Global Pediatric Health
Volume 6: 1–9

DOI: 10.1177/2333794X19855468
journals.sagepub.com/home/gph
SAGE

Sources of Health Care Among Under-5 Malawian Children With Diarrhea Episodes: An Analysis of the 2017 Demographic and Health Survey

Peter Suwirakwenda Nyasulu, PhD[1,4], Emery Ngamasana, MSc[2], and Ngianga-Bakwin Kandala, PhD[3,4]

Abstract

Diarrhea is a leading cause of morbidity and mortality in the world but mostly in Sub-Saharan Africa. These could be prevented if universal coverage of current available interventions were implemented. The study aimed to identify factors associated with the choice of health care source among caretakers seeking treatment for under-5 children with diarrhea illness. Using women's questionnaire we extracted a subset of data of children aged 0 to 59 months from the 2017 Demographic & Health Survey. Questions regarding history of childhood diarrhea for the past 24 hours or last 2 weeks prior to the survey were key in data extraction. Caregivers were asked to report the place where they sought treatment. In this study, 4 types of health facilities were defined: public, private, pharmacies, and other unspecified sources. A multinomial logistic regression model was used to identify sources of health facility used and corresponding factors associated with the choice. Factors associated with choice of health care source included education (educated women were less likely to self-medicate their children [relative risk ration (RRR) = 0.46; 95% confidence interval (CI) = 0.22-0.94]), income (better income earning families were more likely to seek care from private facility such as pharmacy [RRR = 1.87; 95% CI = 1.14-3.09]), and rural living (those in rural areas were more likely to seek treatment from other unspecified sources [RRR = 7.33, 95% CI = 1.40-38.36]). Public health facilities (79.9%) were the main source of health care service; however, reducing under-5 mortality due to diarrhea illness would require significant efforts to address other inequalities in accessing and utilizing health care services.

Keywords

diarrhea episode, sources of healthcare, malawi, under-five children, multinomial logistic regression

Received November 1, 2018. Received revised May 13, 2019. Accepted for publication May 15, 2019.

Background

Diarrhea remains a leading cause of morbidity and mortality across all age groups and regions of the world.[1] Overall, diarrhea accounts for 1.3 million deaths in children under 5 years of age each year, representing almost 9% of the total under-5 mortality.[2] Over time, studies have shown declining trends in the under-5 mortality and diarrhea-related deaths globally since the introduction of rotavirus vaccination and other public health interventions.[3] However, the declining trend on global mortality and childhood deaths due to diarrhea hides striking disparities, with increasingly concentrated deaths in Sub-Saharan Africa[2,4] where health inequities are widespread.[4,5] Children living in impoverished areas

[1]Division of Epidemiology & Biostatistics, Department of Global Health, Faculty of Health Medicine & Health Sciences, Stellenbosch University, Cape Town, South Africa
[2]University of North Carolina at Chapel Hill, NC, USA
[3]Northumbria University, Department of Mathematics, Physics and Electrical Engineering, Faculty of Engineering and Environment, Newcastle upon Tyne, UK
[4]Division of Epidemiology & Biostatistics, School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Corresponding Author:
Peter Suwirakwenda Nyasulu, Stellenbosch University, Francie Van Zijl Drive, Tygerberg, Cape Town, Western Cape 7505, South Africa.
Email: pnyasulu@sun.ac.za

have higher morbidity and mortality from diarrhea due to unimproved water and sanitation among other causes. Other predisposing factors include nutritional risk due to suboptimal breastfeeding; zinc and vitamin A deficiencies; lack of access to health interventions such as rotavirus vaccination and lack of access to health care, which is often a cause for delayed adequate; and effective diarrhea management with simple interventions such as oral rehydration therapy.[4-7]

The majority of childhood deaths from diarrheal disease could be prevented with universal coverage of current available interventions.[4,5] Coverage, defined as the proportion of people receiving a specific intervention among those who need it, includes 2 components: (1) service provision and (2) service utilization.[8] In Malawi, the health care system has been constrained in the provision of services in recent years due to factors such as inadequate financial resources and shortage of medical personnel.[9-11] Yet, Malawi had achieved significant reduction in infant and under-5 mortality rates during the period 1990 to 2011.[12] Progress in mortality reduction has not been similar across socioeconomic strata with health inequities disfavoring the poor.[6,13] Inequities in health care utilization are quite evident in Malawi.[6,7,13] Overall, 38% of children with diarrhea do not access health facilities with 14.5% not accessing any form of treatment for diarrhea.[6] Children from the poorest households are less likely to visit a health facility and receive treatment.[5-7,13,14] Inequity in access and utilization of child health services has been highlighted as a hindering factor toward attaining the Sustainable Development Goal 3, with regard to the reduction of child mortality.[15,16]

