Care-seeking behaviour and implications for malaria control in southern Malawi

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Although malaria is a controllable and preventable disease, it remains among the leading causes of mortality and morbidity in southern Malawi. The importance of early diagnosis and prompt treatment with hospital prescribed drugs and effective home management to control malaria is well established; however, these in part depend on how households make their decisions when family members have suffered from malaria. This study examines the behaviour of households with regard to decisions they make in managing malaria illness. Using hierarchically built data from a survey of 1,400 mothers nested within 33 communities, a series of two-level logistic regression models with Bayesian estimation was used to determine predictors of care-seeking behaviour towards malaria when a family member or a child was perceived to have malaria. The results show that most families normally visit or use medication prescribed at health facilities for both adult (80%) and child (86%) members when they are perceived to have malaria. The main obstacle to accessing the nearest health facility was distance and transport costs (73%) and the main problems encountered at health facilities were long waiting time or absence of health workers (73%) and shortage of drugs (35%). Among the main predictor variables for choices of treatment for childhood malaria was the absence of a health surveillance assistant for those that visited hospitals [β=0.56; 95% CI:-0.86,-0.26]; bought medication from open markets [β=0.51; 95% CI:0.20,0.82]; and those that used other traditional methods or did nothing [β=0.70; 95% CI:-0.04,1.44; p=0.06].. The results have an important role to play in the control and prevention of malaria in Malawi. The results reveal the need for increased awareness about the dangers of purchasing drugs from non-medical and/or uncertified private institutions and sources such as those found in open markets. They also show the important role of community health workers in the delivery of health systems. The study recommends empowerment of community health workers through rigorous and relevant health promotion programmes to update both their knowledge and their skills in communication and counselling.

Introduction

It is well documented that malaria is among the major causes of morbidity and mortality in developing countries, especially among young children. About 3.3 billion people are at risk in 109 countries and territories around the world and most of them in African children.[1] In Malawi, reported estimates of malaria contribution to illnesses in children under 5 years of age is about 35%.[2,3]

Through the Roll Back Malaria project framework, Malawi endorsed an initiative by the World Health Organization (WHO) to halve the year 2000 levels of malaria morbidity and mortality by 2010 and to reduce the malaria burden by a further 50% by 2015.[4] Malawi further pledged that those at risk of malaria have access to the most suitable and affordable combination of personal and community protective measures such as insecticide-treated mosquito nets (ITNs) and prompt, effective treatment for malaria within 24 hours of onset of illness. In addition, Malawi pledged that 60% of all pregnant women who are at risk of malaria have access to intermittent preventive treatment.[4]

Various existing development assistance programmes have funded district-wide integrated malaria control projects, with the aims of accelerating scale-up of intervention and assessing the impact and sustainability of an integrated package of malaria control interventions on malaria-related morbidity and mortality among children under 5 and pregnant women.[5] This included distribution and use of ITNs, improved management of sick children at the household level, improved management of malaria and anaemia in health facilities, and prevention of malaria in pregnant women.

Success in controlling malaria depends on understanding the pattern of malaria in the communities including factors that influence healthcare decision-making at household level, which has implications for policy on the promotion of healthcare services and utilisation.[6]

A number of studies highlighting control of malaria have been carried out in Malawi.[7-9] It has been observed that healthcare decisions are determined by, among others, individual, household and community factors.[10,11] These include parental decisions, socioeconomic status, both at individual and household level, and availability of a health facility and drugs.[12-14]

This paper investigates hierarchical effects of communities on care-seeking behaviour of families in Chikwawa, a district in southern Malawi. The objective is to identify characteristics on hierarchical patterns of malaria care-seeking behaviour together with corresponding risk factors.

Hierarchical binary logistic models with Bayesian estimation are applied to model malaria care-seeking behaviour based on a cross-sectional sample of matriarchal figures that represent households within communities in southern Malawi.

Background

Chikwawa is a district in southern Malawi. It has a surface area of 4,755 km^2 and an elevation of only 100 m above sea level. Chikwawa's climate is subtropical. The rainy season runs from November through April. The district has an average monthly temperature of 28.4^{0}C, with a minimum of 15.2^{0}C and a maximum of 45.6^{0}C.[4] It is normally hot and humid in the months of November to April and hot, dusty and very dry in the months of July to November. Average rainfall in Chikwawa is around 915 mm/year, mostly falling in November to March.[4] Malawi's biggest river, which drains Lake Malawi and is characterised by big marshes, passes through this district.

