Household Socioeconomic Status and Health Care Demand for Childhood Fever and Diarrhea in Tanzania

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Abstract
This study uses 2015/16 Tanzania Demographic and Health Survey (TDHS) data to estimate determinants of treatment seeking for childhood illness and the choice of health provider by employing logistic and multinomial probit model, respectively. Our empirical results from Binary logistic regression results show that treatment seeking for childhood illness is significantly related with mother's occupation, household wealth status, distance to the health facilities, child's age and place of residence. On the other hand, multinomial probit model results show that the choice of health provider is significantly related with mother's occupation and access to mass media, household health insurance, household wealth status, and distance to the health facilities. Our results from both logistic and multinomial probit estimations are robust to alternative models' specifications. In terms of policy implication, this study strongly recommends promotion of health insurance as well as creation of awareness on maternal and reproductive health to mothers. Moreover, the government should enhance, strengthen and ensure that health facilities are constructed close to households' domicile and that these health facilities are provided with adequate services.

Keywords: Child health, Fever, Diarrhea, Tanzania, Demographic and Health Survey
JEL Classification Codes: I12, R22, C10

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1. Introduction

This study explores the effect of household's socioeconomic status on demand for health care and the Choice of health care providers for Childhood Fever and Diarrhea in Tanzania. Available data indicate that cases of under-five mortality rate in Tanzania has, in the recent past, decreased to 74 deaths per 1000 live births in 2015/16 from 141 deaths per 1000 live births in 1990, yet children continue to suffer mostly from fever, diarrhea and acute respiratory infection (NBS and ICF Macro, 2016). It is indisputable that fever and diarrhea are preventable diseases, and that these diseases are inextricably linked to socioeconomic status of the family and community. In addition, the choice of the healthcare provider is influenced by costs consideration, among other factors. Indeed, the question that this study seeks to address remains largely under-researched by academics and policy makers alike.

On the other hand, in order to prescribe appropriate policy intervention that could help to eradicate children's illness and mortality, we need to thoroughly understand socioeconomic factors which determine treatment seeking and choices of health care providers. Of course, this study is not entirely new, and therefore, it fully acknowledges previous empirical works that have been done both in Tanzania and elsewhere (See, for example, Pantaleo and Temba, 2019). However, this study differs from previous studies in that it brings on board both diarrhea and fever whereby we empirically examine socioeconomic determinants of seeking for treatment and the choice of health facilities. To the best of our knowledge there is no study in Tanzania which has attempted to identify determinants of choice of health care facilities using a national representative sample for both rural and urban residents.

In terms of empirical strategy, we use 2015/16 Tanzania Demographic and Health Survey (TDHS), logistic and multinomial probit models in order to address the objectives of this study. Our empirical results from logistic regression model show that treatment seeking for childhood illness is significantly linked with mother's occupation, household wealth status, distance to the health facilities, child's age and place of residence. On the other hand, multinomial probit model estimates show that the choice of health provider is significantly associated with mother's occupation and access to mass media, household having health insurance, household wealth status, and distance to the health facilities. This study recommends promotion of health insurance as well as creation of awareness on maternal and reproductive health to mother. Also, the government should ensure that health facilities are close to households' residence and that latter are provided with adequate health services.

The remainder of this study is organized as follows. Section 2 reviews both theoretical and empirical literature. Section 3 presents the methodology of this study. While section 4 reports empirical results, section 5 checks robustness of our results. Section 6 discusses the results and finally, section 7 concludes.

2. A Review of Theoretical and Empirical Literature

This study adopted the Grossman health capital model (Grossman, 1972). The Grossmann Model asserts that "an individual health is durable capital stock that produces an output of health time, but depreciate with time and therefore investment in health is needed for good health as age increases" (Grossman, 1972). Inborn health needs to be supplemented with other health inputs (medical care) which increase utility in health, but these inputs are constrained by resources

(Grossman, 1972; Wagstaff, 1986). Put it differently, Grossman Model suggests that the demand for healthcare is influenced by economic factors such as income, price and other socioeconomic factors.

On the empirical front, numerous studies in developing countries have attempted to examine driving factors behind treatment seeking and choice of health providers for childhood illness. For instance, a mother with high education level is more likely to seek for hospital treatment for childhood illness (Kahabuka, Kvale and Hinderaker, 2013; Adeoti and Awoniyi, 2014; Adedokun *et al.*, 2017; Woldeamanuel, 2020). Equally, a mother with high education is more likely to choose hospital treatment over traditional treatment (Kazembe, Appleton and Kleinschmidt, 2007; Aremu *et al.*, 2011). Further, household wealth status is highly associated with demand for health services (Ali and Noman, 2013; Adedokun *et al.*, 2017; Arthur, 2019; Woldeamanuel, 2020). Moreover, wealth status of the household affects the choice of health treatment facilities.

Indeed, employed mother are likely to seek treatment for childhood illness (Adeoti and Awoniyi, 2014; Arthur, 2019; Woldeamanuel, 2020). Employed mother are less likely to choose traditional or self-medication (Aremu *et al.*, 2011; Arthur, 2014, 2019). In addition to that, mother residing in urban area are more likely to demand health care for their child illness compared to their counterpart in rural area (Kazembe, Appleton and Kleinschmidt, 2007; Kahabuka, Kvale and Hinderaker, 2013). Mother residing in rural area are more likely to choose tradition/self-medication but those with health insurance are more likely to use government facilities (Arthur, 2014).

Distance to the health facility has also been identified to be associated with demand for health services (Ali and Noman, 2013; Adedokun *et al.*, 2017; Arthur, 2019). In addition, having health insurance increases the probability of seeking treatment for childhood (Arthur, 2019). Moreover, increase in child birth order and age decreases the likelihood of seeking health care for childhood illness (Kanté *et al.*, 2015; Arthur, 2019). On the other hand, increase in mother age increases the likelihood of seeking for health care for child with illness (Woldeamanuel, 2020). Exposure to mass media increases seeking for health care services (Adedokun *et al.*, 2017; Woldeamanuel, 2020).