The integrated management of childhood illness program, developed by the World Health Organization in collaboration with the United Nations Children's Emergency Fund in the 1990s, has been implemented in more than 100 countries including Malawi.[17] Under this program, health care workers were trained and resourced to systematically assess all sick children for key signs and symptoms of grave illness and provide treatment accordingly. Given the focus on this program and its implementation in Malawi as a key strategy for improving the treatment of potentially life-threatening illnesses including diarrhea, it is crucial to know where children's caretakers are seeking care when they have a life-threatening illness such as diarrhea. Such a focus is paramount in instituting effective public health interventions.

The present study sought to document factors associated with the choice for sources of health care among caretakers seeking health care services for the under-5 population with a diarrheal episode.

Methods

The 2015-2016 Demographic and Health Survey (MDHS) was conducted from October 2015 through February 2016 and sought to provide current estimates of basic health and demographic indicators of the population. The survey provided a comprehensive picture of the key social demographic and health challenges facing the Malawian population specifically focusing on maternal and child health.

The Malawian Population and Housing Census conducted in 2008 served as the sampling frame for the 2015-2016 MDHS. This consisted of a complete list of all census standard enumeration areas (SEAs) defined as a geographic area that covers an average of 235 households. Hence, the census frame contained information about the location of the SEAs, the type of residence (rural vs urban), and the estimated number of residential households. In addition, Malawi has 3 main regions (North, Central, and South) divided into 28 districts. Using information from the sampling frame, each district was stratified into rural and urban denomination, which yielded 56 sampling strata. A 2-stage sampling approach was used for the 2015-2016 MDHS.

The first stage of the survey involved a selection of 850 SEAs, including 173 SEAs in urban areas and 677 SEAs in rural areas with a probability proportional to the SEA size with independent selection in each of the sampling stratum. Within each of the selected SEAs, all households were listed; this listing served as a sampling frame for the selection of households at the second stage of the sampling process.

In the second stage of selection, a fixed number of 30 households per urban cluster and 33 per rural cluster were selected with an equal probability systematic selection from the newly created household listing. All women aged 15 to 49 years, who were either permanent residents of the selected households or visitors who stayed in the households the night before the survey, were eligible to be interviewed. In about one third of all sampled households, all men aged 15 to 54 years, including those who were usual residents and others who stayed in the household the night before the interview, were eligible for individual interview. The women's questionnaire gathered data from all eligible women, pertaining to their background characteristics, reproductive history, family planning, maternal and child health, breastfeeding and nutrition, marriage and sexual activity, fertility preferences, husbands, and background among others.

Data obtained from the women's questionnaire were used to extract a subset of data on children between ages 0 and 59 months. Women were asked whether any of their child had diarrhea in the last 24 hours or within the last 2 weeks prior to the survey. For each child with a known diarrheal episode within this timeframe, women

were requested to report the place at which medical treatment or advice was sought for the last episode of diarrhea that the child had.

Outcome Measurement

Type of health care facility sought by the caregivers as the dependent variable was defined as follows:

- Public: including government hospitals, government health centers, government health post/outreach, government mobile clinic, and government HSA
- Private: including private hospitals or clinics, private doctors, mobile clinics, private Christian Health Association of Malawi or mission hospitals, Banja La Mtsogolo, and other private medical facilities
- Pharmacies (private pharmacies, shops, and market)
- Others: traditional practitioners, MACRO (Malawi Aids Counseling and Research Organization), youth drop center, and other unspecified place of treatment or advice

We isolated pharmacies, shops, and market as a single group because research has shown that in many Sub-Saharan African countries, informal pharmacies, drug shops, and markets are important channels for health care treatment.[18,19] We wanted to test whether such assumption would hold true for children with diarrhea episode in the context of Malawi, yet we also strove to document the profile of children that were seeking care through those channels for diarrhea episode. Therefore, our dependent variable consists of 4 categories: (1) public, (2) private–non-pharmacy, (3) pharmacy, and (4) other (traditional healers, MACRO, etc).