Because of these climatic and geographical features, Chikwawa is faced with a number of environmental and socioeconomic problems. The district has some of the worst health indicators in Malawi.[15] Almost every year, Chikwawa is faced with floods from the Shire River and others that feed into it. These floods leave behind marshes from which mosquitoes responsible for malarial illness bleed.

The climatic and ecological conditions also favour high malaria transmission potential. Its mean temperature value of 28.4°C provides optimal conditions that lengthen the life-span of mosquitoes and increase the frequency of blood meals taken by the female *Anopheles* mosquitoes. The rainfall of 915 mm/year and the humid conditions offer favourable breeding places and are conducive to the survival and activity of *Anopheles* mosquitoes.

Currently, fever (mostly due to malaria) is estimated at 52.9%.[16] This is statistically higher than the national average of 41.7% for fever morbidity. Chikwawa has a doctor population ratio of 1:119,381; nurse to population ratio of 1:5,135; and HSA to population ratio of 1:1,319.

Methods

Sample

A survey was conducted to obtain a sample of 1,400 households and 33 villages. Ten enumerators and an experienced supervisor were recruited among those that had already been involved in national surveys at the National Statistical Office in Malawi to collect data. Enumeration maps from the Malawi National Statistical office, normally used for professional national surveys such as the Demographic Health Surveys (DHS),[4] were used for sampling.

A two-stage survey methodology similar to that used in DHS was adopted to produce a district sample of households. The first stage involved sampling of villages that were strategically selected with a probability proportional to the number of enumeration areas in each traditional authority. Chikwawa has 11 traditional authorities and each traditional authority has several villages under its jurisdiction. The second sampling stage took place on the day of interviews. Households were systematically chosen. Only matriarchal figures were eligible for interviews and all other members of the households were asked to leave the interviewing premises to avoid interference.

This study used the Malawi Ministry of Health guidelines for health workers that fever without another identifiable cause should be treated as malaria if accompanied by one of the following symptoms: headache, chills, shivering, or loss of appetite.[18] To reflect this description, this study used the term 'malaria-like' (ML) instead of 'malaria'. The questionnaire was translated into the local language for easy communication.

Ethical clearance

Permission to conduct the survey was received from the Malawi National Health Sciences Research Committee (MNHSRC), the District Commissioner for Chikwawa, and traditional leaders. The MNHSRC is a national body charged with the responsibility of clearing all health-related research activities in Malawi.

Variables

Outcome variables

The distribution of outcome variables is listed in Table 1. A mother in each household was asked to mention i) the action they normally take to treat an adult who has suffered from malaria; ii) the action they normally take to treat a child suffering from malaria; iii) problems they face to reach a health facility; and iv) problems they normally face at a hospital. Responses for the first two questions were in three categories: a) those that visit or use a prescription from a health facility; b) those that use medication bought from a shop, grocery, open market or vendors, but without prescription from a health facility; c) those that use other traditional remedies (e.g. traditional medicine, or covering malaria patients with a wet cloth) or do nothing. A series of binary responses from the first two questions were formed by coding 1 if a particular mode of treatment is mentioned and 0 otherwise. This was done to investigate the pattern and risk factors associated with each mode of treatment.

Table 1: Summary measures for response variables on malaria care-seeking behaviour (n=1,398 adulthood malaria; n= 1,376 childhood malaria)

Variable	(%)
Action taken when an adult has malaria	
Visit or use medication from health facility	80.24
Use medication bought from shop/grocery/market/vendors	17.39
Use other remedies (i.e. traditional or do nothing)	2.36
Action taken when a child has malaria	
Visit or use medication from health facility	85.76
Use medication bought from shop/grocery/market/vendors	12.10
Use other remedies (i.e. traditional or do nothing)	2.15
Problems to reach hospital	
Long distance or transport costs	72.7
Too much work	6.5
Other	6.1
Problems at hospital	
Cost of medical services	12.2
Long waiting time or health workers don't show	72.7
No drugs	35.3
Other	6.6

Responses on problems faced to reach the hospital were grouped in three main categories: i) long distance or transport costs, ii) too much work, and iii) other. Responses on problems faced at the hospital were grouped into four main categories: i) cost of medical services, ii) long waiting time or health workers don't show, iii) no drugs, and iv) other.

Explanatory variables included in the models

Only variables that were significant at p≤0.25 in their independent relationship with the first two response variables were included in this

study. Four variables satisfied this requirement and these are distance to the nearest health facility, type of health facility, existence of a health surveillance assistant (HSA), and existence of transport (i.e. bicycle, motorcycle, car or ox cart.