Although much has been done empirically to explore socioeconomic factors which determine treatment seeking for health facilities as well as the choices of health care provider, our study differs from previous studies in that it takes into account both diarrhea and fever. Indeed, to the best of our knowledge, this is the first study that has attempted to examine the determinants of treatment seeking for health facilities and choice of health facilities using a national representative sample for both rural and urban residents.

3. Methodology

3.1 Data and sample

The study uses 2015/2016 Tanzania Demographic and Health Survey (TDHS) data. The TDHS records information on socioeconomic, demographic, environmental, and health characteristics of households by interviewing women aged 15-49 years, men aged 15-59 years, and collecting information of children under-5 years. Detailed survey methodology and sampling techniques are

provided in the main reports (NBS and ICF Macro, 2016). The study at hand adapted the analytical cross-sectional design by focusing on data of children under age of five years who had fever or diarrhea and whose mother either reported that they sought for treatment or not. Since the focus is on children who were reported to have fever or diarrhea, estimates are based on the sample of 1,861 and 1,257 under-five age children who had fever and diarrhea two weeks prior to the survey, respectively. Moreover, the choice of treatment facilities is based on mothers who reported that they sought for treatment only. Therefore, estimates on the choice of treatment facilities is based on the sample of 1,539 and 880 under age of five children whose treatments were sought from either home remedies, public, or private health facilities.

3.2 Econometric Models

This study is guided by the Grossman Health Capital Model alluded in the literature review section. The treatment seeking and choice of treatment facilities are both determined by socioeconomic factors of the family and child characteristics. The determinants of treatment seeking are estimated by using the logistic regression model. The logistic model can be expressed as follows:

$$Pr(TS_i = 1) = p_i = \frac{e^{-(X\beta)}}{1 + e^{-(X\beta)}} = \frac{1}{1 + e^{-(X\beta)}} \quad (1)$$

where:

p_i indicates the probability of seeking for treatment for fever and diarrhea illness; TS is a dichotomous variable, coded as $TS = 1$ if treatment was sought for fever or diarrhea morbidity; X is the set of explanatory variables which includes social and economic status of the family and child specific characteristics; and β are the estimated regression coefficients. Using logarithmic transformation in equation (1), we obtain the logit function written as follows:

$$ln\left(\frac{p_i}{1 - p_i}\right) = X\beta \quad (2)$$

Therefore, the empirical model used for estimation is specified as follows:

$$\begin{aligned} lnTSF_i = {} & \beta_0 + \beta_1 OCCUP_i + \beta_2 HI_i + \beta_3 WQ_i + \beta_4 EDUC_i + \beta_5 CBO_i + \beta_6 CHILDSEX_i \\ & + \beta_7 RESIDENCE_i + \beta_8 DM_i + \beta_9 MARITAL_i + \beta_{10} DISTANCE_i \\ & + \beta_{11} MOTHERAGE_i + \beta_{12} CHILDAGE_i + \beta_{13} SEXHEAD_i \\ & + \beta_{14} MEDIACCESS_i \\ & + \varepsilon_i \end{aligned} \quad (3)$$

where:

$lnTSF$ is the log of odds of treatment seeking for fever illness; $OCCUP$=Occupation of the mother; HI=health insurance ownership by the household; WQ=Wealth Quintiles;$EDUC$ = Education level of the mother; CBO=Child birth order; $RESIDENCE$=Place of residence; DM=Decision making on child health; $MARITAL$=Marital status of the mother; $DISTANCE$=Distance to the health facility; $MOTHERAGE$=Mother's age; $CHILDAGE$=child's age; $SEXHEAD$=sex of the head of household; $MEDIACCESS$=media access by the mother; and ε is the stochastic term.

Moreover, the same logit model specification is used to examine the determinant of seeking for treatment for diarrhea morbidity, specified as follows:

$$lnTSD_i = \beta_0 + \beta_1 OCCUP_i + \beta_2 HI_i + \beta_3 WQ_i + \beta_4 EDUC_i + \beta_5 CBO_i + \beta_6 CHILDSEX_i + \beta_7 RESIDENCE_i + \beta_8 DM_i + \beta_9 MARITAL_i + \beta_{10} DISTANCE_i + \beta_{11} MOTHERAGE_i + \beta_{12} CHILDAGE_i + \beta_{13} SEXHEAD_i + \beta_{14} MEDIACCESS_i + \varepsilon_i \quad (4)$$

Where:
$lnTSD$ is the log of odds of seeking treatment for childhood diarrhea illness. On the other hand, determinants of choice of healthcare facilities, are estimated by using *Multinomial Probit Model* (MNP). The MNP was chosen because of the categorical nature of the dependent variable (i.e. the choice from home remedies, private and public health facilities). The following equations are estimated in order to determine choice of treatment facilities by mother who sought treatment for childhood fever (equation 5) and diarrhea (equation 6).

$$CHF_i = \beta_0 + \beta_1 OCCUP_i + \beta_2 HI_i + \beta_3 WQ_i + \beta_4 EDUC_i + \beta_5 CBO_i + \beta_6 CHILDSEX_i + \beta_7 RESIDENCE_i + \beta_8 DM_i + \beta_9 MARITAL_i + \beta_{10} DISTANCE_i + \beta_{11} MOTHERAGE_i + \beta_{12} CHILDAGE_i + \beta_{13} SEXHEAD_i + \beta_{14} MEDIACCESS_i + \varepsilon_i \quad (5)$$

$$CHD_i = \beta_0 + \beta_1 OCCUP_i + \beta_2 HI_i + \beta_3 WQ_i + \beta_4 EDUC_i + \beta_5 CBO_i + \beta_6 CHILDSEX_i + \beta_7 RESIDENCE_i + \beta_8 DM_i + \beta_9 MARITAL_i + \beta_{10} DISTANCE_i + \beta_{11} MOTHERAGE_i + \beta_{12} CHILDAGE_i + \beta_{13} SEXHEAD_i + \beta_{14} MEDIACCESS_i + \varepsilon_i \quad (6)$$

Where, CHF and CHD are the choice of health facility for treatment of fever and diarrhea illness, respectively from home remedies, public or private health facilities.

