Factors associated with appropriate care-seeking for fever in under-5 children: Comparative multilevel analysis of national data in three West African countries.

Introduction

Malaria is endemic to all countries in West Africa. Young children and pregnant women are particularly at risk of its adverse effects. Despite considerable governmental efforts to reduce the burden of malaria and progress made in the last decade, malaria continues to be a major source of morbidity and mortality in the sub-region. The World Health Organization (WHO) has recommended that children and other people with a fever should be taken for care in a health facility within 24 hours of the onset of the fever. Whereas most countries in West Africa have adopted the WHO policy, most children still do not receive appropriate care for fever. In this paper, we explored the socio-demographic, psychosocial and contextual factors associated appropriate care-seeking for fever in children aged less than five years old in Burkina Faso, Guinea, and Nigeria. These three countries are among the largest contributors to the burden of malaria worldwide.

Theoretical Basis

The theoretical basis of this study is the ideation model that posits that the decision to adopt or reject a health-protective behavior is influenced by a set of psychosocial variables, including knowledge, perceived threat, efficacy beliefs, descriptive and injunctive norms, and attitudes. The ideation model has been widely used to understand the predictors of various health behaviors.

Data

The analyses used data from national surveys (Burkina Faso: DHS; Guinea and Nigeria: MIS) conducted in 2021 and that included the Social and Behavior Change (SBC) module. The SBC module is based on the ideation model and includes questions related to the psychosocial determinants of malaria-related behaviors. We analyzed the Kids' Recode datasets that include 12,343 under-5 children in Burkina Faso, 4,133 in Guinea, and 10,988 in Nigeria.

Methods

The dependent variable in this study is appropriate care-seeking for a child with fever in the past two weeks defined as seeking care in a health facility or from a community health worker with 24 hours of the onset of fever. The independent variables explored were literature-informed and include child's sociodemographic characteristics, mother's socio-demographic characteristics, child's use of bed nets, mother's pregnancy care-related behaviors, mother's malaria-related psychosocial characteristics, household variables and community variables. We performed mixed effects logistic regression with QR decomposition using the *meqrlogit* command in Stata 17. We estimated fixed effects of the measured independent variables as well as random effects at the cluster (enumeration area) level.

Findings

The percentage of children with a fever in the two weeks before the survey was significantly higher in Nigeria (35.2%) compared to Burkina Faso (21.4%) and Guinea (22.0%). Similarly, the prevalence of appropriate care-seeking varied across countries: 55.0% in Burkina Faso compared to 25.1% in Guinea and 24.8% in Nigeria. The data further showed statistically significant variations in the prevalence of appropriate care by several independent variables. In Burkina Faso, appropriate care-seeking varied by the child's sex, mother's education level, knowledge of malaria prevention, perceived severity, descriptive norm, and exposure to communication messages about malaria, and household poverty level. In Guinea, there are variations by mother's education level, perceived susceptibility to malaria, attitudes towards self-medication, and descriptive norm, household poverty, and place of residence. In Nigeria, there are variations by mother's education level, perceived severity of malaria, perceived susceptibility to malaria, attitudes towards self-medication, descriptive norm, receipt of skilled antenatal care, and exposure to malaria messages, and household poverty. The multilevel analysis showed significant clustering of appropriate care-seeking at the cluster level in all three countries.

Clustering was more pronounced in Nigeria than in the other two countries with an intraclass correlation coefficient of 30.3% compared to 12.7% in Burkina Faso and 12.2% in Guinea. Across countries, there are differences and commonalities in the factors associated with appropriate care. In all three countries, appropriate care-seeking was negatively associated with attitudes towards self-medication and positively correlated with the belief that prompt care-seeking for fever was a community norm. Some factors were associated with the behavior in only one or two countries. For example, the odds of appropriate care-seeking were higher for a male child compared to a female child, were lower for poorer households compared to richer households, and were lower for women with a moderate level of perceived severity compared to those with low perceived severity level in Burkina Faso. These variables presented no significant associations in either of the other two countries. The association with mother's education level was positive in Burkina Faso and Nigeria but insignificant in Guinea. Mother's receipt of skilled antenatal care and exposure to malaria messages as well as the number of children with fever in the household were positively associated with appropriate care-seeking in Nigeria but not elsewhere. Mother's perceived susceptibility to malaria was positively associated with appropriate care-seeking in Guinea and Nigeria but insignificant in Burkina Faso.

Conclusion
The ideation model is useful to understand the factors that should be the focus of a SBC program designed to promote appropriate care-seeking for fever in children. Whereas there are some differences across countries, two psychosocial variables are important correlates across the three study countries: attitudes towards self-medication and descriptive norm regarding prompt care-seeking. In addition, there is significant clustering of appropriate care-seeking at the cluster level in all three countries, pointing to the relevance of community mobilization strategies.

