated with appropriate care-seeking, while neither Benin nor Côte d'Ivoire show this significant relationship. In DRC,

caregivers in the Kasai zone experienced 41% reduced odds (aOR=0.59, $p<0.01$) of appropriate care-seeking when compared to their counterparts from the North. Caregivers in other study zones in DRC did not experience increased or reduced odds of care-seeking when compared to the North.

Finally, in both DRC and Côte d'Ivoire, but not Benin, the data show that caregiver's exposure to malaria-related messages was associated with a 35% (DRC: aOR=1.35, $p<0.05$) and 45% (Côte d'Ivoire: aOR=1.45, $p<0.05$) increased likelihood of appropriate care-seeking behaviour. Urban residence, caregiver marital status, and caregiver education was not found to be significantly associated with the behaviour in any multivariate models.

Ideational factors associated with appropriate care-seeking

Two ideational variables were significantly associated with the outcome of appropriate care-seeking for a febrile child under 5 years old in all three countries. Caregivers with knowledge that a child with fever should be taken for care same or next day after the fever had significantly increased odds of appropriate care-seeking in all three countries (Côte d'Ivoire: aOR=2.28, $p<0.01$; DRC: aOR=3.33, $p<0.001$; Benin: aOR=10.74, $p<0.001$). In addition, discussion about malaria with others was positively associated across all three countries with increased odds of practicing appropriate care for febrile children under 5 (Côte d'Ivoire: aOR=1.46, $p<0.05$; DRC: aOR=2.03, $p<0.001$; Benin: aOR=1.94, $p<0.05$).

Other ideational variables yielded significant relationships with appropriate care-seeking in some but not all countries included in this study. The belief that facility-based health workers make parents pay for malaria care for under-five children was associated with a 33% reduction in the odds of appropriate care-seeking in DRC (aOR=0.67, $p<0.05$) but was not significant in either Côte d'Ivoire or Benin. A descriptive norm of appropriate care-seeking—that is, the belief that at least one-half of parents in one's community take their febrile children to a health facility the same or next day after its onset—was found to be positively associated with appropriate care-seeking behaviour in Côte d'Ivoire (aOR=1.71, $p<0.01$) and Benin (aOR=2.57, $p<0.05$), but not DRC. A caregivers' perceived self-efficacy to take actions related to appropriate care-seeking for a child with fever (e.g., finding the money to get to the facility) was positively associated with the behaviour in Benin (aOR=2.38, $p<0.05$), but not in Côte d'Ivoire or DRC. Finally, holding positive attitudes toward prompt care-seeking for fever was found to be positively and significantly associated with appropriate care-seeking in Côte d'Ivoire alone (aOR=1.51, $p<0.05$). Other ideational variables, including the belief

that health workers treat their patients with respect, were not found to be significantly associated with appropriate care-seeking in multivariate models for any of the three countries.

Discussion

This study identified sociodemographic and ideational variables associated with appropriate care-seeking for children under 5 years of age with fever in three African countries. Some of the variables are common to the three countries, while others are specific to one or two countries. No sociodemographic variable was consistently associated with the outcome variable in all the three countries. Nonetheless, the child's age, the caregiver's exposure to malaria messages, household wealth, and zone of residence were each associated with appropriate care-seeking in two of the three countries. The association with the child's age was statistically significant in DRC and Côte d'Ivoire, with care-seeking for fever being the most likely for children 0–11 months old, echoing findings from prior studies [36–39]. As a child's age increased to 12–34 months and 35–49 months, their likelihood of being taken to a health facility for their fever quickly decreased in both countries. This finding suggests that caregivers may consider fever to be more serious in their younger children compared to older ones potentially because the latter generally have had more experience with fever. Exposure to malaria messages was positively associated with appropriate care-seeking in DRC and Côte d'Ivoire and, while the directionality of this association cannot be ascertained from this cross-sectional survey, it may be an indication that public health communication activities in those countries are reaching and resonating with an important audience for malaria care-seeking behaviours.

The associations found with ideational variables in this study echo findings from some prior studies while differing from others and expanding the scope of available evidence. Further, there were differences and commonalities across countries as summarized in Table 6. Of greatest importance, two ideational factors were consistently and significantly associated with prompt and appropriate care-seeking for a child under 5 with fever in all three countries. These were (1) the caregiver's knowledge of the ideal time to seek care for a febrile child and (2) having discussed malaria with others in the prior 6 months.