3.3 Measurement of Variables

Treatment seeking for childhood fever and diarrhea illness is coded as 1 if respondent reported that treatment was sought for fever or diarrhea and 0 if treatment was not sought. On the other hand, choice of healthcare facility for fever and diarrhea illness, is categorical with home remedies, public or private health facilities. The treatment and choice of treatment facilities stands as a substitute to the demand of child healthcare.

The independent variables used include socioeconomic factors that determine treatment seeking and choice of health facility. Mother's occupation was categorized into not working, professional, self-employed, and manual working. Seeking for health treatment and choice of health facilities for childhood fever and diarrhea illness are expected to be positively affected if the mother works. Also, choice of health provider is also expected to be positively affected if mother works. Health insurance consists of respondents with and those without health insurance. We expect health insurance to positively affect health seeking and choice of the health facility as this reduces possibility of out of pocket expenditure to get service.

Mother's education is expected to positively affect health seeking and choice of health facility as education raises awareness of the mother. Also, decision making about child health was categorized into: mother alone, husband/partner alone, both mother and husband/partner, and someone else. We expect that mutual decision making on child's health would positively affect health seeking and choice of health facility.

Mother's marital status was categorized into either married or not. Married couples are expected to seek for health services and chooses health facilities because there is high possibility of mutual decisions on child's health compared to unmarried couples. Further, distance to the health facility if it is a problem was coded 1 and 0 if it was not a problem. We expected this to negatively affect health seeking and choice of health facility since long distance to the health facilities have cost implication on accessing the service due to travel costs. In addition, age of the mother was categorized into; 15 – 24 years, 25 – 34 years, and 35 – 49 years. This is expected to positively affect both health seeking and choice of health facility when the child is sick. This could be due to the increased experience that a mother might have accumulated towards child illness.

In addition, access to media was coded 1 if mother had access to media and 0 if had no access at all. This is expected to positively affect health seeking and choice of health facility during childhood illness as it raises awareness of the mother on childhood diseases and its related risks. Sex of the head of household was coded 1 if female and 0 if male. This is expected to positively affect health seeking and choice of health facility. This is because mothers are responsible in taking care of the child. Moreover, child characteristics included are child's sex which is coded 1 if female and 0 if male. Household wealth index calculated by including household assets and other wealth facilities by Principal Component Analysis (Montgomery *et al.*, 2000; Sahn and Stifel, 2003; Filmer and Pritchett, 2011) was included. This is expected to affect positively both health seeking and choice of health facilities.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 reports descriptive statistics. The numbers of mother in different occupations are observed to be similar in the two groups. Also, more mothers reside in rural areas, and only 25% and 31% live in urban area for child with fever and diarrhea, respectively. Distribution of the sex of the child is 51% female and 49% male for mother with child who had fever. On the other hand, about 50% of female child had diarrhea. In addition, 41% comprises mother aged 25-34 years (for fever) and 15-24 years (for diarrhea). Also, about 80% of the parents with children who had fever seek for appropriate treatment for their children either in public, private, and other health facilities. On the other hand, about 70% mother who had diarrhea seek for the appropriate health care for their child.

Table 1: Descriptive statistics of variables

	Fever				Diarrhea			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Occupation of the mother								
Not working	0.1682	0.3741	0	1	0.1718	0.3774	0	1
Professional	0.0312	0.1738	0	1	0.0342	0.1818	0	1
Self employed	0.5320	0.4991	0	1	0.5219	0.4997	0	1
Manual	0.2687	0.4434	0	1	0.2721	0.4452	0	1
Health Insurance	0.0645	0.2457	0	1	0.0597	0.2370	0	1
Wealth quintile of the household								
Poorest	0.1972	0.3980	0	1	0.1710	0.3767	0	1
Poorer	0.2133	0.4098	0	1	0.2100	0.4075	0	1
Middle	0.1891	0.3917	0	1	0.1877	0.3907	0	1
Richer	0.2080	0.4060	0	1	0.2339	0.4235	0	1
Richest	0.1924	0.3943	0	1	0.1973	0.3981	0	1
Mother's education	5.8125	3.6669	0	16	5.9594	3.6103	0	15
Child birth order	3.5830	2.5791	1	17	3.2721	2.4451	1	12
Female child	0.4868	0.5000	0	1	0.5020	0.5002	0	1
Urban residence	0.2515	0.4340	0	1	0.2959	0.4566	0	1
Decision making on child health								
Woman alone	0.2456	0.4305	0	1	0.2458	0.4307	0	1
Husband alone	0.1478	0.3550	0	1	0.1583	0.3652	0	1
Mother and husband	0.5685	0.4954	0	1	0.5625	0.4963	0	1
Someone else	0.0365	0.1877	0	1	0.0318	0.1756	0	1
Married mother	0.6373	0.4809	0	1	0.5847	0.4930	0	1
Distance to health facility a problem	0.4578	0.4984	0	1	0.4479	0.4975	0	1
Mother's age								
15-24 years	0.3278	0.4695	0	1	0.4041	0.4909	0	1
25-34 years	0.4095	0.4919	0	1	0.3858	0.4870	0	1
35-49 years	0.2628	0.4403	0	1	0.2100	0.4075	0	1
Child age	25.9189	15.6748	0	59	21.0485	13.2216	0	59
Female household head	0.1875	0.3904	0	1	0.1870	0.3900	0	1
Mother media access	0.8227	0.3820	0	1	0.8298	0.3760	0	1
Number of Observations		1,861				1,257		

Source: Author's computation from the DHS data (NBS and ICF Macro, 2016)

4.2 Factors for treatment seeking for childhood fever illness

Table 2 column 1 presents treatment seeking for childhood fever illness. Treatment seeking for childhood fever was significantly associated with mother's occupation, marital status and age, household wealth status, distance to the health facility and child's age. The odds of treatment seeking for childhood fever is 3.2 times higher among children whose mothers are professionally employed than children whose mothers' are not working. Moreover, children whose mothers are self-employed odds of seeking treatment for fever is 1.9 times higher than children whose mothers are not working. Further, the odds of seeking treatment for childhood fever were about 50% higher among children from richer households compared to their counterpart from poorest households. Also, mother whose distance to the health facility is a problem are 0.722 less likely to seek treatment for childhood fever compared to mother whose distance to the health facility is not a problem. There was observed decrease in odds of seeking for treatment for childhood fever as age of the child increases.