Table 1: Prevalence of appropriate case-seeking by selected characteristics and by country			
Characteristics	Percentage (95% CI)		
	Burkina Faso	Guinea	Nigeria
Sex of child			
Female	52.8 (49.2, 56.4)*	26.5 (20.4, 32.6)	23.5 (20.7, 25.4)
Male	57.2 (53.8, 60.6)	23.9 (19.2, 28.6)	26.0 (23.2, 28.8)
Age of child in years			
0	54.7 (49.5, 59.9)	26.9 (19.0, 34.9)	23.4 (19.2, 27.6)
1 – 2	56.2 (52.8, 59.6)	25.5 (21.1, 30.0)	25.3 (22.3, 28.4)
3 - 4	53.9 (50.0, 57.9)	23.6 (18.2, 29.0)	24.8 (21.7, 28.0)
Mother's education level			
None	51.7 (48.3, 55.1)***	21.6 (17.3, 25.9*	19.6 (16.3, 22.9)***
Primary	60.4 (55.1, 65.6)	29.4 (21.5, 37.3)	30.0 (24.0, 36.1)
Secondary/Higher	64.2 (59.0, 70.0)	32.7 (24.9, 40.6)	29.9 (26.7, 33.0)
Mother's perceived severity of malaria.			
Low	57.7 (53.4, 62.0)**	23.8 (18.8, 28.8)	23.3 (20.0, 26.5)*
Medium	49.0 (44.1, 53.9)	27.4 (21.5, 33.2)	23.7 (20.4, 27.0)
High	57.0 (53.1, 61.0)	23.0 (16.5, 29.4)	28.3 (24.0, 32.7)
Mother's perceived susceptibility to malaria.			
Low	50.8 (40.6, 61.0)	16.8 (6.8, 26.8)**	15.7 (11.4, 20.0)****
Medium	53.6 (50.2, 57.0)	23.1 (18.2, 27.8)	26.8 (24.1, 29.6)
High	57.6 (53.7, 61.5)	32.4 (25.9, 39.1)	19.4 (14.8, 24.0)
Mother's attitude towards self-medication for fever			
Unfavorable	56.1 (52.3, 59.8)	31.0 (24.7, 37.4)*	32.0 (28.3, 35.7)***

	Burkina Faso	Guinea	Nigeria
Favorable	54.3 (50.7, 57.8)	22.3 (17.8, 26.8)	21.4 (18.7, 24.1)
Mother's knowledge of bed nets as a way to prevent malaria.			
Knew	56.3 (53.4, 59.2)***	22.5 (16.9, 28.1)	22.0 (18.2, 25.7)$^{\xi}$
Did not know	40.0 (32.4, 47.6)	26.1 (21.2, 30.9)	26.3 (23.4, 29.2)
Mother agreed/disagreed that prompt care-seeking for fever as a community norm.			
Agreed	60.6 (57.5, 63.7)***	31.3 (25.2, 37.5)***	16.0 (12.6, 19.5)***
Disagreed	44.0 (39.7, 48.4)	17.7 (11.5, 23.8)	28.2 (25.0, 31.4)
Don't know	57.2 (43.8, 70.6)	24.2 (17.1, 31.3)	25.8 (20.7, 31.0)
Mother received skilled ANC during pregnancy.			
Yes	56.7 (53.6, 59.8)	22.1 (17.1, 27.1)$^{\xi}$	22.3 (19.6, 25.0)***
No	53.0 (49.3, 56.7)	27.4 (22.9, 31.9)	28.1 (25.0. 31.1)
Number of sources of exposure to malaria messages in past 6 months			
None	51.5 (45.6, 57.5)*	23.9 (19.3, 28.4)$^{\xi}$	21.4 (18.4, 24.5)**
One	52.0 (47.8, 56.2)	28.8 (21.6, 36.0)	28.3 (24.6, 32.0)
Two of more	59.0 (55.4, 62.7)	20.5 (14.9, 26.2)	32.7 (25.8, 39.5)
Number of children with fever in household			
One	54.3 (51.4, 57.3)	26.4 (22.0, 30.7)	23.3 (20.8, 25.8)$^{\xi}$
Two or more	57.5 (52.1, 63.0)	22.8 (16.6, 28.9)	26.2 (23.2, 29.9)
Household wealth quintile			
Lower two	48.5 (43.9, 53.1)***	18.5 (13.8, 23.3)***	21.5 (17.7, 25.3)**
Upper three	59.3 (56.4, 62.2)	30.2 (24.8, 34.6)	27.9 (25.0, 30.7)
Type of place of residence			
Rural	53.9 (50.7, 57.2)	21.4 (17.2, 25.6)	24.3 (21.3, 27.2)
Urban	58.8 (53.9, 63.7)	35.0 (27.8, 42.3)**	26.5 (22.5, 30.5)
All Cases	55.0 (52.3,57.8)	25.1 (21.2,29.0)	24.8 (22.4, 27.2)
Number of observations	2623	921	3732
Notes: Significance of difference of proportions: $^{\xi}$p<.1; * p<.05; ** p<.01; *** p<.001			