Malawi's health service delivery system consists of community, primary, secondary and tertiary care levels.[19] In Chikwawa, health posts are administered at community (village) level where service is provided through HSAs. HSAs are tried and trusted individuals at the community (village) level and are responsible for undertaking promotive, preventive, curative and rehabilitative tasks in the promotion of the Ministry of Health Essential Healthcare Package (EHP).

Analysis and estimation

Multilevel modelling was utilised to analyse the data, with households as level 1 and communities as level 2. A series of two-level binary logistic regression models, with any action taken when a member of a household is perceived to have malaria as response variables, were constructed to test their pattern of variation and corresponding predictors. The binary regression model[20,21] was used to explain the probability of outcomes for households. If the i_{th} household from the j_{th} village had the required attribute then a response would be written:

$$y_{if} = \begin{cases} 1_{if} & i_{th}\ household\ from\ j_{th}\ community\ had\ the\ required \\ 0 & attribute\ otherwise \end{cases}$$

such that

$y_{if}\ \pi_{if} = Ber\ (\pi_{if})$ and $logit\ (\pi_{if}) = x_{if}\beta + u_{0f}$ is a random components model $i = 1,....., I_j$. households; and $j = 1,....., J$ communities, with π_{if} as the probability that i_{th} the household in the j_{th} community had the attribute. The vector β is the regression coefficient corresponding to a covariate x_{if}. Variation at the community level is modelled through u_{0f} such that $u_{0j} \sim N(0, \sigma^2_u)$.

Estimation was performed using Bayesian procedures in MLwiN 2.10 software. Initial estimates to obtain prior samples were derived using second-order penalised quasi-likelihood procedures with restricted iterative generalised least-squares.[22] Stability of all model parameters was monitored by observing the Raftery-Lewis and the Brooks-Draper mean diagnostics.[23] The maximum number of iterations performed to achieve stability was 50,000.

Results

The distribution of response variables is summarised in Table 1. Most households, 80%, either took their malaria patients to hospital or used hospital prescriptions for home treatment. Nearly one in every five households bought malaria drugs from shops, groceries, markets or vendors. Two in every 100 households used other traditional methods or did nothing. When a child was perceived to have malaria, 86% of the households visited or used medication from health facilities; only 12% bought medication without prescription and two in every 100 used traditional methods or did nothing.

The majority of respondents, 73%, cited long distance or transport costs as the main obstacle to reach their nearest health facility. A small percentage (7%) mentioned work-related activities as obstacles to accessing healthcare and a similar percentage mentioned problems such as absence of a bridge over a river or no one to watch after they had gone to hospital. Similarly, 73% mentioned prolonged waiting time and absence of health workers as the main problems at the hospital.

However, slightly more than one-third of the women cited lack of drugs, while 10 in every 100 mothers named cost of medical services as the main hitch at the hospitals. Seven in every 100 women mentioned other reasons.

Table 2: Summary measures for predictor variables included in the ML care-seeking behaviour (n= 1,398 adulthood malaria; n= 1,376 childhood malaria)

Variable	(%)
Distance to nearest health facility	
<1 km	34.7
1 km and <2km	42.4
≥2 km	22.8
Nearest hospital is CHAM*	
No	86.0
Yes	14.0
Any HSA?	
Yes	68.2
No	31.8
Any form of transport? (bicycle, motorcycle, car, or ox cart)	
Yes	57.1
No	42.9

CHAM = Christian Hospitals Association of Malawi

Predictor variables are shown in Table 2. Seven in every 10 households came from communities with an HSA, while two-thirds had a means of transport.

Three binary logistic regression models to identify predictors of care-seeking behaviour for adulthood ML symptoms are given in Table 3. Similarly, Table 4 gives three logistic regression models to identify care-seeking behaviour for childhood ML symptoms. The response variables for each group (adults and children) included a variable for those that seek medication from health facilities (hospitals), a variable for those that buy malaria drugs from shops, open markets or vendors, and another variable for those that either use traditional methods or do nothing when an adult has malaria.

Distance to the nearest hospital, CHAM hospital, and existence of an HSA were the main significant factors that affect visitation to a health facility when an adult has ML symptoms. When compared to those living within a kilometre, families living more than two kilometres away from the nearest health facility were less likely to visit that facility when they had malaria [β = -0.96; 95% CI : -1.72,-0.20] and instead opted to buy malaria drugs from shops, groceries, markets or from vendors [β = 0.98; 95% CI : 0.20,1.76]. Similarly families living in a radius of more than two kilometres away from a health facility were less likely to take their children to hospital when they had ML symptoms [β = -0.88; 95% CI : -1.52,-0.23; instead they chose to buy medication from open markets [β = 0.92; 95% CI: 0.18,1.65 respectively].