4.3 Factors for treatment seeking for childhood diarrhea illness

Table 2 column 2 presents treatment seeking for childhood diarrhea illness. Seeking for treatment for childhood diarrhea was significantly associated with occupation of the mother, household wealth status, place of residence, distance to the health facility and child's age. Compared to non-working mother, mother who work professionally, self-employed and manual have high odds of seeking health treatment by 2.25, 2.79, and 1.89 times for childhood diarrhea. Also, mother from middle wealth status households are 50% more likely to seek for treatment for childhood diarrhea compared to children from poorest household. Moreover, odds of seeking for treatment of childhood diarrhea among urban residence is 1.6 times higher compared to their rural counterpart. Children whose mother said distance to the health facility as problem are less likely to seek for treatment of childhood diarrhea illness. Similarly, children increase in age is associated with decreased odds of seeking for treatment of childhood diarrhea.

Table 2: Estimated Odds Ratio from Logistic Regression and OLS Coefficient of LPM for Determinants of Demand for Health Services for Childhood Fever and Diarrhea

	Odds ratio		LPM	
	(1)	(2)	(3)	(4)
Variables	Fever	Diarrhea	Fever	Diarrhea
Occupation of the mother (Not working)				
Professional	3.156*	2.252*	0.0962**	0.164**
	(2.046)	(0.968)	(0.0429)	(0.0808)
Self employed	1.875***	1.791***	0.0901***	0.125***
	(0.367)	(0.334)	(0.0298)	(0.0412)
Manual	1.155	1.888***	0.0203	0.134***
	(0.226)	(0.365)	(0.0289)	(0.0416)
Health insurance	1.191	1.347	0.0172	0.0583
	(0.382)	(0.374)	(0.0326)	(0.0525)
Wealth index of the household (Poorest)				
Poorer	1.047	1.318	0.00907	0.0598
	(0.192)	(0.264)	(0.0297)	(0.0431)
Middle	1.308	1.519*	0.0410	0.0852*
	(0.268)	(0.329)	(0.0307)	(0.0447)
Richer	1.548*	0.981	0.0637**	-0.00129
	(0.350)	(0.223)	(0.0324)	(0.0493)
Richest	1.292	0.932	0.0402	-0.0110
	(0.368)	(0.275)	(0.0413)	(0.0615)
Mother's education	1.030	0.996	0.00412	-0.000556
	(0.0205)	(0.0222)	(0.00289)	(0.00463)
Child birth order	0.939	1.007	-0.00804	0.00131
	(0.0389)	(0.0423)	(0.00573)	(0.00884)
Female child	1.161	0.937	0.0198	-0.0131
	(0.146)	(0.120)	(0.0175)	(0.0262)
Urban household	1.283	1.615**	0.0339	0.0956**
	(0.253)	(0.312)	(0.0249)	(0.0382)
Decision maker on child health care (mother alone)				
Husband alone	1.165	1.022	0.0195	0.00561
	(0.249)	(0.225)	(0.0305)	(0.0432)
Mother and partner	1.073	0.847	0.00881	-0.0326

	Odds ratio		LPM	
	(1)	(2)	(3)	(4)
Variables	Fever	Diarrhea	Fever	Diarrhea
	(0.177)	(0.148)	(0.0233)	(0.0351)
Someone else	1.981	0.556	0.0879*	-0.122
	(0.840)	(0.207)	(0.0468)	(0.0832)
Mother married	1.300*	1.158	0.0382*	0.0301
	(0.186)	(0.167)	(0.0211)	(0.0299)
Distance is a problem	0.722**	0.802*	-0.0456**	-0.0456*
	(0.0940)	(0.105)	(0.0185)	(0.0270)
Age of the mother (15-24 years)				
25-34 years	1.143	0.895	0.0165	-0.0216
	(0.201)	(0.154)	(0.0252)	(0.0353)
35-49 years	2.031**	0.707	0.0906**	-0.0706
	(0.592)	(0.194)	(0.0369)	(0.0574)
Child age	0.991**	0.991*	-0.00133**	-0.00181*
	(0.00425)	(0.00494)	(0.000613)	(0.00106)
Female head of household	1.059	0.886	0.00767	-0.0240
	(0.185)	(0.155)	(0.0242)	(0.0362)
Media access	1.250	1.091	0.0342	0.0180
	(0.206)	(0.198)	(0.0267)	(0.0383)
Constant	1.919*	1.641	0.685***	0.615***
	(0.680)	(0.564)	(0.0543)	(0.0737)
Observations	1,861	1,257	1,861	1,257
R-squared			0.032	0.030

***Notes*:** Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

4.4 Choice of Treatment for Childhood Fever Illness

Table 3 column 1 and 2 shows choices of treatment for childhood fever illness. The choice of treatment was between home remedies, public and private health facilities. Results show that, mother who are professional employed are less likely to choose public health facilities for treatment of childhood fever over home remedies. Moreover, mother who are self-employed are less likely to seek for treatment from public and private health facilities for treatment of childhood fever illness over home remedies. Further, mother who do manual work are less likely to choose public health facilities over home remedies in the treatment of fever. In addition, household with health insurance chooses public health facilities over home remedies in the treatment of fever. Compared child from poorest household, child from richer and richest households chooses private health facilities over home remedies. Also, increase in child's birth order is associated with decrease in the choice of public health facilities compared to home remedies. Further, child from households residing in urban areas chooses private health facilities over home remedies in the treatment of fever. In addition, compared to decision making made by mother alone, decision making made by husband alone is associated with a decrease in the choice of public health facilities over home remedies. Moreover, compared to unmarried mother, married mother chooses public health facilities over home remedies in the treatment of fever. Also, mothers who responded distance to be a problem are less likely to choose public and private health facilities for childhood fever illness treatment over home remedies. Female headed households are less likely to choose public health facilities over home remedies in the treatment of childhood fever compared to their counterpart male headed households.