Knowledge of the ideal timing of care-seeking for febrile children was one of the most significant factors associated with the outcome across the three study countries. This finding makes intuitive sense considering the documented role in health behaviour literature of a person's knowledge in performing these behaviours. Few studies have looked at the association of knowledge

Table 6 Summary of ideational predictors of appropriate care, by country

Predictor	Côte d'Ivoire	DRC	BN
Perceived severity of malaria	ns	ns	ns
Perceived susceptibility to malaria	ns	ns	ns
Knowledge that a child with fever should be taken for care on the same or next day as the onset of fever	+	+	+
Discussed malaria with spouse, friends or relations in last 6 months	+	+	+
Perception that facility-based health workers make parents pay for treatment for their child	ns	–	ns
Belief that appropriate care-seeking for fever is a community norm	+	ns	+
Perception that health workers treat their patients with respect	ns	ns	ns
Positive attitudes towards case management	+	ns	ns
Perceived self-efficacy for treatment	ns	ns	+

ns: not significant, +: positively associated and significant, –: negatively associated and significant

specifically about the ideal timing of care-seeking with appropriate care-seeking behaviour for fever; the finding is, however, consistent with what Menon, Njau, and McFarland (2009) found in their study in Uganda [4]. Being a cross-sectional survey, the directionality of this finding cannot be assumed and it may be possible that caregivers who sought care promptly at a health facility in the two weeks before the survey were more knowledgeable about care-seeking timing due to information they may have received at that recent encounter. The ideation model accounts for this phenomenon by noting that a reinforcement effect exists between performing a health behaviour and levels of ideation and SBC programs are encouraged to leverage it. Further studies using non-cross sectional methods might seek to better elucidate the effect of reinforcement of ideational factors by virtue of care-seeking encounters or the performance of other malaria-related behaviours.

This study also found discussion with friends or family about malaria in the past six months is strongly associated with appropriate care-seeking for children under five with fever in all the three study countries. This finding is understandable as interpersonal communication not only allows sharing of information, but also allows people to clarify their ideas and values. According to the ideation model, this type of dialogue with peers can serve to reinforce one's commitment to perform a desired health behaviour. While the directionality of the relationship may not be inferred by virtue of the cross-sectional design of this study, this particular variable focuses on discussion with family or friends, and not with health workers, which may have minimized the effect of the care-seeking encounter (behavioural outcome) on this variable.

Four other ideational variables were statistically significantly associated with the outcome behaviour in one or two of the study countries. Descriptive norms related to

appropriate care-seeking was positively associated with the behaviour in Côte d'Ivoire and Benin, echoing findings from similar surveys in Nigeria and Madagascar [8], and implying that study respondents who believed that other people in their communities seek appropriate care for their febrile children, were more likely to adopt this behaviour. Social norms have been documented as important factors influencing decisions around health behaviours [40] and these findings may support that.

The negative association found in DRC between appropriate care-seeking and the perception that health workers make caregivers pay for malaria care for febrile children is understandable and underscores the fact that perceived cost is a potential barrier to appropriate care-seeking. This finding also suggests the potential influence a health system's capacity can have on ideational variables in a given setting. Similar arguments have been made by Mazzi et al. [10], Mitiku & Assefa [12], and Adedokun & Yaya [37]. Since most malaria testing and treatment services provided in public health facilities of DRC are intended to be free of cost, SBC programming in DRC that seeks to improve care-seeking will need to address this perception among parents and also improve the quality and content of service communication from health providers to ensure that expectations around the cost of malaria care are clear.

Positive attitudes towards appropriate care-seeking were positively associated with the outcome only in Côte d'Ivoire. The lack of a significant association with attitudes in DRC and Benin is consistent with what Do et al. found for Mali, Nigeria, and Madagascar. Finally, perceived self-efficacy was only positively associated with appropriate care-seeking in Benin. This finding is consistent with evidence from Rwanda [6]. The lack of a significant association with perceived self-efficacy in Côte d'Ivoire and DRC is consistent with findings from Mali, Nigeria, and Madagascar [8, 12].

In contrast to findings from other studies [12, 13, 41], this study found no significant association between appropriate care-seeking and perceived severity or perceived susceptibility in any of the three study countries. This finding, however, echoes what Do et al. [8] found in a three-country study. While the reasons for the lack of association with perceived severity and perceived susceptibility related to malaria are not clear, the authors note limitations to the measures of perceived severity and susceptibility in this study below.

Implications

Findings from this study have implications for SBC programming. The fact that the factors associated with the behaviour differ by country indicate that different strategies are needed by country and that effective strategies should be evidence-based and tailored to the specific needs of the intended populations. Further, the finding that the odds of appropriate care-seeking vary by geographic zone in DRC indicates that messages and interventions in DRC may need to be sub-national in scope.

Nonetheless, several recommendations for malaria SBC programs are proposed based on these findings. This study found that older children in Côte d'Ivoire and DRC were less likely to be promptly taken for care at a facility, compared to younger ones, suggesting public health programs should emphasize the need for appropriate care-seeking for all children, irrespective of age. Additionally, increasing specific knowledge about care-seeking for fever and promoting the discussion about malaria with others should be a focus of SBC programs in all three countries, and given this observed trend, may very well play a central role in other francophone West African countries. Programs in the region which are not able to collect formative data can leverage these findings to that effect, whereas those that are able to conduct formative research can include measures of these variables for assessing their respective levels and if there is room for improving this specific knowledge.

The finding that a caregiver's descriptive norms, or the belief that other people in their communities seek appropriate care for their febrile children, were significant factors associated with this behaviour in both Côte d'Ivoire and Benin, implies that programs can seek to leverage and elevate this factor. Programs can employ behaviour modeling and local testimonials to position appropriate care-seeking as a community norm that is practiced by the average caregiver.