Families in areas without an HSA were less likely to visit a hospital with adulthood ML illness [β = -0.42; 95% CI : -0.69,-0.13] but chose to either buy their medication from an open market [β = 0.35; 95% CI : 0.05,0.64] or use traditional, other methods or do nothing [β = 0.81; 95% CI : 0.09,1.52]. Similarly, families in communities without an HSA were less likely to take their children to a hospital [β = -0.56; 95% CI : -0.86,-0.26]; instead they also preferred to either buy malaria drugs to treat the children

Table 3: Hierarchical binary logistic model to identify determinants of household care-seeking behaviour for adulthood ML illness in Chikwawa, Malawi, 2007

Variables	Hospital treatment		Buy		Traditional or nothing	
	β	(95% CI)	β	(95% CI)	β	(95% CI)
Distance to nearest health facility						
<1 km	(Reference group)					
1 and <2 km	-0.38	(-1.06,0.31)	0.45	(-0.26,1.15)	-0.36	(-1.31,0.60)
≥2 km	-0.96	(-1.72,-0.20)**	0.98	(0.20,1.76)**	0.28	-0.74,1.31)
Any HSA?						
Yes	(Reference group)					
No	-0.42	(-0.69,-0.13)**	0.35	(0.05,0.64)**	0.81	(0.09,1.52)**
CHAM hospital?						
No	(Reference group)					
Yes	-0.45	(-0.86,-0.04)**	0.61	(0.10,1.12)**	-0.05	(-1.18,1.08)
Any form of transport? (bicycle, motorcycle, car, or ox cart)						
No	(Reference group)					
Yes	-0.03	(-0.29,0.29)	0.15	(-0.12,0.12)	-0.67	(-1.39,1.39)*
Community effects						
$\sigma^2_{u_{0j}}$	0.50	(0.06,0.93)**	0.46	(0.04,0.88)**	0.15	(-0.38,0.68)

CI - Confidence intervals; *–$p \leq 0.10$; **–$p \leq 0.05$

Table 4: Hierarchical binary logistic regression to identify determinants of household care-seeking behaviour for childhood ML illness in Chikwawa, Malawi, 2007

Variables	Hospital treatment		Buy		Traditional or nothing	
	β	(95% CI)	β	(95% CI)	β	(95% CI)
Distance to nearest health facility						
<1 km	(Reference group)					
1 and <2 km	-0.50	(-1.08,0.08)*	0.58	(-0.06,1.21)*	-0.62	(-1.60,0.35)
≥ 2 km	-0.88	(-1.52,-0.23)**	0.92	(0.18,1.65)**	-0.09	(-0.94,1.13)
Any HSA?						
Yes	(Reference group)					
No	-0.56	(-0.86,-0.26)**	0.51	(0.20,0.82)**	0.70	(-0.04,1.44)*
CHAM Hospital?						
Yes	(Reference group)					
No	-0.71	(-1.22,-0.21)**	0.86	(0.30,1.42)**	0.50	(-0.51,1.52)
Any form of transport? (bicycle, motorcycle, car, or ox cart)						
No	(Reference group)					
Yes	0.15	(-0.14,0.43)	-0.09	(-0.39,0.39)	-0.35	(-1.09,1.09)
Community effects						
$\sigma^2_{u_{0j}}$	0.25	(-0.02,0.52)*	0.33	(-0.01,0.67)*	0.08	(-0.23,0.39)

CI - Confidence intervals; *–$p \leq 0.10$; **–$p \leq 0.05$

[β = 0.51; 95% CI : 0.20,0.82] or use traditional, other methods or do nothing [β = 0.70; 95% CI : -0.024,1.44 p = 0.06].

Members from households close to CHAM hospitals were less likely to visit the CHAM hospitals when they had ML illness [β = -0.45, 95% CI : -0.86,-0.04]. Instead they preferred to buy drugs from an open market [β = 0.61; 95% CI : 0.10,1.12] Similarly, members near CHAM hospitals were less likely to take their children to the hospitals when they had malaria [β = -0.71; 95% CI : -1.22,-0.21] but chose to use drugs bought from an open market [β = 0.86; 95% CI : 0.30,1.42].