4.5 Choice of treatment for childhood diarrhea illness

Table 3 column 3 and 4 shows choice of treatment for childhood diarrhea illness. The choice of treatment was between home remedies, public and private health facilities. Compared to non-working mother, professional employed mother is less likely to choose public health facilities over home remedies in the treatment of childhood diarrhea. Moreover, self-employed mother is less likely to choose public and private health facilities over home remedies in the treatment of childhood diarrhea. Households with health insurance choose public health facilities for treatment of diarrhea over home remedies compared to households with no health insurance. Poorer and middle wealth status households choose public health facilities over home remedies in the treatment of childhood compared to poorest households. In addition, richer households choose public and private health facilities in the treatment of diarrhea over home remedies. Further, child from richest households chooses private health facilities over home remedies in the treatment of diarrhea. Compared to decision on child's health made by mother alone, decision by someone else chooses private health facilities over home remedies in the treatment of childhood diarrhea. Distance to the health facilities being a problem reduces choice of public health facilities over home remedies in the treatment of diarrhea. Mother chooses private health facilities over home remedies as child's age increases in the treatment of diarrhea. Lastly, mother with access to mass media chooses private health facilities over home remedies compared to their counterpart with no access to mass media in the treatment of childhood diarrhea illness.

Table 3: Multinomial Probit Regression Results for Choice of Health Provider with Home Remedies as Comparison a Group

	Fever		Diarrhea	
	(1)	(2)	(3)	(4)
Variables	Public	Private	Public	Private
Occupation of the mother (Not working)				
Professional	-0.713**	-0.143	-0.684*	0.375
	(0.322)	(0.330)	(0.405)	(0.433)
Self employed	-0.723***	-0.808***	-0.500**	-1.046***
	(0.159)	(0.203)	(0.201)	(0.290)
Manual	-0.297*	-0.185	-0.109	-0.203
	(0.159)	(0.186)	(0.206)	(0.262)
Health insurance	0.676***	0.363	0.888***	0.560
	(0.207)	(0.251)	(0.287)	(0.357)
Wealth index of the household (Poorest)				
Poorer	0.144	0.297	0.724***	-0.0251
	(0.149)	(0.268)	(0.208)	(0.451)
Middle	0.244	0.426	0.787***	0.522
	(0.159)	(0.264)	(0.215)	(0.378)
Richer	0.165	0.716***	0.488**	0.653*
	(0.173)	(0.258)	(0.238)	(0.380)
Richest	-0.317	1.138***	0.376	0.972**
	(0.231)	(0.302)	(0.299)	(0.447)
Mother's education	0.0155	0.0251	0.0283	0.0571
	(0.0162)	(0.0219)	(0.0222)	(0.0353)
Child birth order	-0.0528*	-0.0381	0.0259	0.0729
	(0.0308)	(0.0456)	(0.0429)	(0.0647)
Female child	-0.00475	-0.190	0.0246	0.153
	(0.0958)	(0.126)	(0.128)	(0.186)
Urban household	0.123	0.321*	-0.0701	-0.341
	(0.150)	(0.168)	(0.190)	(0.275)
Decision maker on child health care (mother alone)				
Husband alone	-0.360**	-0.0811	0.119	0.112
	(0.162)	(0.241)	(0.208)	(0.310)
Mother and partner	-0.0552	0.270	-0.0689	-0.0210
	(0.128)	(0.173)	(0.169)	(0.233)
Someone else	0.169	0.380	0.678	0.892*
	(0.271)	(0.337)	(0.425)	(0.532)
Mother married	0.186*	0.202	0.141	-0.105
	(0.111)	(0.150)	(0.143)	(0.220)
Distance is a problem	-0.344***	-0.272**	-0.214*	-0.166

	Fever		Diarrhea	
	(1)	(2)	(3)	(4)
Variables	Public	Private	Public	Private
	(0.0997)	(0.133)	(0.130)	(0.195)
Age of the mother (15-24 years)				
25-34 years	-0.113	-0.229	0.0348	0.0955
	(0.135)	(0.176)	(0.169)	(0.254)
35-49 years	0.287	-0.157	-0.256	-0.717
	(0.203)	(0.276)	(0.283)	(0.441)
Child age	-0.00233	0.00413	0.00618	0.0147**
	(0.00326)	(0.00422)	(0.00515)	(0.00714)
Female head of household	-0.298**	0.107	0.0821	0.145
	(0.135)	(0.170)	(0.178)	(0.228)
Media access	0.197	0.463*	0.255	1.131**
	(0.136)	(0.242)	(0.183)	(0.470)
Constant	0.640**	-1.701***	-0.609*	-2.969***
	(0.291)	(0.419)	(0.359)	(0.794)
Observations	1,539	1,539	880	880

***Notes*:** Values are coefficients, with robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

5. Robustness check

Next, we run a robustness test just to see how our results are susceptible to alternative model specifications. First, we undertake robustness test by estimating a linear probability model (LPM) as logistic model could suffer from unobserved heterogeneity, to see if there will be significant changes to our estimates. Similarly, in order to check whether our estimates of demand for health facilities could differ for rural and urban residence bias, we estimated a multinomial logit for each. This differs from the previous estimate where we estimated a pooled sample including both rural and urban residence. Robustness check on the decision to seek for child treatment is as shown on Table 2 (column 3 and 4). We observe that significance and sign of estimates are robust to logistic estimation. On the other hand, robustness test on choice of health facilities from private or public health facilities compared to home treatment shows that results are similar for rural and urban residence.