Independent variables included the following:

- Age of the children in months (broken in 6 groups: 0-5, 6-11, 12-23, 24-35, 36-47, and 48-59) following the Malawian 2017 DHS
- Sex of the children (male and female)
- Mother's highest level of education ("0" no education, "1" primary education, and "3" secondary and higher education)
- Mother's marital status
- Wealth quintile
- Area and region of residence
- Source of drinking water for the family
- Type of toilet (flash toilet or pit latrine)

Sources of drinking water was categorized into "improved" (piped into dwelling, piped into yard/plot, piped to neighbor, public tap/standpipe, or tube to well or borehole), "unimproved" (unprotected well, unprotected spring, and river or dam or lake or ponds), other sources (rainwater, cart with small tank, and other unspecified sources), and not de jure residents. Not de jure resident children were excluded from the final model because data were collected at the household level and assigned to individuals in the data. Therefore, most of the information regarding those children were missing.

Statistical Analysis

Summary measures including weighted frequencies and percentages for categorical variables were derived from the baseline characteristics of the study population. Univariate analysis was performed to document the association between socioeconomic and demographic characteristics of the study participants with the dependent variable, health care source. A bivariate and multivariate multinomial logistic regression models were fitted and relative risk ratio (RRR) with the associated 95% confidence interval (CI) were reported to investigate the relationship between dependent variable, health care source, and covariates. Besides, with regard to P value, as stated by the American Statistical Association (https://amstat.tandfonline.com/doi/pdf/10.1080/00031305.2016.1154108?needAccess=true), practice that reduce data analysis or scientific inference to mechanical "bright-line" rules (such as $P < .05$) for justifying scientific claims or conclusion can lead to erroneous beliefs and poor decision making. It is recommended that researchers should bring many contextual factors into play to derive scientific inference including the study design, the quality of measurements, the external evidence, and the validity of the assumption that underlines data analysis. Given the fact that we did not control for many contextual factors (road infrastructures for ease of access to health facilities, level of health professional training across different health facility types, etc) we reported also any P value $<.10$). This allowed us to consider any such factors that could be further investigated, while controlling for more contextual factors and external evidence.

Ethical Approval and Informed Consent

This was not required as data were extracted directly online from the National Demographic Health Survey of Malawi.

Results

Of the 17 286 children whose guardian completed the survey, 16 548 children had valid records on diarrhea episode. Of the 16 548 valid records, 3584 children had a diarrhea

Table 1. Sociodemographic Characteristics of Study Population.

Characteristics	N (%)
Age (in months)	
0-5	1674 (10.1)
6-11	1692 (10.2)
12-23	3230 (19.5)
24-35	3261 (19.7)
36-47	3391 (20.5)
48-59	3300 (19.9)
Sex	
Male	8242 (49.8)
Female	8307 (50.2)
Education	
No education	2224 (13.4)
Primary education	10 962 (66.2)
Secondary education	3362 (20.3)
Marital status	
Never married	538 (3.25)
In union	13 891 (83.9)
Separate or divorce/widow	2119 (12.8)
Wealth quintile	
Poorest	4074 (24.6)
Poorer	3707 (22.4)
Middle	3203 (19.4)
Richer	2901 (17.5)
Richest	2663 (16.1)
Area of residence	
Urban	2212 (13.4)
Rural	14 336 (86.6)
Region	
Northern	1900 (11.5)
Central	7003 (42.3)
Southern	7645 (46.2)
Source of drinking water	
Improved	14 186 (85.7)
Unimproved	2204 (13.3)
Other[a]	158 (1.0)
Type of toilet facility	
Improved	13 422 (81.1)
Unimproved	2994 (18.1)
Not de jure resident	132 (0.8)

[a]Other source of drinking water includes other unspecified sources and not de jure resident because this represented a very small sample.

episode in the previous 24 hours or within the previous 2 weeks, representing 22% of the study population. Table 1 provides a description of the study population with regard to the sociodemographic characteristics. Children were evenly distributed in terms of sex, and more than half of the children (60.1%) were 24 months and older at the time of the interview. Two thirds of the mothers had primary education, and 13.4% had no education. Most of the mothers were married (83.9%), against 3.25% who were never married and 12.8% were divorced or separated. A very low proportion of children lived in urban areas (13.4%) while the majority lived in rural areas (86.6%). Most families had access to improved source of water (85.7%) and improved sanitation (81.1%). Most children came from families that are residents from the Southern (46.2%) and Central (42.3%) regions.