Choice of treatment for adulthood malaria significantly varied between communities for those that visited hospitals [β = 0.50; 95% CI : 0.06,0.93] and those that bought medication from an open market [β = 0.46; 95% CI : 0.04,0.88]. However, these were only marginally significant for choice of treatment for childhood malaria [β = 0.25; 95% CI : -0.02,0.52; p <0.07 and β = 0.33; 95% CI : -0.01,0.67; p <0.06 respectively]. There was no evidence of any clustering within communities for those that chose to use other methods or do nothing for both adulthood and childhood ML illnesses, implying no significant differences between communities in those that used other methods or did nothing.

Discussion

A number of studies have looked at care-seeking behaviour for malaria, both within Malawi and in neighbouring countries.[7,9,24-27] While most of these studies analysed data from national surveys, this paper analyses survey results within a district with the aim of determining the pattern and factors associated with care-seeking behaviour specific to a district. More than 80% of households either visited or used prescriptions from hospitals to treat malaria, less than 20% used malaria medication bought from shops or markets and about 2% used other remedies. These rates are in contrast with other studies in Malawi[9,27] that calculated relatively

lower rates for those visiting hospitals or using hospital medication and relatively higher rates for those that purchased drugs from open markets. This trend may partly be attributed to the implementation of initiatives such as the Integrated Management of Childhood Illness and the EHP that, among others, seek to increase the efficiency of publicly funded health services and to improve equity of access to health services.

Currently, the recommended first-line treatment for uncomplicated malaria at health facilities is artemisinin combination therapy (ACT), which was changed from sulfadoxine-pyrimethamine (SP) approved in 1993 by the Malawi Ministry of Health and Population. Regression results show that proximity to a health facility and availability of HSAs are important in accessing this drug. Those that live furthest away from hospitals may not access hospital drugs and instead may be inclined to purchase drugs from shops if they have the financial resources. The problem with buying drugs is that they are sold without prescription (i.e. without oral advice from medical experts). The only prescription is written down on the packaging of drugs and in English. This may not be helpful in Chikwawa where almost half of the women interviewed had not attended any formal school and may be illiterate. This may result in too many drugs being prescribed to patients, inadequate doses being prescribed, expired or counterfeit drugs being purchased, or clinical guidelines not being followed or adhered to.[28] More importantly is the fact that SP is still available for home and community use through general shops throughout Malawi. However, scientific data have shown that the efficacy of SP has deteriorated.[29] This means SP may no longer be a reliable weapon against malaria due to drug resistance.

Those that live far from government health facilities and do not have resources, cannot access free recommended malaria drugs and instead may choose to use traditional or other treatment methods or even do nothing. There are limited studies on the relationship between transport and healthcare utilisation in developing countries, especially Africa. Studies that have been carried out have mainly looked at motorised

transportation and healthcare utilisation or programmes. Such studies have observed that distance and transportation are important in discussions of utilisation[30-34] and that transportation is a big factor in accessing healthcare or involvement in health programmes.[34,35] Policy implications here include the need for carefully designed research to examine rural community transportation behaviour characteristics and their relationship to healthcare utilisation and programmes in order to inform policy alternatives to address geographic barriers to healthcare in the rural communities. There is also a need to increase awareness about the dangers of purchasing drugs from non-medical and/or uncertified institutions by focusing attention on communities that rely on shops, markets or vendors to purchase drugs for those suffering with ML illness.

HSAs are responsible for teaching, monitoring, and even prescribing drugs to people in rural communities, including in their homes. In some cases they are responsible for managing healthcare centres and community health posts and are therefore directly involved in the distribution of healthcare resources, including ACT. This is reflected in the regression results. Families that did not have access to an HSA were less likely to visit hospitals, and instead were more likely to purchase drugs from the open market. This shows that those in close contact with HSAs were more likely to visit hospitals or use hospital prescriptions and were unlikely to buy drugs from an open market. Policy implications of this result are that community health committees and workers are important in health delivery. There is a need to empower them through rigorous and relevant health promotion programmes, such as refresher courses, to update both their knowledge and their skills in communication and counselling on the use and administration of drugs.

The regression results also show that families near CHAM hospitals were less likely to use hospitals and instead were more likely to buy malaria drugs from shops. Empirical data suggest that health-financing systems appear to influence patient behaviour for prescription and access to healthcare, especially some costly healthcare.[36,37] CHAM hospitals are private hospitals run on behalf of Christian organisations. They used to charge for their services, including consultation and cost of medication. In relative terms, this was more expensive for the poor communities who live off less than one US Dollar a day. However, CHAM now has a memorandum of understanding with the Government of Malawi to treat some patients for free and be reimbursed through the EHP, a minimum package of services to be provided free of charge at the point of delivery to all Malawians.[38] This change in policy has resulted in an increased number of people accessing CHAM facilities.

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