Table 4: Multinomial Probit Regression Results for Choice of Health Provider: Rural versus Urban

	Fever				Diarrhea			
	Urban		Rural		Urban		Rural	
Variables	Public	Private	Public	Private	Public	Private	Public	Private
Occupation of the mother (not working)								
Professional	-0.764	-0.764	-0.632	-0.0596	0.478	1.940*	-1.268**	-0.430
	(0.644)	(0.607)	(0.455)	(0.511)	(0.885)	(1.097)	(0.546)	(0.578)
Self employed	-0.743	-1.906**	-0.864***	-0.576**	-0.418	-1.330	-0.639**	-1.221***
	(0.460)	(0.792)	(0.192)	(0.267)	(0.516)	(0.949)	(0.255)	(0.384)
Manual	-0.327	-0.896**	-0.411*	0.189	0.121	-0.512	-0.0842	-0.300
	(0.344)	(0.394)	(0.213)	(0.279)	(0.389)	(0.599)	(0.290)	(0.397)
Health insurance	0.0461	0.225	0.987***	0.265	-0.676	0.761	1.726***	0.606
	(0.526)	(0.577)	(0.256)	(0.369)	(0.623)	(0.825)	(0.429)	(0.554)
Wealth index of the household (Poorest)								
Poorer	-0.0992	-0.0571	0.139	0.287	4.844***	17.51***	0.590***	-0.441
	(0.807)	(0.982)	(0.155)	(0.268)	(1.512)	(1.561)	(0.216)	(0.506)
Middle	0.664	14.51***	0.200	0.384	1.836	15.99***	0.826***	0.384
	(0.699)	(1.004)	(0.167)	(0.279)	(1.366)	(1.309)	(0.227)	(0.387)
Richer	-0.185	13.90***	0.209	0.919***	2.360*	14.45***	0.378	0.516
	(0.587)	(0.763)	(0.193)	(0.280)	(1.231)	(0.985)	(0.277)	(0.384)
Richest	-0.114	15.52***	-0.679**	0.606	1.777	15.33***	-0.0829	0.734
	(0.617)	(0.732)	(0.320)	(0.408)	(1.224)	(0.998)	(0.449)	(0.585)
Mother's education	0.0427	0.0108	0.0109	0.0415	0.173**	0.134	0.00754	0.0968**
	(0.0528)	(0.0608)	(0.0181)	(0.0254)	(0.0694)	(0.108)	(0.0260)	(0.0466)
Child birth order	-0.0283	-0.289*	-0.0772**	0.00108	-0.150	0.378	0.0662	0.0702
	(0.0840)	(0.147)	(0.0352)	(0.0564)	(0.109)	(0.234)	(0.0512)	(0.0849)
Female child	0.233	0.169	-0.0439	-0.341**	0.357	0.275	-0.0292	0.157
	(0.263)	(0.321)	(0.111)	(0.159)	(0.311)	(0.457)	(0.156)	(0.258)
Decision maker on child health care (mother alone)								
Husband alone	-0.498	-0.547	-0.412**	0.0289	1.779***	3.330***	-0.271	-1.310**
	(0.472)	(0.620)	(0.186)	(0.326)	(0.683)	(0.894)	(0.251)	(0.614)
mother and partner	-0.473	-0.664	-0.0124	0.542**	0.603	0.657	-0.314	-0.175
	(0.350)	(0.428)	(0.149)	(0.234)	(0.411)	(0.722)	(0.211)	(0.322)
Someone else	16.45***	15.96***	-0.321	0.554	15.96***	16.64***	-0.422	0.118
	(0.491)	(0.626)	(0.320)	(0.460)	(0.558)	(0.786)	(0.598)	(0.969)
Mother married	0.717**	0.201	0.0514	0.426**	0.102	-0.722	0.120	-0.0350
	(0.303)	(0.360)	(0.128)	(0.205)	(0.406)	(0.579)	(0.175)	(0.327)
Distance is a problem	-0.0553	-0.356	-0.431***	-0.237	0.560*	0.589	-0.440***	-0.463*
	(0.283)	(0.343)	(0.113)	(0.160)	(0.339)	(0.544)	(0.159)	(0.268)
Age of the mother (15-24 years)								
25-34 years	-0.309	-0.134	-0.0539	-0.289	0.492	-0.226	-0.0802	0.121

	Fever				Diarrhea			
	Urban		Rural		Urban		Rural	
Variables	Public	Private	Public	Private	Public	Private	Public	Private
	(0.344)	(0.421)	(0.158)	(0.229)	(0.377)	(0.633)	(0.213)	(0.365)
35-49 years	0.169	-0.00670	0.408*	-0.110	-0.146	-1.797	-0.390	-0.900
	(0.508)	(0.628)	(0.242)	(0.375)	(0.653)	(1.184)	(0.359)	(0.707)
Child age	0.0125	0.0315***	-0.00496	-0.00404	0.00867	0.0479***	0.00850	0.0166*
	(0.00964)	(0.0111)	(0.00374)	(0.00526)	(0.0118)	(0.0174)	(0.00638)	(0.00978)
Female head of household	-0.0347	-0.0621	-0.435***	0.246	0.456	-0.242	0.00318	0.629**
	(0.355)	(0.409)	(0.164)	(0.220)	(0.423)	(0.640)	(0.221)	(0.296)
Media access	0.137	14.59***	0.170	0.222	1.036	17.50***	0.160	0.909*
	(0.478)	(0.561)	(0.145)	(0.248)	(0.664)	(1.882)	(0.203)	(0.519)
Constant	0.0594	-28.61***	1.094***	-2.047***	-4.997***	-36.62***	-0.0139	-2.507***
	(0.877)	(1.129)	(0.338)	(0.496)	(1.777)	(2.762)	(0.418)	(0.926)
Observations	403	403	1,136	1,136	272	272	608	608

***Notes*:** Values are coefficients, with robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

6. Discussion

The study finding indicates a significant association between treatment seeking for childhood fever and occupation of the mother, household wealth status, marital status of the mother, distance to the health facilities, age of the mother and age of the child. Similarly, treatment seeking for childhood diarrhea is significantly associated with occupation of the mother, household wealth status, place of residence of the household, distance to the health facility and child's age.