With regards to those factors that were significant in a single country, the implications for public health programs are to leverage them in those specific countries. Promoting positive attitudes towards appropriate care-seeking can be part of a comprehensive strategy,

particularly in Côte d'Ivoire. The costs that parents should expect for malaria care for children can be clarified in DRC, while leveraging and raising self-efficacy for prompt and appropriate care-seeking can be addressed by SBC programmes in Benin. Finally, while this study focused primarily on individual-level factors that can be leveraged for improved care-seeking for febrile children, SBC strategies in these three and other malaria endemic countries should also identify and address structural and perceived barriers to the behaviour, to comprehensively support behaviour change, per global best practices.

Limitations

This study has some limitations that warrant mention. The cross-sectional nature of the data analyzed precludes causal inferences. Data from all three household surveys relies on retrospective self-reported responses, rendering responses subject to recall and social desirability biases. To mitigate recall bias regarding message exposure, respondents were first asked if they had seen or heard any malaria-related messages in the past three months. Those who positively responded were asked to complete the slogan of a recent malaria campaign in their area. Those who identified a malaria message *and* correctly completed the campaign slogan were considered "exposed". Further, one of the four items used to assess perceived severity and one of the four items used to assess perceived susceptibility did not form a scale in a separate scale-validation analysis. As such, these measures are to be interpreted with caution in each country, although neither construct was a significant factor associated with care-seeking behaviour in any of the three countries. Finally, structural factors that may influence care-seeking were not measured. The availability of malaria tests and treatment was not quantified. There was no assessment of the service environment or service provider attitudes and behaviours. Findings can be further validated or augmented through repeated study over time, especially as transmission seasonality and mosquito behaviour adapts to climate change. Qualitative research in these communities will help public health leaders further understand behavioural patterns specific in each context.

Conclusions

This study of the ideation factors associated with appropriate care-seeking for febrile children under five conducted in Benin, Côte d'Ivoire, and DRC identified several ideational variables which may influence caregiver behaviour, namely knowledge of optimal care-seeking timing, discussion with others about malaria, perceptions of descriptive norms about care-seeking for febrile children, and, in DRC, the perception that parents are charged for seeking care for their children, in Côte d'Ivoire, positive

attitudes about the behaviour, and in Benin, perceived self-efficacy to perform the behaviour. Exposure to malaria-related messages was also found to be significantly associated with the behavioural outcome in Côte d'Ivoire and DRC. Several clear implications for programme planners in these three countries are described above. In summary, programs can increase exposure to malaria-related activities, which should prioritize content that increases awareness that care should be sought for young children (of any age) on the same or next day of fever onset and from a qualified health provider. Secondly, programmes can work to increase interpersonal discussion about malaria between spouses, families, and friends. In promoting interpersonal discussion about malaria, programmes can also augment descriptive norms about appropriate care-seeking for fever. Finally, in DRC, where caregivers anticipate being charged fees for treatment of their child's malaria, social and behaviour change programming clarifying cost of services and ensuring appropriate service provider communication and behaviour around service fees is necessary to generate demand in communities. In Côte d'Ivoire, programmes can support increased positive attitudes, and in Benin, increased perceptions of self-efficacy. These findings therefore inform how finite SBC resources can be focused for potentially greater impact on care-seeking for fever in young children. Finally, routine malaria program monitoring will benefit from capturing appropriate ideological variables, particularly in studies where an MBS has been conducted.

Abbreviations

aOR	Adjusted Odds Ratio
DHS	Demographic and Health Survey
DRC	Democratic Republic of the Congo
EA	Enumeration Area
MBS	Malaria Behaviour Surveys
MIS	Malaria Indicator Survey
RBM	Roll Back Malaria
SBC	Social and Behaviour Change
WHO	World Health Organization

Supplementary Information

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Additional file 1

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Author contributions

AC and MB conducted the analysis and drafted the paper. JH reviewed literature and drafted the background section. MT, AK, and GH interpreted the results; GH also contributed to paper drafts and major revisions. GA conducted analysis. TB, AD, FM, and ESM reviewed the manuscript and provided revisions. SB designed the study, interpreted results, and reviewed the manuscript. FM and ESM supported implementation of the DRC survey. All authors reviewed and approved the final manuscript.

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Availability of data and materials

Datasets for each Malaria Behavior Survey are available via the USAID Development Data Lab (www.data.usaid.gov).

Declarations

Ethics approval and consent to participate

Ethical approval for each survey was obtained from the Johns Hopkins Bloomberg School of Public Health Institutional Review Board, as well as the authorities in each respective country prior to data collection: the National Ethics and Research Committee in Côte d'Ivoire, the University of Kinshasa School of Public Health Ethics Committee in DRC, and the National Committee for Health Research and Ethics, the National Institute of Statistics, and the Directorate of Research of the Ministry of Health in Benin. Trained interviewers obtained informed consent from all participants prior to the interviews. For unmarried female participants under the age of 18, parental permission and participant assent was attained. Interviewers read a written informed consent script to each respondent to obtain informed consent prior to starting the interview. Respondents' confidentiality was protected in part because no personal identifiers were collected in the data collection tool. Access to completed questionnaires was limited to only research staff.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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