Of the 3584 children who had diarrhea in the previous 2 weeks or 24 hours prior to the survey, only 2393 (66.8%) sought treatment or advice for their diarrheal episode, while 1190 (33.2%) children did not seek treatment or advice. Of those who sought treatment or advice, 79.9% first went to a public facility, 8.7% went to a private facility, 8.2% went to pharmacies, and 3.2% went to other unspecified sources. Table 2 provides a description of the association between place of treatment and some selected sociodemographic characteristics of the children and their caretakers. Most of the children were taken to the public health facilities, regardless of their sociodemographic characteristics. However, we found that such proportions varied significantly with the mother's education, household wealth quintile, area of residence, and type of household toilet facilities. For instance, among noneducated women and those with primary education, public hospitals and pharmacy were the main sources of care for children who had diarrhea for the period under study. However, with higher education (either secondary and higher), the proportions of care seeking through pharmacy consultations is lower, in favor of private facilities (13.7% of mother with secondary education or higher went to private facilities compared with 7.5% of women with primary or no education).

Likewise, with regard to wealth quintile we found that most of the children were brought to public health facilities. However, care seeking through private sector among children in the highest wealth (20.7%) was 4 times higher than among those in the lower wealth quintile (5.7% and 5.2%, respectively, for the poorest and poor wealth quintile). The proportion of children who sought care at a given source also varied with the area of residence. Although public facility were most solicited, care seeking through private facilities was higher among urban residents (16.3%) compared with rural residents (7.5%).Table 3 presents results from the multinomial logistic regression model for the estimation of source of care as a function of select characteristics. Overall, public health facilities were the main source of care and we used this as a reference category.

In the final model, we found that the probability of selecting a given type of health care facility varied widely as a function of age and sex of the children, mother's education and marital status, area of usual

Table 2. Association Between Source of Care and Sociodemographic Characteristics[a].

Characteristics	Public (N = 1913)	Private–Non-Pharmacy (N = 208)	Pharmacy (N = 195)	Other (N = 77)	*P*
Age (in months)					
0-5	86 (79.49)	13 (12.24)	4 (3.43)	5 (4.84)	.12
6-11	392 (82.55)	30 (6.42)	47 (9.80)	6 (1.23)	
12-23	677 (81.16)	83 (9.98)	47 (5.69)	26 (3.17)	
24-35	365 (78.67)	41 (8.77)	42 (9.03)	16 (3.53)	
36-47	251 (77.48)	27 (8.17)	30 (9.25)	17 (5.11)	
48-59	141 (75.57)	14 (7.54)	26 (13.72)	6 (3.18)	
Sex					
Male	1037 (79.66)	112 (8.58)	106 (8.15)	47 (3.62)	.79
Female	876 (80.28)	97 (8.85)	89 (8.17)	29 (2.70)	
Education					
No education	185 (78.24)	18 (7.47)	23 (9.83)	10 (4.46)	.03
Primary education	1367 (80.57)	127 (7.52)	145 (8.52)	58 (4.40)	
Secondary education	361 (78.51)	63 (13.72)	27 (6.00)	8 (1.80)	
Marital status					
Never married	58 (71.37)	11 (13.07)	7 (9.02)	5 (5.91)	.17
In union	1579 (79.61)	180.5 (9.10)	158 (8.00)	66 (3.31)	
Separate or divorce/widow	277 (84.02)	17 (5.08)	30 (9.05)	6 (1.86)	
Wealth quintile					
Poorest	512 (82.87)	35 (5.7)	46 (7.51)	24 (3.95)	.001
Poorer	444 (82.05)	28 (5.16)	45 (8.32)	24 (4.46)	
Middle	364 (80.13)	38 (8.32)	45 (9.99)	7 (1.16)	
Richer	358 (82.44)	36 (8.32)	30 (6.86)	10 (2.39)	
Richest	68 (68.01)	71 (20.67)	29 (8.29)	10 (3.03)	
Area of residence					
Urban	249 (74.08)	55 (16.28)	28 (8.35)	4 (1.29)	.009
Rural	1663 (80.9)	153 (7.46)	167 (8.13)	72 (3.51)	
Region					
Northern	196 (82.56)	22 (9.20)	8 (3.51)	11 (4.73)	.38
Central	889 (79.58)	90 (8.11)	98 (8.76)	40 (3.55)	
Southern	829 (79.73)	96 (9.23)	89 (8.57)	26 (2.47)	
Source of drinking water					
Improved	1663 (80.36)	178 (8.63)	160 (7.72)	68 (3.29)	.22
Unimproved	233 (77.81)	24 (7.89)	34 (11.48)	8 (2.82)	
Other[b]	17 (70.04)	6 (25.83)	1 (4.13)	0 (0.00)	
Type of toilet facility					
Improved	1515 (79.1)	175 (9.14)	155 (8.07)	71 (3.69)	.04
Unimproved	385 (83.94)	27 (5.90)	41 (8.87)	6 (1.28)	
Not de jure resident	13 (67.98)	6 (32.02)	0 (0.00)	0 (0.00)	