Table 2 indicates that treatment seeking for childhood fever is significantly associated with mother's working status. Thus, working mother has high odds of seeking treatment for childhood fever and diarrhea. Specifically, mothers who are professional and self-employed have high odds of seeking treatment for childhood fever and diarrhea compared to a non-working mother. Moreover, mother who do manual work have high odds of seeking treatment for childhood diarrhea compared to non-working mother. Similarly, previous studies have found a significant and positive association between mother working status and demand for healthcare (Mao, Saint and Nit, 2013; Arthur, 2019). Odds of seeking treatment for childhood fever is higher among child from richer households compared to the child from poorest family. Further, odds of seeking treatment for of childhood diarrhea is higher aiming children from middle wealth status compared to the poorest. This is consistent with findings from previous studies which found a positive relationship between treatment seeking and wealth status of the household (Nonvignon *et al.*, 2010; Ayalneh, Fetene and Lee, 2017).

Odds of seeking treatment for childhood diarrhea is higher for children from households residing in urban area compared to their rural counterpart. This is consistent with finding from other studies in Ethiopia (Gedamu, 2017; Girma *et al.*, 2018; Woldeamanuel, 2020). Married mothers have higher odds of seeking for treatment for childhood diarrhea compared to unmarried one. This signifies the importance of having a partner who can provide support on child health issues. This agrees with findings from previous study (Arthur, 2019). Distance to the health facilities being a problem decreases odds of seeking childhood treatment for childhood fever and diarrhea, respectively. This implies that, the problem of distance to the health facility being a problem decreases mother's likelihood of seeking treatment for child fever illness. This could be attributed by transport and time costs one has to incur in travelling to the health facilities from their home. Compared to child whose mother are aged 15-24, child whose mother are aged 35-49 years have higher odds of seeking treatment for childhood fever. This contradicts with findings from the previous studies (Sarker *et al.*, 2016; Ayalneh, Fetene and Lee, 2017; Woldeamanuel, 2020). Lastly, child's age increase reduces the odds of seeking treatment for childhood fever and diarrhea illness. This is in line with findings from previous study (Arthur, 2019).

Moreover, Table 3 shows determinants of choices of health facilities among children whose treatment were sought from public and private health facilities compared to home remedies. Mother occupation is significantly associated with decreases in the likelihood of utilizing public and private health facilities compared to home remedies. Specifically, professional workers and self-employed mothers are less likely to choose public health facilities over home remedies for treatment of childhood fever and diarrhea. Further, mother who are self-employed are less likely to choose private health facilities over home remedies for treatment of diarrhea. This could be explained by the fact that working mother may be occupied and may have less time available to

spend at health facilities and in most cases may opt for home remedies to childhood morbidity. This concurs with findings from previous studies (Arthur, 2019).

Household with health insurance chooses public health facilities over home remedies. This could be attributed by the fact, with health insurance, mother avoid out of pocket spending to get treatment for childhood fever and diarrhea illness. Results are in corroboration with previous studies on health insurance and use of health facilities (Nonvignon *et al.*, 2010; Arthur, 2014). Also, choice of health facility is influenced by wealth status of the household. Specifically, mother from rich households chooses private health facilities for treatment of childhood fever and diarrhea. This could be explained by purchasing power of the health services that richer and richest households have compared to poorest households. This is consistent with findings from previous studies (Anyanwu, 2007; Nonvignon *et al.*, 2010).

Mother who said distance to the health facilities is a problem, are less likely to choose public and private health facilities over home remedies. This could be attributed by the cost implication resulting from transport cost and time that is needed to access health facilities. This is in line with findings from previous studies (Arif, 2004; Filmer, 2005).

7. Conclusion

The prevalence of preventable disease which put under five age children at risk of dying before their fifth birth year is about 18% and 12% for fever and diarrhea, respectively in Tanzania. Further, it has been reported that about 20% and 30% received no treatment for childhood fever and diarrhea, respectively. Mother occupation, household wealth status, distance to the health facility, and child's age are significantly associated with seeking for treatment of childhood fever and diarrhea illness. Moreover, mother marital status and age are significantly associated with seeking treatment for childhood fever only whilst urban household residence is also significantly associated with seeking treatment for diarrhea illness. On the other hand, choice of public and private health facilities over home remedies for treatment of childhood fever and diarrhea is determined by occupation of the mother, health insurance, household wealth status, distance to the health facility and mother access to mass media.

These findings underscore numerous policy implications. First, it is important to ensure that mothers are well educated on child health, maternal and reproductive health. Second, there is a need for government to ensure that more health facilities are close to people's residences and that these facilities are equipped with essential medicine as well as equipment. Third, it is important for households to be empowered economically in order to augment their purchasing power of health services. And lastly, economic empowerment should go in tandem with health insurance which is significantly associated with utilization of healthcare facilities.

8. References

Adedokun, S. T. *et al.* (2017) 'Contextual factors associated with health care service utilization for children with acute childhood illnesses in Nigeria', *PLoS ONE*, 12(3), pp. 1–14.

Adeoti, A. . and Awoniyi, O. . (2014) 'Demand for health care services and child health status in Nigeria- A Control Function Approach', *African Research Review*, 8(1), pp. 273–301.

Ali, K. J. and Noman, A. N. K. (2013) 'Determinants of demand for health care in Bangladesh : An Econometric analysis', *World Journal of Social Sciences*, 3(6), pp. 153–163.

Anyanwu, J. C. (2007) 'Demand for health care institutions' services: Evidence from malaria fever treatment in Nigeria', *African Development Review*, 19(2), pp. 304–334.