Table 3: Results of the multilevel logistic regression analysis of appropriate care-seeking for fever in under-5 children on selected characteristics, by country

Characteristics	Odds Ratio (95% CI)		
	Burkina Faso	**Guinea**	**Nigeria**
Sex of child			
Female (RC)	1.00	1.00	1.00
Male	1.24 (1.05, 1.48)**	0.74 (0.53, 1.03)$^{\xi}$	1.11 (0.93, 1.33)
Mother's age in years	1.00 (0.99, 1.01)	1.01 (0.98, 1.03)	0.99 (0.98, 1.01)
Mother's education level			
None (RC)	1.00	1.00	1.00
Primary	1.30 (0.99, 1.67)$^{\xi}$	1.13 (0.73, 1.75)	1.40 (1.05, 1,87)*
Secondary/Higher	1.37 (1.05, 1.79)*	1.49 (0.89, 2.48)	1.56 (1.18, 2.07)**

Mother's perceived severity of malaria.			
Low (RC)	1.00	1.00	1.00
Medium	0.73 (0.57, 0.92)**	1.30 (0.88, 1.92)	1.03 (0.82, 1.31)
High	0,98 (0.79, 1.23)	1.06 (0.66, 1.70)	1.10c(0.91, 1.49)
Mother's perceived susceptibility to malaria.			
Low (RC)	1.00	1.00	1.00
Medium	1.09 (0.74, 1.62)	1.41 (0.73, 2.71)	1.62 (1.12, 2.35)**
High	1.21 (0.81, 1.81)	2.21 (1.10, 4.50)*	1.10 (0.72, 1.70)
Mother's attitude towards self-medication for fever			
Unfavorable (RC)	1.00	1.00	1.00
Favorable	0.73 (0.61, 0.88)***	0.58 (0.41, 0.83)**	0.69 (0.56, 0.85)***
Mother's knowledge of bed nets as a way to prevent malaria.			
Did not know (RC)	1.00	1.00	1.00
Knew	1.33 (0.96, 1.84)$^{\xi}$	1.00 (0.66, 1.51)	1.03 (0.83, 1.28)
Mother agreed/disagreed that prompt care-seeking for fever as a community norm.			
Disagreed (RC)	1.00	1.00	1.00
Agreed	2.07 (1.70, 2.51)***	2.74 (1.81, 4.14)***	2.11 (1.64, 2.71)***
Don't know	1.65 (1.00, 2.74)*	1.87 (1.14, 3.06)**	1.50 (1.2p, 2.06)**
Mother received skilled ANC during pregnancy.			
No (RC)	1.00	1.00	1.00
Yes	1.33 (0.90, 1.96)	1.64 (0.77, 3.52)	1.49 (1.13, 1.98)**
Number of sources of exposure to malaria messages in past 6 months			
None (RC)	1.00	1.00	1.00
One	0.97 (0.74, 1.27)	1.34 (0.89, 2.02)	1.41 (1.14, 1.74)***
Two of more	1.05 (0.80, 1.39)	0.82 (0.50, 1.35)	1.59 (1.16, 2.17)**
Number of children with fever in household			
One (RC)	1.00	1.00	1.00
Two or more	1.20 (0.97, 1.49)$^{\xi}$	0.78 (0.54, 1.11)	1.29 (1.06, 1.56)**
Household poverty status			
Non-poor (RC)	1.00	1.00	1.00
Poor	0.79 (0.64, 0.98)*	0.66 (0.43, 1.02)$^{\xi}$	0.80 (0.62, 1.05)
Cluster level random effects: Variance (Std. Error)	0.48 (0.11)	0.41 (0.20)	1.44 (0.21)
Cluster level intraclass correlation	12.7%	11.2%	30.3%
Proportional reduction in variance compared to an empty model	61.5%	41.1%	7.0%
Number of observations	2623	921	3732
Notes: RC = Reference Category; $^{\xi}$ p<.1; * p<.05; ** p<.01; *** p<.001			