[a]The table includes only children with episode of diarrhea who reported sources of care (N = 2393).
[b]Other source of drinking water includes other unspecified sources and not de jure resident because this represented a very small sample.

residence, sanitation, and source of drinking water for the household.

For instance, we found no difference in the probability of choosing a private facility over a public one, as children's age changes. However, the study shows that the likelihood of choosing pharmacy over public facilities for health care of children with diarrheal episodes was higher among children between 24 and 35 months (RRR = 2.52; 95% CI = 0.87-7.34) and children between 48 and 59 months (RRR = 2.80; 95% CI = 0.99-7.94) compared with children less than 6 months of age. The study did not show any significant differences in the choice of private facilities, pharmacies, or others over public facilities, with regard to the sex of the children.

We found that mothers with secondary education and higher were less likely (RRR = 0.46; 95% CI =

Table 3. Multinomial Logit Estimation of Choices for Health Care facility: Marginal Effects and (95% Confidence Interval).

Characteristics	Private vs Public	Pharmacy vs Public	Others vs Public
Age (in months)			
0-5	1	1	1
6-11	0.57 (0.28-1.16)	1.68 (0.57-4.97)	0.30 (0.08-1.14)
12-23	0.89 (0.46-1.73)	1.41 (0.49-4.03)	0.57 (0.18-1.84)
24-35	0.68 (0.34-1.39)	2.53 (0.87-7.34)	0.78 (0.23-2.61)
36-47	0.65 (0.31-1.39)	1.83 (0.63-5.36)	1.00 (0.29-3.47)
48-59	0.59 (0.26-1.35)	2.80 (0.99-7.94)	0.76 (0.20-2.93)
Sex			
Male	1	1	1
Female	1.01 (0.76-1.35)	0.84 (0.60-1.18)	0.91 (0.53-1.57)
Education			
No education	1	1	1
Primary education	0.72 (0.40-1.31)	0.72 (0.43-1.21)	0.74 (0.35-1.55)
Secondary education	0.89 (0.48-1.67)	0.46 (0.22-0.94)	0.60 (0.21-1.70)
Marital status			
Never married	1	1	1
In union	0.57 (0.30-1.06)	0.63 (0.28-1.41)	0.42 (0.14-1.24)
Separate or divorce/widow	0.52 (0.24-1.12)	0.74 (0.30-1.79)	0.24 (0.06-0.91)
Wealth quintile			
Poorest	1	1	1
Poorer	1.00 (0.56-1.79)	1.36 (0.28-1.41)	1.03 (0.49-2.19)
Middle	1.60 (0.91-2.78)	1.87 (1.13-3.09)	0.51 (0.21-1.27)
Richer	1.65 (0.93-2.93)	1.34 (0.75-2.38)	0.80 (0.37-1.71)
Richest	5.30 (2.82-9.94)	2.47 (1.23-4.96)	1.58 (0.60-4.14)
Area of residence			
Urban	1	1	1
Rural	2.37 (1.44-3.89)	1.28 (0.70-2.32)	7.33 (1.40-38.36)
Region			
Northern	1	1	1
Central	0.53 (0.32-0.90)	1.28 (0.70-2.32)	0.64 (0.31-1.34)
Southern	0.60 (0.36-0.98)	1.85 (0.98-3.49)	0.63 (0.29-1.37)
Source of drinking water			
Improved	1	1	1
Unimproved	1.52 (0.93-2.48)	1.70 (1.09-2.66)	1.66 (0.86-3.18)
Type of toilet facility			
Improved	1	1	1
Unimproved	0.70 (0.44-1.13)	1.03 (0.66-1.61)	0.36 (0.16-0.83)

0.22-0.94) to seek care for their children diarrheal episodes from pharmacies compared with public health facilities. A closer look at the marginal effects of education on the choice of health care facilities indicates that the likelihood of seeking care at a public health facilities increased with the level of education of the mother (see Figure 1).