Aremu, O. *et al.* (2011) 'Socio-economic determinants in selecting childhood diarrhoea treatment options in Sub- Saharan Africa : A multilevel model', *Italian Journal of Pediatrics*, 37(13), pp. 1–8.

Arif, G. M. (2004) 'Child health and poverty in Pakistan', *Pakistan Development Review*, 43(3), pp. 211–238.

Arthur, E. (2014) 'Socioeconomic correlates and the choice of treatment for childhood fever in Ghana', *African Population Studies*, 28(2), pp. 946–955.

Arthur, E. (2019) 'The effect of household socioeconomic status on the demand for child health care services', *African Development Review*, 31(1), pp. 87–98.

Ayalneh, A. A., Fetene, D. M. and Lee, T. J. (2017) 'Inequalities in health care utilization for common childhood illnesses in Ethiopia: Evidence from the 2011 Ethiopian Demographic and Health Survey', *International Journal for Equity in Health*. International Journal for Equity in Health, 16(1), pp. 1–9.

Bradley, R. H. and Corwyn, R. F. (2002) 'Socioeconomic status and child development', *Annual Review of Psychology*, 53(1), pp. 371–399.

Filmer, D. (2005) 'Fever and its treatment among the more and less poor in sub-Saharan Africa', *Health Policy and Planning*, 20(6), pp. 337–346.

Filmer, D. and Pritchett, L. (2011) 'Estimating wealth effects without expenditure data-or tears : an application to educational enrollments in states of India', *Demography*, 38(1), pp. 115–132.

Gedamu, G. (2017) 'Magnitude and Associated Factors of Diarrhea among Under Five Children in Farta Wereda ', *Quality in Primary Care*, 25(4), pp. 199–207.

Girma, M. *et al.* (2018) 'Determinants of childhood diarrhea in west Gojjam, northwest Ethiopia: A case control study', *Pan African Medical Journal*, 30(234), pp. 1–11.

Grossman, M. (1972) 'On the concept of health capital and the demand for health', *Journal of Political Economy*, 80(2), pp. 223–255.

Kahabuka, C., Kvale, G. and Hinderaker, S. G. (2013) 'Care-seeking and management of common childhood illnesses in Tanzania– Results from the 2010 Demographic and Health Survey', *PLoS ONE*, 8(3), pp. 1–9.

Kanté, A. M. *et al.* (2015) 'Childhood illness prevalence and health seeking behavior patterns in rural Tanzania', *BMC Public Health*. BMC Public Health, 15(1), pp. 1–12.

Kazembe, L. N., Appleton, C. C. and Kleinschmidt, I. (2007) 'Choice of treatment for fever at household level in Malawi: examining spatial patterns', *Malaria Journal*, 6(40).

Mao, B., Saint, L. and Nit, S. (2013) *Factors associated with utilization of health services for childhood diarrhea and fever in Cambodia: Further analysis of the Cambodia Demographic and Health Survey. Phnom Penh, Cambodia*.

Montgomery, M. R. *et al.* (2000) 'Measuring living standards with proxy variables', *Demography*, 37(2), pp. 155–174.

Mugo, M. G. (2012) 'Impact of parental socioeconomic status on child health outcomes in Kenya', *African Development Review*, 24(4), pp. 342–357.

Nattey, C., Masanja, H. and Klipstein-Grobusch, K. (2013) 'Relationship between household socio-economic status and under-five mortality in Rufiji DSS, Tanzania.', *Global health action*, 6(2), pp. 49–56.

NBS (2014) 'Household Budget Survey Main Report, 2011/12', *National Bureau of Statistics, United Republic of Tanzania*.

NBS and ICF Macro (2016) *Tanzania demographic and health Survey and malaria indicator survey 2015-2016*. Dar es Salaam, Tanzania.

Nonvignon, J. *et al.* (2010) 'Treatment choices for fevers in children under-five years in a rural Ghanaian district', *Malaria Journal*, 9(1), pp. 1–8.

Olaniyan, O. and Sunkanmi, O. A. (2012) 'Demand for child healthcare in Nigeria', *Global Journal of Health Science*, 4(6), pp. 129–140.

Pantaleo, I and Temba, G (2019) "Socio-Economic Determinants of Diarrheal Morbidity among Children in Tanzania" *African Journal of Economic Review,* Volume VII, Issue 2, pp. 147-164

Roser, M., Ritchie, H. and Dadonaite, B. (2020) *Child and Infant Mortality - Our World in Data*. Available at: https://ourworldindata.org/child-mortality (Accessed: 8 March 2020).

Sahn, D. E. and Stifel, D. (2003) 'Exploring alternative measures of welfare in the absence of expenditure data', *Review of Income and Wealth*, 49(4), pp. 463–489.

Sarker, A. R. *et al.* (2016) 'Prevalence and health care–seeking behavior for childhood diarrheal disease in Bangladesh', *Global Pediatric Health*, 3(2016), pp. 1–12.

Troeger, C. *et al.* (2018) 'Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016', *The Lancet Infectious Diseases*, 18(11), pp. 1211–1228.

UN (2015) *Transforming our world: the 2030 Agenda for Sustainable Development*. Available at: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.

URT (2018) *Tanzania Human Development Report 2017: Social policy in the context of economic transformation*. Available at: http://www.esrf.or.tz/docs/thdr2017launch.pdf.

URT (2019) *Household budget survey 2017-18: Key indicators report*. Available at: https://www.nbs.go.tz/nbs/takwimu/hbs/2017_18_HBS_Key_Indicators_Report_Engl.pdf

Wagstaff, A. (1986) 'The demand for health: A simplified Grossman Model', *Bulletin of Economic Research*, 38(1), pp. 93–95.

WHO (2007) *Combating waterborne disease at the household level*. Available at: https://www.who.int/household_water/advocacy/combating_disease.pdf.

Woldeamanuel, B. T. (2020) 'Trends and factors associated with healthcare utilization for childhood diarrhea and fever in Ethiopia : Further analysis of the Demographic and Health Surveys from 2000 to 2016', *Journal of Environmental and Public Health*, 2020, pp. 1–16.