In addition, the likelihood of choosing private over public health facilities was lower among married mothers (RRR = 0.57; 95% CI = 0.30-1.06) and separated or divorced ones (RRR = 0.52; 95% CI = 0.24-1.12) compared with those who had never been married. The probability of access to public facility was even 10.4% higher (ME = 10.4%; $P = .05$) for separated or divorced mothers compared with never married mothers, while other factors were held constant. The study also found that families in the upper wealth quintiles were less likely to seek care from public facilities; they tended to opt for private facilities and pharmacies. For instance, sick children from the richest income families were more likely to seek care from private health facilities (RRR = 5.30; 95% CI = 2.82-9.94) and pharmacies

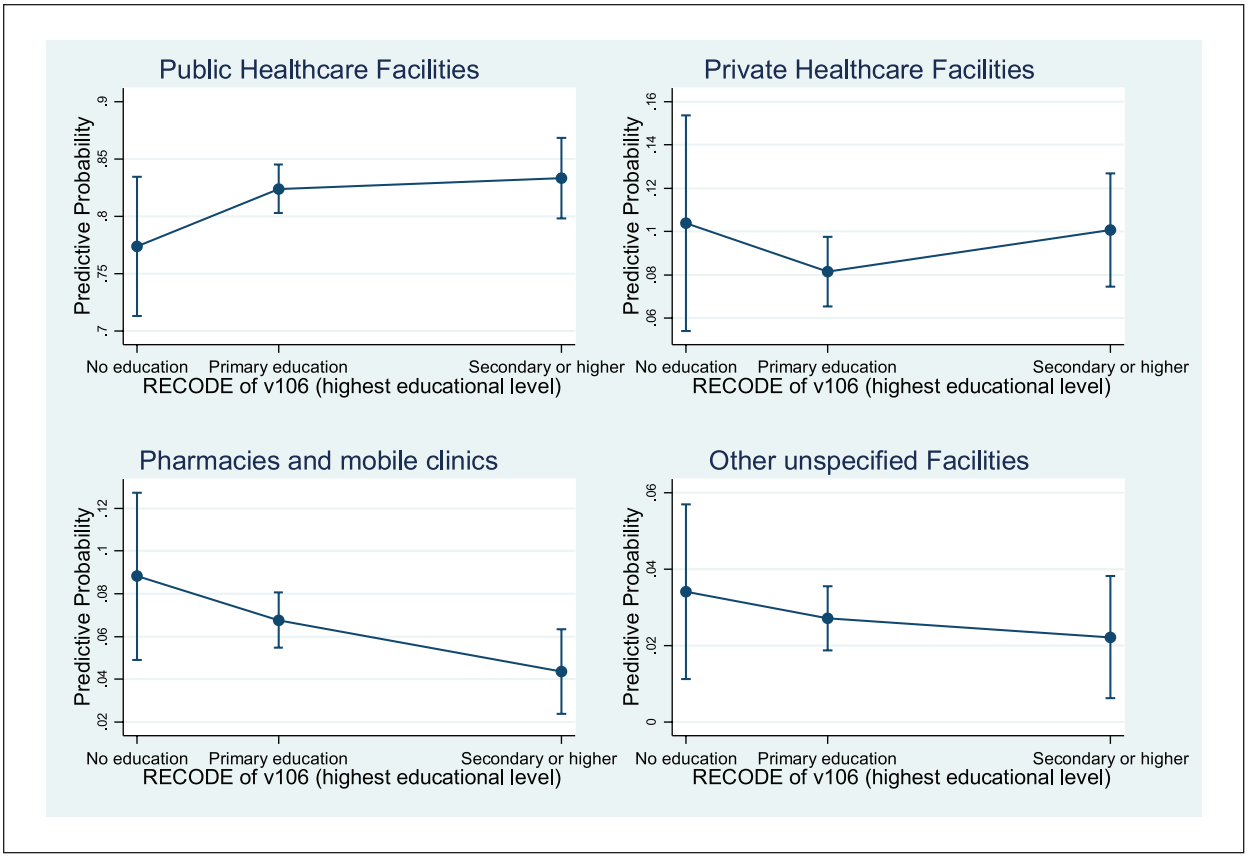

Figure 1. Selection of health care facility by mother's educational level.

(RRR = 2.47; 95% CI = 1.23-4.96) compared with public health facilities.

Residents of rural areas were more likely to seek care from private health facilities (RRR = 2.37; 95% CI = 1.44-3.89) compared with public health facilities. For instance, our study showed that the probability of seeking care from a public facility was lower for children living in a rural area (ME = 8.6%; $P = .001$) compared with children living in an urban area. Accordingly, we found that children in the rural area were 5.1% more likely (ME = 0.051; $P = .001$) to seek care from a private facility compared with children in the urban area, while other variables in the model are kept constant. Finally, we found that for children living in a family that is getting water from other an unimproved source, they were more likely to seek care from private clinics (RRR = 1.70; 95% CI = 1.09-2.66) compared with public facilities.

Discussion

Our study aimed to elucidate our understanding of factors associated with the choice and sources of health care services among those seeking care for the under-5 children with diarrheal episode. The study found that diarrhea is still prevalent among the under-5 Malawian population. Actually, this study found that 22% of the under-5 Malawian population had diarrhea within the 24 hours or in the 2 weeks preceding the survey. This prevalence of diarrhea is 4% higher than the 2010 estimates, which was 18%, thereby suggesting that there is a persistent environmental vulnerability to diarrhea among the under-5 children. This reinforces the need to ensure availability as well as improved access to health care services for the under-5 population in Malawi. Efforts to improve access and provision of services have contributed to increase the proportions of children seeking treatment or advice for diarrheal episode, which has resulted in a 4.7% (38% in 2010 to 33.3% in 2016) decline in the proportion of children who did not seek treatment or advice during their diarrheal episode, compared with previous reports in 2010.[6]

In line with other previous studies, our study suggests that financial resources heavily dictate the choice of health care facility as shown by the household wealth index. Children from well-resourced families tend to be consistently seeking care from private facilities, while

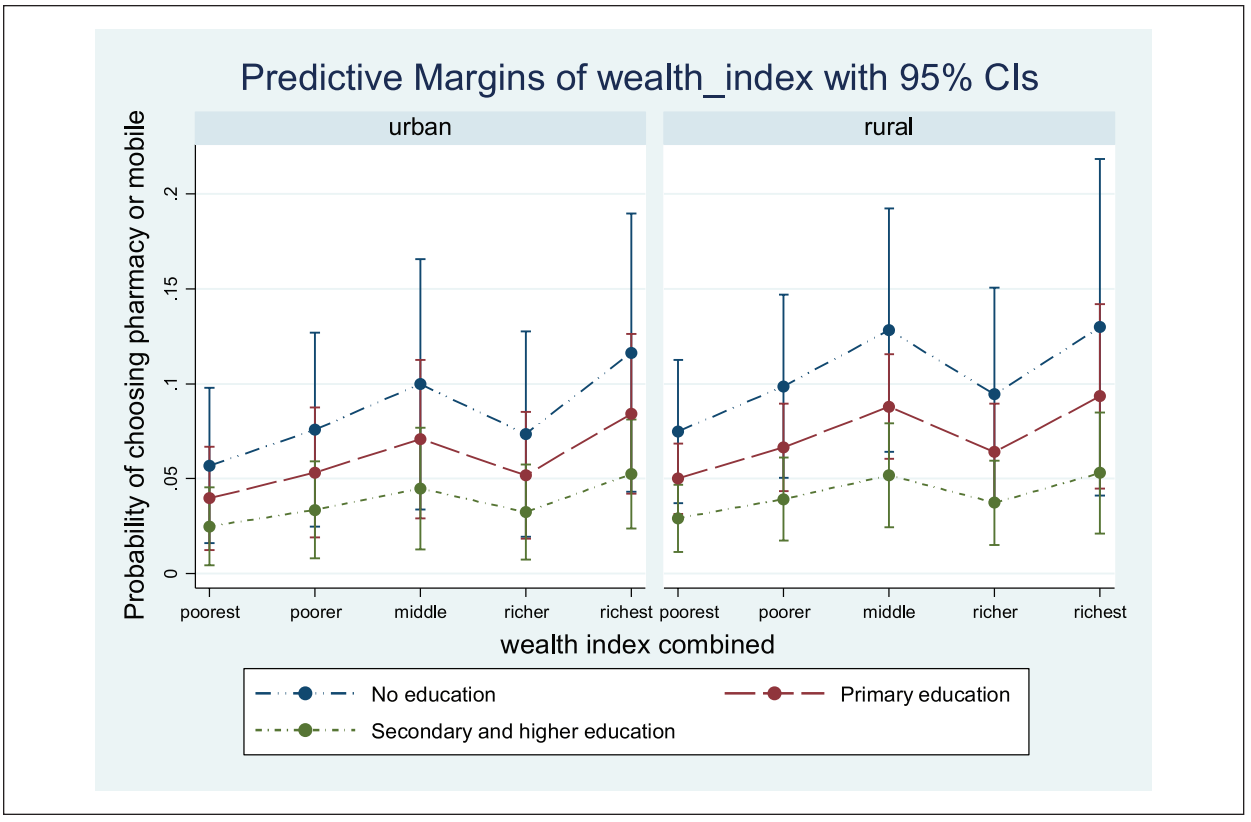

Figure 2. Selection of pharmacies and mobile clinics by mothers' education, residence and wealth.

children from lower resourced families showed preponderance to self-medication, hence pharmacies were a common choice of health care for them.[9,10] This important finding highlights the need to expand interventions targeting hard to reach populations, which are more inclined to seek care from the grass roots sources. The reduction in under-5 diarrhea mortality, as observed in some parts of the country, could be due to introduction of the rotavirus vaccination and the use of oral rehydration salts.[3,4] However, children with diarrhea seeking care through pharmacies and other unspecified sources may not have the chance to access rotavirus vaccine or oral rehydration salts putting such children at an increased risk for severe diseases and death. This is worrying considering that more than 86% of the children live in rural areas where access to health care is difficult and mainly through private facilities (RRR = 2.37; 95% CI = 1.44-3.89). This preference for private facilities in rural areas should be considered in a context of limited access to other services, such as immunizations. Besides, this is particularly alarming, given other access barriers such as the higher cost of transportation and distance to access those private facilities in a rural area.[20]

On the other hand, our study showed that as mother's education shifts toward higher education, their children with episodes of diarrhea tend to be less likely to undergo self-medication. Instead, they are more likely to be taken to public hospitals or private hospitals. This finding highlights the important role of education in improving maternal and child health outcomes, especially in those living in rural areas. As shown in Figure 2, children from richer households living in rural areas are more likely to seek care from pharmacies and mobile clinics, when their mothers are less educated, compared with more educated and poor mothers living in rural areas. This suggests that education could mitigate the risk of poor management of diarrheal episodes even if the family is poor and living in rural areas.

Conclusion

Diarrhea is still prevalent among under-5 children living in Malawi and more children are seeking treatment for diarrheal episode. Public facilities are playing a key role in providing health care for under-5 children with diarrheal episode. However, we found that sociodemographic factors significantly influence caregivers on the

choice of utilization of health care services for their under-5 children with diarrhea. Poorer families are more likely to resort to the grassroots health care sources, putting their kids at higher risk for severe disease or death.

Author Contributions

Conceived and designed the study: PN EM. Analyzed the data: EM. Wrote the paper PN EM NK. Reviewed the paper for intellectual content and approved the final version: PN EM NK.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported through the DELTAS Africa Initiative SSACAB [grant #DEL-15-005]. The DELTAS Africa Initiative is an independent funding scheme of the African Academy of Sciences (AAS)'s Alliance for Accelerating Excellence in Science in Africa (AESA) and supported by the New Partnership for Africa's Development Planning and Coordinating Agency (NEPAD Agency) with funding from the Wellcome Trust [grant #107754/Z/15/Z] and the UK government. The views expressed in this publication are those of the author(s) and not necessarily those of AAS, NEPAD Agency, Wellcome Trust or the UK government.

ORCID iD

Peter Suwirakwenda Nyasulu https://orcid.org/0000-0003-2757-0663

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